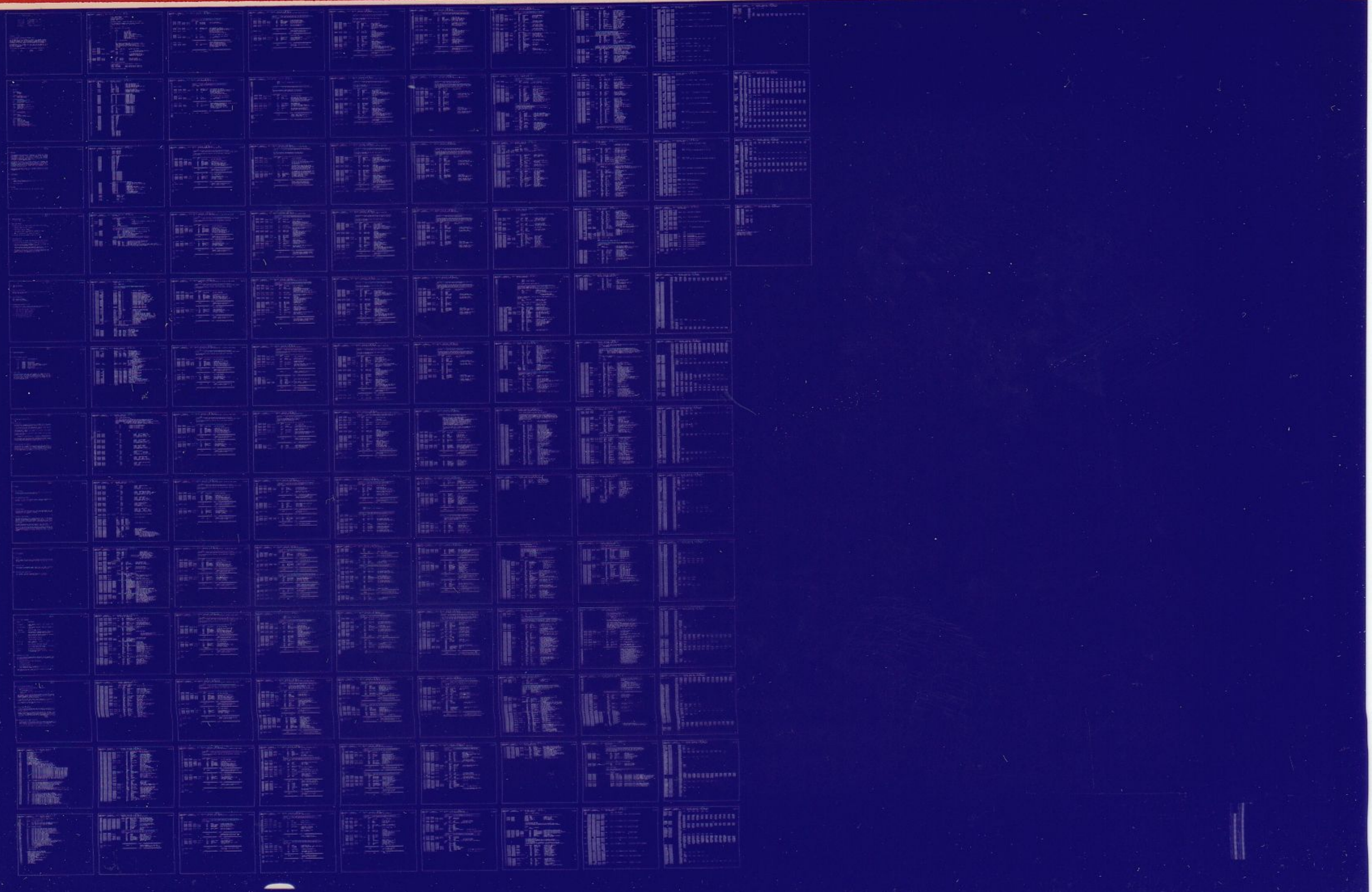
MINC-11

MNCKW DIAGNOSTIC
CVMNCB0

AH-B092B-MC

FICHE 1 OF 1

DEC 1978
digital
MADE IN USA



IDENTIFICATION

PRODUCT CODE: AC-B091B-MC

PRODUCT NAME: CVMNCB0 MNCKW DIAG (CLOCK)

DATE CREATED: AUGUST 1978

MAINTAINER: DIAGNOSTIC ENGINEERING

table of contents

1.0 abstract

this program allows the user to check-out or debug the mnckw 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 mnckw could inject signals on st2, st1, or slave in inputs, it must be disconnected.

even though the mnckw is a q bus option, this program was designed to run on any pdp-11 family computer. if the user is unfamiliar with an lsi-11 he should review sections 8.4 and 8.5. a software switch register is included with this program. it can be used on an lsi-11 or by cpu's that have hardware switch registers, see section 8.6.

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) an i/o terminal (la36, vt100, etc.)
2. mnckw under test.

2.2 storage

this program occupies and uses only the lower 8k of memory.

3.0 loading procedure

3.1 paper tape method

standard 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 (* 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 rydp based method

standard procedure for normal xxdp operation should be followed.

1. ensure that the diagnostic disk is installed in drive 0.
2. boot the disk by typing ''173000g'' if in the micro-code odt state or cycling the power ''on-off'' switch.
3. upon successful booting, the diagnostic monitor will identify itself and inform the operator of selectable options.
4. the operator should type ''r mncb'' followed by depressing the ''return'' key. this operation will load the diagnostic into memory and start the program at location 200.

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 program
204 restart of program
210 tester starting address

4.3 program and/or operator action

the operator must type a single test indicator character followed by a "return". the following characters are used:

l = logic test with no dwarf connected.

d = logic test with dwarf connected.

b = base or vector address changes.

g = get new switch register value.

h = help operator and retype this list.

5.0 operating procedure

5.1 switch register function

swr bit	octal	function when set
15	100000	halt on error
14	040000	loop on test
13	020000	inhibit error typeout
12	010000	inhibit sizing the number of mnckw's
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

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 mnckw's to exercise, one pass will exercise all mnckw's.

the program will report the number of mnckw's found before starting the logic test.

at end of pass when all units have been tested, the following typeout will occur:

```
''endpass 12 - total errors 4    ;bad units 0000000000000100
```

this indicates that the program has completed 10 decimal passes. during that time 4 decimal 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 mnckw it detects on the system. to inhibit this feature, set switch register bit 12 or set bit 15 of location ''$envm''. also, to test an individual mnckw in a group, set this bit and refer to section 3.2 for changing the base address of the mnckw 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.

6.2 non-standard error halts

any halt in the trap catcher area locations 000000-001000, indicates time-out or illegal instruction hardware trap.

7.0 restrictions

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 signals while the diagnostic is running.

7.2 possible program "bombs"

the first two tests of this program check to see if the mnckw responds to the address the program thinks its at. if the mnckw does not respond, a bus error occurs. also bus errors can occur during the time the program sizes to see how many mnckw's are on your system.

for more information on the next subject, see jan. 1976 lsi-11 engieering 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 rewrite 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 (logic test)

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 loation 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 commands 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 tester starting address

a special starting address has been provided for manufacturing to use to inform the program that the clock module is cabled to an in-house tester.

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 the tester. switches 1 and 3 of s2 (on the clock module) should be on, all other switches on s2 should be off.

8.8 logic test with a dwarf connected

more complete testing of the clocks i/o signals can be made if a dwarf module is connected to the clock. if you do this, select "d" to run the logic test with the dwarf tests enabled.

a series of instructions will be typed out for you to follow.

```
                                .TITLE  CVMNC-B MNCKW  DIAGNOSTIC
                                ;*COPYRIGHT (C) 1978
                                ;*DIGITAL EQUIPMENT CORP.
                                ;*MAYNARD, MASS. 01754
                                ;*
                                ;*PROGRAM BY EDWARD C. BADGER AND SUBMITTED BY R. SHOOP
                                ;*
                                ;*THIS PROGRAM WAS ASSEMBLED USING THE PDP-11 MAINDEC SYSMAC
                                ;*PACKAGE (MAINDEC-11-DZQAC-C3), JAN 19, 1977.
                                ;*
                        000001  $TN=1

                                .SBTTL  OPERATIONAL SWITCH SETTINGS
                                ;*
                                ;*      SWITCH                  USE
                                ;*      ------          --------------------
                                ;*        15            HALT ON ERROR
                                ;*        14            LOOP ON TEST
                                ;*        13            INHIBIT ERROR TYPEOUTS
                                ;*        12            INHIBIT SIZING THE # OF MNCKW'S
                                ;*        11            INHIBIT ITERATIONS
                                ;*        10            ENABLE LINE FREQUENCY RATE TESTING
                                ;*         9            LOOP ON ERROR
                                ;*         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  021316  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  001530                  JMP     @#START         ;MAX. OF 8 UNITS
000204  000137  001550                  JMP     @#RESTRT        ;RESTART ADDRESS
000210  000137  001506                  JMP     TESTER          ;TESTER STARTING ADDRESS

                                .SBTTL  BASIC DEFINITIONS

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

                                ;*MISCELLANEOUS DEFINITIONS
```

```
(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
```

```
                                                        D  2
    (1)                         .EQUIV  SW03,SW3
    (1)                         .EQUIV  SW02,SW2
    (1)                         .EQUIV  SW01,SW1
    (1)                         .EQUIV  SW00,SW0
    (1)
    (1)                         ;*DATA BIT DEFINITIONS (BIT00 TO BIT15)
    (1)         100000          BIT15=  100000
    (1)         040000          BIT14=  40000
    (1)         020000          BIT13=  20000
    (1)         010000          BIT12=  10000
    (1)         004000          BIT11=  4000
    (1)         002000          BIT10=  2000
    (1)         001000          BIT09=  1000
    (1)         000400          BIT08=  400
    (1)         000200          BIT07=  200
    (1)         000100          BIT06=  100
    (1)         000040          BIT05=  40
    (1)         000020          BIT04=  20
    (1)         000010          BIT03=  10
    (1)         000004          BIT02=  4
    (1)         000002          BIT01=  2
    (1)         000001          BIT00=  1
    (1)                         .EQUIV  BIT09,BIT9
    (1)                         .EQUIV  BIT08,BIT8
    (1)                         .EQUIV  BIT07,BIT7
    (1)                         .EQUIV  BIT06,BIT6
    (1)                         .EQUIV  BIT05,BIT5
    (1)                         .EQUIV  BIT04,BIT4
    (1)                         .EQUIV  BIT03,BIT3
    (1)                         .EQUIV  BIT02,BIT2
    (1)                         .EQUIV  BIT01,BIT1
    (1)                         .EQUIV  BIT00,BIT0
    (1)
    (1)                         ;*BASIC ''CPU'' TRAP VECTOR ADDRESSES
    (1)         000004          ERRVEC= 4               ;;TIME OUT AND OTHER ERRORS
    (1)         000010          RESVEC= 10              ;;RESERVED AND ILLEGAL INSTRUCTIONS
    (1)         000014          TBITVEC=14              ;;''T'' BIT
    (1)         000014          TRTVEC= 14              ;;TRACE TRAP
    (1)         000014          BPTVEC= 14              ;;BREAKPOINT TRAP (BPT)
    (1)         000020          IOTVEC= 20              ;;INPUT/OUTPUT TRAP (IOT) **SCOPE**
    (1)         000024          PWRVEC= 24              ;;POWER FAIL
    (1)         000030          EMTVEC= 30              ;;EMULATOR TRAP (EMT) **ERROR**
    (1)         000034          TRAPVEC=34              ;;''TRAP'' TRAP
    (1)         000060          TKVEC=  60              ;;TTY KEYBOARD VECTOR
    (1)         000064          TPVEC=  64              ;;TTY PRINTER VECTOR
    (1)         000240          PIRQVEC=240             ;;PROGRAM INTERRUPT REQUEST VECTOR
 5653
 5654           171020                  ABASE=  171020
 5655           000440                  AVECT1= 440
 5656           000200                  APRIOR= 200
 5657
 5658           167400                  $SWR=   167400
 5659           000001                  $TN=    1
 5660
 5661                        .SBTTL  ACT11 HOOKS
  (1)
```

```
(2)                                ;;*****************************************************************
(1)                                ;HOOKS REQUIRED BY ACT11
(1)           000214                       $SVPC=.                    ;SAVE PC
(1)           000046                       .=46
(1)    000046 014704                       $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)           000214                       .=$SVPC                    ;; RESTORE PC
5662          001000                       .=1000
5663                               .SBTTL  APT PARAMETER BLOCK
(1)
(2)                                ;;*****************************************************************
(1)                                ;SET LOCATIONS 24 AND 44 AS REQUIRED FOR APT
(2)                                ;;*****************************************************************
(1)           001000                       .$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 000012               $TSTM:  .WORD   10.      ;;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)
```

```
5664                                    .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  ;;H 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  171020                 $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
```

```
  (1)                                   .SBTTL  ERROR POINTER TABLE
  (1)
  (1)                                   ;*THIS TABLE CONTAINS THE INFORMATION FOR EACH ERROR THAT CAN OCCUR.
  (1)                                   ;*THE INFORMATION IS OBTAINED BY USING THE INDEX NUMBER FOUND IN
  (1)                                   ;*LOCATION $ITEMB. THIS NUMBER INDICATES WHICH ITEM IN THE TABLE IS PERTINENT.
  (1)                                   ;*NOTE1:        IF $ITEMB IS 0 THE ONLY PERTINENT DATA IS ($ERRPC).
  (1)                                   ;*NOTE2:        EACH ITEM IN THE TABLE CONTAINS 4 POINTERS EXPLAINED AS FOLLOWS:
  (1)
  (1)                                   ;*      EM              ;;POINTS TO THE ERROR MESSAGE
  (1)                                   ;*      DH              ;;POINTS TO THE DATA HEADER
  (1)                                   ;*      DT              ;;POINTS TO THE DATA
  (1)                                   ;*      DF              ;;POINTS TO THE DATA FORMAT
  (1)
  (1)
  (1)  001256                           $ERRTB:
 5665
 5670                                   ;ITEM   1
 5671  001256  021662                          EM1                     ;CLOCK   SR FUNCTION ERROR
 5672  001260  022604                          DH1                     ;ERRPC   ASR     WAS     S/B
 5673  001262  024262                          DT1                     ;$ERRPC,ASR,$BDDAT,$GDDAT
 5674  001264  024402                          DF0                     ;ALL NUMBERS ARE IN OCTAL FORM
  (1)
 5675                                   ;ITEM   2
 5676  001266  021730                          EM2                     ;CLOCK   SR DATA ERROR
 5677  001270  022604                          DH1                     ;ERRPC   ASR     WAS     S/B
 5678  001272  024262                          DT1                     ;$ERRPC,ASR,$BDDAT,$GDDAT
 5679  001274  024402                          DF0                     ;ALL NUMBERS ARE IN OCTAL FORM
  (1)
 5680                                   ;ITEM   3
 5681  001276  021772                          EM3                     ;CLOCK  BR DATA ERROR
 5682  001300  022651                          DH3                     ;ERRPC   ABR     WAS
 5683  001302  024304                          DT3                     ;$ERRPC,ABR,$BDDAT,$GDDAT
 5684  001304  024402                          DF0                     ;ALL NUMBERS ARE IN OCTAL FORM
  (1)
 5685                                   ;ITEM   4
 5686  001306  022034                          EM4                     ;INTERRUPT ERROR.
 5687  001310  022702                          DH4A                    ;ERRPC   TO      ROM ADDR.
 5688  001312  024320                          DT4                     ;$ERRPC,         TRTO,TRFRO
 5689  001314  024402                          DF0                     ;ALL NUMBERS ARE IN OCTAL FORM
  (1)
 5690                                   ;ITEM   5
 5691  001316  022073                          EM5                     ;CLOCK   COUNT REG ERROR
 5692  001320  022604                          DH1                     ;ERRPC   ASR   WAS   S/B
 5693  001322  024262                          DT1                     ;$ERRPC, ACR, $BDDAT, $GDDAT
 5694  001324  024402                          DF0                     ;ALL NUMBERS ARE IN OCTAL FORM
  (1)
 5695                                   ;ITEM   6
 5696  001326  022250                          EM12                    ;CLOCK   COUNT FUNCTION ERROR
 5697  001330  022743                          DH12                    ;ERRPC   ASR
 5698  001332  024332                          DT12                    ;ERRPC, ASR
 5699  001334  024402                          DF0                     ;ALL NUMBERS ARE IN OCTAL FORM
  (1)
```

```
 5701                                   ;ITEM   7
 5702  001336  022361                           EM16                    ;CLOCK   INTERRUPT ERROR
 5703  001340  022743                           DH12                    ;ERRPC   ASR
 5704  001342  024332                           DT12                    ;$ERRPC, ASR
 5705  001344  024402                           DF0                     ;ALL NUMBERS ARE IN OCTAL FORM
  (1)
 5706                                   ;ITEM   10
 5707  001346  022430                           EM20                    ;CLOCK   REPEATABILITY ERROR
 5708  001350  022765                           DH20                    ;ERROR   ASR   2ND CNT 1ST CNT  3RD CNT
 5709  001352  024342                           DT20                    ;$ERRPC, ASR, $BDDAT, $GDDAT, $TMP0
 5710  001354  024402                           DF0                     ;ALL NUMBERS ARE IN OCTAL FORM
  (1)
 5711                                   ;ITEM   11
 5712  001356  022213                           EM11                    ;CLOCK   COUNT ERROR
 5713  001360  022604                           DH1                     ;ERRPC   ASR   WAS   S/B
 5714  001362  024356                           DT22                    ;$ERRPC, ASR, $BDDAT, $TMP0
 5715  001364  024402                           DF0                     ;ALL NUMBERS ARE IN OCTAL FORM
  (1)
 5716                                   ;ITEM   12
 5717  001366  022475                           EM26                    ;CLOCK ADDRESSING ERROR
 5718  001370  023025                           DH26                    ;ERRPC   CLOCK ADDR.
 5719  001372  024372                           DT26                    ;$ERRPC,$TMP0
 5720  001374  024402                           DF0                     ;ALL NUMBERS ARE IN OCTAL FORM
  (1)
 5721                                   ;ITEM   13
 5722  001376  022315                           EM13                    ;CLOCK I.D. LINES ERROR
 5723  001400  022604                           DH1                     ;ERRPC  ASR     WAS     S/B
 5724  001402  024262                           DT1                     ;$ERRPC ASR     $BDDAT  $GDDAT
 5725  001404  024402                           DF0                     ;ALL NUMBERS ARE IN OCTAL FORM
  (1)
 5726                                   ;ITEM   14
 5727  001406  022134  022635  024276           EM6,DH2,DT2,DF0         ;EXISTING UNIT FAILS TO RESPOND
       001414  024402
 5728
 5729  001416  177546                   KWL:    177546                  ;LINE CLOCK ADDRESS
 5730
 5731  001420  171020                   ASR:    .WORD   ABASE
 5732  001422  171022                   ABR:    .WORD   ABASE+2
 5733  001424  000440                   VECT1:  .WORD   AVECT1
 5734  001426  000442                   VECTP:  .WORD   AVECT1+2
 5735  001430  000444                   VECT2:  .WORD   AVECT1+4        ;VECTOR ADDR. OF ST2 INTRS.
 5736  001432  000446                   VECT2P: .WORD   AVECT1+6
 5737  001434  000200                   PRIOR:  .WORD   APRIOR
 5738
 5739  001436  167774                   DR:     .WORD   167774
 5740  001440  167772                   DR2:    .WORD   167772
 5741  001442  170430                   TSCLC:  .WORD   170430          ;ADR. OF TESTOR CLOCK
 5742  001444  170432                   TSCLD:  .WORD   170432          ;BUFFER PRESET REG.
 5743  001446  000000                   $TMP0:  .WORD   0               ;TEMP STORAGE.
 5744  001450  000000                   MASKNM: 0                       ;CURRENT UNIT MASK BIT
 5745  001452  000000                   BADUNT: 0                       ;WORKING LOC. TO DETERMINE BAD UNIT #
 5746  001454  000004                   VADDR:  4                       ;INCREMENT TO THE NEXT MNCKW BASE ADDRESS
 5747  001456  000010                   VVECTR: 10                      ;INCREMENT TO THE NEXT MNCKW VECTOR ADDRESS
 5748  001460  000000                   EVER:   0                       ;INDICATOR IF THE UNIT COUNT HAS BEEN REPORTED
 5749  001462  000000                   ROTATE: .WORD   0                       ;POINT TO DEVICE UNDER TEST.
 5750  001464  000000                   UTEST:  .WORD   0                       ;KEEPS TRACK OF GOOD UNITS.
```

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 5751  001466  000000                   ERCNT:  .WORD   0                       ;COUNTS ERRORS.
 5752  001470  000000                   MDEVCT: .WORD   0                       ;COUNTS DEVICES TESTED.
 5753  001472  000000                   TSTCNT: .WORD   0                       ;MAX DEVICES TO BE TESTED.
 5754  001474  000000                   LCNT:   .WORD   0                       ;TOTAL UNITS TESTED.
 5755  001476  000000                   DWARF:  .WORD   0       ;INDICATE IF TESTOR/DWARF MODULE PRESENT
 5756                                                           ; (=1,YES DWARF,   =BIT15, YES TESTOR)
 5757  001500  000000                   ASK:    .WORD   0                       ;=1 WHEN QUESTION ASKED IN RUN.
 5758  001502  000000                   TEMP1:  0                               ;RESTART INDICATOR
 5759  001504  000000                   UNITBD: 0
 5760
 5762          001506                   TESTER=.
 5763  001506  005037  001502                    CLR     TEMP1           ;CLEAR RESTART FLAG
 5764  001512  012737  000001  001472            MOV     #1,TSTCNT       ;LOAD MAX UNIT COUNT
 5765  001520  012737  100000  001476            MOV     #BIT15,DWARF    ;INDICATE TESTER CONNECTED
 5766  001526  000412                            BR      1$
 5767          001530                   START=.
 5768  001530  012737  000010  001472            MOV     #8.,TSTCNT      ;TEST UP TO 8 UNITS.
 5769  001536  005037  001502                    CLR     TEMP1           ;CLEAR RESTART FLAG
 5770  001542  005037  001476                    CLR     DWARF           ;NO TESTER OR DWARF CONNECTED
 5771  001546  000402                            BR      1$
 5772          001550                   RESTRT=.
 5773  001550  005237  001502                    INC     TEMP1           ;SET RESTART FLAG
 5774  001554  000005                   1$:     RESET
 5775                                   .SBTTL  INITIALIZE THE COMMON TAGS
  (1)                                   ;;CLEAR THE COMMON TAGS ($CMTAG) AREA
  (1)  001556  012706  001100                    MOV     #$CMTAG,R6      ;;FIRST LOCATION TO BE CLEARED
  (1)  001562  005026                            CLR     (R6)+           ;;CLEAR MEMORY LOCATION
  (1)  001564  022706  001140                    CMP     #SWR,R6 ;;DONE?
  (1)  001570  001374                            BNE     .-6             ;;LOOP BACK IF NO
  (1)  001572  012706  001100                    MOV     #STACK,SP       ;;SETUP THE STACK POINTER
  (1)                                   ;;INITIALIZE A FEW VECTORS
  (1)  001576  012737  016476  000020            MOV     #$SCOPE,@#IOTVEC ;;IOT VECTOR FOR SCOPE ROUTINE
  (1)  001604  012737  000340  000022            MOV     #340,@#IOTVEC+2 ;;LEVEL 7
  (1)  001612  012737  016066  000030            MOV     #$ERROR,@#EMTVEC ;;EMT VECTOR FOR ERROR ROUTINE
  (1)  001620  012737  000340  000032            MOV     #340,@#EMTVEC+2 ;;LEVEL 7
  (1)  001626  012737  021576  000034            MOV     #$TRAP,@#TRAPVEC ;;TRAP VECTOR FOR TRAP CALLS
  (1)  001634  012737  000340  000036            MOV     #340,@#TRAPVEC+2;LEVEL 7
  (1)  001642  012737  021140  000024            MOV     #$PWRDN,@#PWRVEC ;;POWER FAILURE VECTOR
  (1)  001650  012737  000340  000026            MOV     #340,@#PWRVEC+2 ;;LEVEL 7
  (1)  001656  005037  001160                    CLR     $TIMES          ;;INITIALIZE NUMBER OF ITERATIONS
  (1)  001662  005037  001162                    CLR     $ESCAPE         ;;CLEAR THE ESCAPE ON ERROR ADDRESS
  (1)  001666  112737  000001  001115            MOVB    #1,$ERMAX       ;;ALLOW ONE ERROR PER TEST
  (1)  001674  012737  001674  001106            MOV     #.,$LPADR       ;;INITIALIZE THE LOOP ADDRESS FOR SCOPE
  (1)  001702  012737  001702  001110            MOV     #.,$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)  001710  013746  000004                    MOV     @#ERRVEC,-(SP)  ;;SAVE ERROR VECTOR
  (2)  001714  012737  001750  000004            MOV     #64$,@#ERRVEC   ;;SET UP ERROR VECTOR
  (2)  001722  012737  177570  001140            MOV     #DSWR,SWR       ;;SETUP FOR A HARDWARE SWICH REGISTER
  (2)  001730  012737  177570  001142            MOV     #DDISP,DISPLAY  ;;AND A HARDWARE DISPLAY REGISTER
  (2)  001736  022777  177777  177174            CMP     #-1,@SWR        ;;TRY TO REFERENCE HARDWARE SWR
  (2)  001744  001012                            BNE     66$             ;;BRANCH IF NO TIMEOUT TRAP OCCURRED
  (2)                                                                    ;;AND  THE HARDWARE SWR IS NOT = -1
  (2)  001746  000403                            BR      65$             ;;BRANCH IF NO TIMEOUT
  (2)  001750  012716  001756            64$:    MOV     #65$,(SP)       ;;SET UP FOR TRAP RETURN
  (2)  001754  000002                            RTI
```

```
   (2)  001756  012737  000176  001140  65$:    MOV     #SWREG,SWR      ;;POINT TO SOFTWARE SWR
   (2)  001764  012737  000174  001142           MOV     #DISPREG,DISPLAY
   (2)  001772  012637  000004           66$:    MOV     (SP)+,@#ERRVEC  ;;RESTORE ERROR VECTOR
   (1)
   (2)  001776  005037  001202                   CLR     $PASS           ;;CLEAR PASS COUNT
   (2)  002002  132737  000200  001215           BITB    #APTSIZE,$ENVM  ;;TEST USER SIZE UNDER APT
   (2)  002010  001403                            BEQ     67$             ;;YES,USE NON-APT SWITCH
   (2)  002012  012737  001216  001140           MOV     #$SWREG,SWR     ;;NO,USE APT SWITCH REGISTER
   (2)  002020                           67$:
  5776                                   ;ROUTINE TO OVERLAY 4 LOC OF THE '$TYPE'' ROUTINE
  5777  002020  012737  005046  020410           MOV     #5046,$TYPE     ;LOWER PS
  5778  002026  012737  012746  020412           MOV     #12746,$TYPE+2
  5779  002034  012737  020422  020414           MOV     #$TYPE+12,$TYPE+4
  5780  002042  012737  000002  020416           MOV     #RTI,$TYPE+6
  5781  002050  004737  017030                   JSR     PC,$TKINT       ;ENABLE TKB INTR.
  5782
   (1)  002054  012746  000000                   MOV     #0,-(SP)                ;SET CPU PRIORITY ON RETERN.
   (1)  002060  012746  002066                   MOV     #68$,-(SP)              ;SHOW RETURN ADDRESS.
   (1)  002064  000002                           RTI                             ;CAUSE A RETURN(PUTS STATUS IN STATUS REG.).
   (1)  002066                           68$:
   (1)
  5783  002066  005037  001204                   CLR     $DEVCT          ;ZERO DEVICE COUNT.
  5784  002072  012737  021316  000004           MOV     #IOTRD,@#ERRVEC ;FIX TRAP CATCHER.
  5785  002100  012737  000340  000006           MOV     #340,@#ERRVEC+2
  5786                                   .SBTTL  TYPE PROGRAM NAME
   (1)                                   ;;TYPE THE NAME OF THE PROGRAM IF FIRST PASS
   (1)  002106  005227  177777                   INC     #-1             ;;FIRST TIME?
   (1)  002112  001045                           BNE     69$             ;;BRANCH IF NO
   (1)  002114  104401  002162                   TYPE    ,70$            ;;TYPE ASCIZ STRING
   (2)                                   .SBTTL  GET VALUE FOR SOFTWARE SWITCH REGISTER
   (2)  002120  005737  000042                   TST     @#42            ;;ARE WE RUNNING UNDER XXDP/ACT?
   (2)  002124  001012                           BNE     71$             ;;BRANCH IF YES
   (2)  002126  123727  001214  000001           CMPB    $ENV,#1         ;;ARE WE RUNNING UNDER APT?
   (2)  002134  001406                           BEQ     71$             ;;BRANCH IF YES
   (2)  002136  023727  001140  000176           CMP     SWR,#SWREG      ;;SOFTWARE SWITCH REG SELECTED?
   (2)  002144  001005                           BNE     72$             ;;BRANCH IF NO
   (2)  002146  104407                           GTSWR                   ;;GET SOFT-SWR SETTINGS
   (2)  002150  000403                           BR      72$
   (2)  002152  112737  000001  001134  71$:     MOVB    #1,$AUTOB       ;;SET AUTO-MODE INDICATOR
   (2)  002160                           72$:
   (1)  002160  000422                           BR      69$             ;;GET OVER THE ASCIZ
   (1)                                   ;;70$:  .ASCIZ  <CRLF>#CVMNC-B  MNCKW (CLOCK) DIAGNOSTIC#<CRLF>
   (1)  002226                           69$:
  5787  002226  105737  001134                   TSTB    $AUTOB          ;TEST IF UNDER A MONITOR
  5788  002232  001407                           BEQ     50$             ;BR IF NOT
  5789  002234  005037  001476                   CLR     DWARF           ;CLEAR DWARF FLAG
  5790  002240  012737  000010  001472           MOV     #8.,TSTCNT      ;LOAD MAX. # OF UNITS
  5791  002246  000137  002464                   JMP     LOGIC           ;RUN LOGIC TEST
  5792  002252  005737  001502           50$:    TST     TEMP1           ;TEST IF RESTARTING
  5793  002256  001004                           BNE     MTEST1          ;BR IF YES
```

```
                                        .SBTTL  KEYBOARD COMMAND DECODER
002260  104401  023056        MTEST:  TYPE,   PRIME0          ;INFORM THE OPER. OF THE TESTS
002264  104401  023231                TYPE,   PRIME1
002270  000005                MTEST1: RESET
002272  052777  000100  176644        BIS     #BIT6,@$TKS     ;ENABLE TKB INTR.
002300  105037  001476                CLRB    DWARF           ;INDICATE NO DWARF CONNECTED
002304  005037  001202                CLR     $PASS           ;INIT. PASS COUNTER
002310  005037  001112                CLR     $ERTTL          ;INIT. TOTAL ERROR COUNT
002314  005037  001460                CLR     EVER            ;INIT. # OF UNIT TYPEOUT
002320  004737  003002                JSR     PC,PRIADR       ;INIT THE ADDR. AND VECTOR
002324  104401  023565                TYPE,   DOT
002330  104412                        RDLIN                   ;GET OPER. INPUT
002332  013637  002462                MOV     @(SP)+,RUNIT    ;GET 1ST CHAR
002336  142737  000040  002462        BICB    #40,RUNIT       ;ENSURE UPPER CASE
002344  122737  000102  002462        CMPB    #'B,RUNIT       ;TEST IF 'B'
002352  001002                        BNE     1$              ;BR IF NOT
002354  000137  015024                JMP     BASEXC          ;CHANGE BASE OR VECTOR ADDRESS
002360  122737  000104  002462  1$:   CMPB    #'D,RUNIT       ;TEST IF 'D'
002366  001007                        BNE     3$              ;BR IF NOT
002370  105237  001476                INCB    DWARF           ;SET DWARF FLAG
002374  012737  000001  001472        MOV     #1,TSTCNT       ;INDICATE ONLY 1 UNIT WITH DWARF
002402  000137  002464                JMP     LOGIC           ;RUN LOGIC TEST WITH DWARFS
002406  122737  000107  002462  3$:   CMPB    #'G,RUNIT       ;TEST IF 'G'
002414  001002                        BNE     5$              ;BR IF NOT
002416  104407                        GTSWR                   ;GET SWITCH VALUE
002420  000723                        BR      MTEST1          ;AND RETYPE DOT
002422  122737  000110  002462  5$:   CMPB    #'H,RUNIT       ;TEST IF 'H'
002430  001713                        BEQ     MTEST           ;BR IF YES
002432  122737  000114  002462  6$:   CMPB    #'L,RUNIT       ;TEST IF 'L'
002440  001005                        BNE     77$             ;BR IF NOT
002442  012737  000010  001472        MOV     #8.,TSTCNT      ;LOAD # OF UNITS
002450  000137  002464                JMP     LOGIC           ;RUN LOGIC TEST WITH NO DWARFS
002454  104401  001170        77$:    TYPE,   $QUES           ;TYPE '?'
002460  000703                        BR      MTEST1          ;AND RETYPE DOT
002462  000000                RUNIT:  0               ;CHAR. THE OPER. TYPED IN
```

```
                                                .SBTTL  DETERMINE THE NUMBER OF MNCKW'S ON THE SYSTEM
002464  013737  001250  001126  LOGIC:  MOV     $BASE,$BDDAT    ;GET BASE ADDRESS
002472  005037  001450                  CLR     MASKNM
002476  005037  001206                  CLR     $UNIT           ;CLEAR UNIT NUMBER
002502  012737  002556  000004          MOV     #2$,ERRVEC      ;LOAD RETURN ADDRESS
002510  005777  176412          1$:     TST     @$BDDAT         ;TEST IF ADDRESS EXISTS
002514  063737  001454  001126          ADD     VADDR,$BDDAT    ;UPDATE BUS ADDRESS
002522  005237  001206                  INC     $UNIT           ;UPDATE UNIT COUNT
002526  005737  001214                  TST     $ENV            ;TEST IF 'DO NOT SIZE''
002532  100423                          BMI     3$              ;BR IF NO SIZEING
002534  032777  010000  176376          BIT     #SW12,@SWR      ;TEST IF SW 12 IS SET
002542  001017                          BNE     3$              ;BR IF INHIBIT SIZING SWITCH IS SET
002544  023737  001472  001206          CMP     TSTCNT,$UNIT    ;TEST IF MAX NUMBER
002552  001356                          BNE     1$              ;BR IF NOT
002554  000412                          BR      3$              ;BR IF MAX
002556  022626                  2$:     CMP     (SP)+,(SP)+     ;RESTORE STACK
002560  005737  001206                  TST     $UNIT           ;TEST IF ANY EXIST
002564  001006                          BNE     3$              ;BR IF ANY ARE THERE
002566  005737  000042                  TST     @#42            ;TEST IF XXDP CHAIN MODE
002572  001003                          BNE     3$              ;BR IF YES
002574  104012                          ERROR   12              ;BASE ADDRESS CAUSED A BUS TRAP
002576  000137  014616                  JMP     $EOP
002602  012737  021316  000004  3$:     MOV     #IOTRD,ERRVEC   ;RESTORE ERROR VECTOR
002610  012737  000200  000006          MOV     #200,ERRVEC+2
002616  005737  001460                  TST     EVER            ;TEST IF # HAS BEEN REPORTED
002622  100426                          BMI     4$              ;BR IF IT HAS
002624  005737  001476                  TST     DWARF           ;TEST IF TESTER MODE
002630  100414                          BMI     6$              ;BR IF TESTER
002632  104401  023760                  TYPE    ,FOUND1         ;TELL OPERATOR # OF MNCKW FOUND
002636  013746  001206                  MOV     $UNIT,-(SP)
002642  104405                          TYPDS
002644  104401  024003                  TYPE    ,FOUND2
002650  005737  001206                  TST     $UNIT           ;TEST IF ANY UNITS
002654  001002                          BNE     6$              ;BR IF SOME
002656  000137  014616                  JMP     $EOP            ;REPORT EOP
002662  013737  001206  001460  6$:     MOV     $UNIT,EVER      ;SAVE THE # OF MNCKW'S FOR LATER
002670  052737  100000  001460          BIS     #BIT15,EVER     ;SET 'REPORTED NUMBER FLAG''
002676  000410                          BR      5$
002700  123737  001460  001206  4$:     CMPB    EVER,$UNIT      ;TEST IF ANY HAVE GONE AWAY
002706  001404                          BEQ     5$              ;BR IF ALL ARE STILL THERE
002710  113737  001460  001450          MOVB    EVER,MASKNM     ;SAVE FOR ERROR REPORT
002716  104014                          ERROR   14              ;EXISTING UNIT FAILED TO RESPOND
002720  005037  001206          5$:     CLR     $UNIT           ;RESET UNIT POINTER
002724  004737  003002                  JSR     PC,PRIADR       ;LOAD BUS ADDRESSES
002730  012737  000001  001450          MOV     #BIT0,MASKNM    ;LOAD DEVICE MASK
002736  005037  001452                  CLR     BADUNT          ;RESET BAD UNIT INDICATOR
002742  005037  001500                  CLR     ASK
002746  005037  001470                  CLR     MDEVCT          ;TESTING FIRST UNIT.
002752  005037  001466                  CLR     ERCNT           ;NO ERRORS.
002756  012737  000001  001462          MOV     #1,ROTATE       ;POINT TO FIRST UNIT.
002764  013737  001462  001464          MOV     ROTATE,UTEST
002772  005046                          CLR     -(SP)   ;ONE WAY TO LOWER THE CPU INTR. LEVEL
002774  012746  003106                  MOV     #TST1,-(SP)
003000  000002                          RTI
```

```
                                .SBTTL  SUBROUTINE TO PRIME THE BASE AND VECTOR VALUES
5887  003002  013737  001250  001420  PRIADR: MOV     $BASE,ASR       ;LOAD INITIAL BASE ADDR
5888  003010  013737  001244  001424          MOV     $VECT1,VECT1    ;LOAD INITIAL VECTOR ADDR
5889  003016  042737  170000  001424  FIXADR: BIC     #170000,VECT1   ;CLEAR OUT PRIORITY BITS.
5890  003024  013737  001424  001426          MOV     VECT1,VECTP     ;NOW FIX VECTOR +2 ADDR.
5891  003032  062737  000002  001426          ADD     #2,VECTP
5892  003040  013737  001424  001430          MOV     VECT1,VECT2     ;LETS FIX ST2 VECTOR ADDR.
5893  003046  062737  000004  001430          ADD     #4,VECT2        ;ITS 4 GREATER THEN THE 1ST.
5894  003054  013737  001430  001432          MOV     VECT2,VECT2P    ;VECTOR +2 ADDR.
5895  003062  062737  000002  001432          ADD     #2,VECT2P
5896  003070  013737  001420  001422          MOV     ASR,ABR         ;FIX ADDR OF PRESET REG=
5897  003076  062737  000002  001422          ADD     #2,ABR          ;CSR + 2
5898  003104  000207                          RTS     PC              ;RETURN
5899                          ;;**************************************************************
 (3)                            ;*TEST 1        *TEST THE I.D. LINE CODE IF ON THE TESTER
 (3)                            ;;**************************************************************
 (2)  003106  000004            TST1:   SCOPE
5900  003110  005737  001476                  TST     DWARF           ;TEST IF ON THE TESTER
5901  003114  100020                          BPL     TST2            ;;BR IF NOT
5902  003116  005077  176316                  CLR     @DR2            ;ENSURE TESTER STATUS
5903  003122  017737  176310  001126          MOV     @DR,$BDDAT      ;READ TESTER REG. <I.D. LINES>
5904  003130  042737  177417  001126          BIC     #177417,$BDDAT  ;MASK OFF OTHER BITS
5905  003136  012737  000120  001124          MOV     #120,$GDDAT     ;LOAD EXPECTED VALUE
5906  003144  023737  001124  001126          CMP     $GDDAT,$BDDAT   ;COMPARE THE VALUES
5907  003152  001401                          BEQ     TST2            ;;BR IF SAME
5908
5909

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

5910  003154  104013                  ERROR   13                      ;REPORT INCORRECT I.D. LINE CODE
5911                                                                  ;MUST BE WRONG BOARD OR I.D. FAILURE
5912

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

```
5949
 (1)
 (1)
 (5)                                    ;;*****************************************************************
 (4)                                    ;*TEST 2          *TEST THE ADDRESSABILITY OF CLOCK CSR
 (4)                                    ;;*****************************************************************
 (3)  003156  000004                    TST2:   SCOPE
 (2)  003160  012737  000050  001160            MOV     #50,$TIMES      ;;DO 50 ITERATIONS
 (2)  003166  012737  003202  001106            MOV     #1$,$LPADR      ;;SET SCOPE LOOP ADDRESS
 (1)  003174  012737  003202  001110            MOV     #1$,$LPERR
 (1)
 (1)
 (1)
 (1)  003202  013746  000004            1$:     MOV     @#ERRVEC,-(SP)  ;SAVE CONTENTS OF ADDRS 6.
 (1)  003206  012737  003222  000004            MOV     #2$,@#ERRVEC    ;SET TIME-OUT TRAP VECTOR TO HANDLER IN CASE.
 (1)                                                                    ;WE TIME-OUT WHEN ADDRESSING THE KW11.
 (1)  003214  005777  176200                    TST     @ASR            ;ADDRESS THE CLOCK!
 (1)                                                                    ;IF CLOCK DOES NOT RETURN
 (1)                                                                    ;'BUS SSYN'' THEN WE'LL TIME-OUT
 (1)
 (1)  003220  000412                            BR      3$              ;THE CLOCK WAS THERE! EXIT SUB-TEST.
 (1)  003222                            2$:
 (2)  003222  062706  000004                    ADD     #4,SP                   ;/ADD #4 TO STACK POINTER.
 (1)  003226  013737  001420  001446            MOV     ASR,$TMP0       ;FOR ERROR TYPEOUT.
 (1)
 (2)
                                        ;;$$$$$$$$$$$$$$$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$

 (1)  003234  104012                            ERROR   12              ;REPORT ERROR=CLOCK CSR FAILED TO RETURN
 (1)                                                                    ;'BUS SSYN'' WHEN ADDRESSED.
 (1)  003236  012637  000004                    MOV     (SP)+,@#ERRVEC  ;NOTE: IF PROGRAM HAS INCORRECT
 (1)  003242  000137  014616                    JMP     $EOP            ;ADDRESS THEN WE MIGHT NOT BE
 (1)                                                                    ;TALKING TO THE CLOCK. MAKE SURE
 (1)                                                                    ;OF CLOCK ADDRESS.
 (1)
 (2)
                                        ;;$$$$$$$$$$$$$$$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$

 (1)  003246  012637  000004            3$:     MOV     (SP)+,@#ERRVEC
 (1)
```

```
 5951
  (5)                                ;;*****************************************************************
  (4)                                ;*TEST 3          *TEST THE ADDRESSABILITY OF CLOCK BUFFER REG.
  (4)                                ;;*****************************************************************
  (3)  003252  000004                TST3:   SCOPE
  (1)
  (1)
  (1)  003254  013746  000004        1$:     MOV     @#ERRVEC,-(SP)  ;SAVE CONTENTS OF ADDRS 6.
  (1)  003260  012737  003274  000004        MOV     #2$,@#ERRVEC    ;SET TIME-OUT TRAP VECTOR TO HANDLER IN CASE.
  (1)                                                                ;WE TIME-OUT WHEN ADDRESSING THE KW11.
  (1)  003266  005777  176130                TST     @ABR            ;ADDRESS THE CLOCK!
  (1)                                                                ;IF CLOCK DOES NOT RETURN
  (1)                                                                ;'BUS SSYN' THEN WE'LL TIME-OUT
  (1)
  (1)  003272  000412                        BR      3$              ;THE CLOCK WAS THERE! EXIT SUB-TEST.
  (1)  003274                        2$:
  (2)  003274  062706  000004                ADD     #4,SP                   ;/ADD #4 TO STACK POINTER.
  (1)  003300  013737  001422  001446        MOV     ABR,$TMP0       ;FOR ERROR TYPEOUT.
  (1)
  (2)
                                     ;;$$$$$$$$$$$$$$$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$

  (1)  003306  104012                        ERROR   12              ;REPORT ERROR=CLOCK BUFFER REG. FAILED TO RETURN
  (1)                                                                ;'BUS SSYN' WHEN ADDRESSED.
  (1)  003310  012637  000004                MOV     (SP)+,@#ERRVEC  ;NOTE: IF PROGRAM HAS INCORRECT
  (1)  003314  000137  014616                JMP     $EOP            ;ADDRESS THEN WE MIGHT NOT BE
  (1)                                                                ;TALKING TO THE CLOCK. MAKE SURE
  (1)                                                                ;OF CLOCK ADDRESS.
  (1)
  (2)
                                     ;;$$$$$$$$$$$$$$$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$

  (1)  003320  012637  000004        3$:     MOV     (SP)+,@#ERRVEC
  (1)
 5959
 5997
 5998
```

```
(1)                                     ;/#
(5)                                     ;;**********.**********.**********.**********.**********
(4)                                     ;*TEST 4        *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)  003324  000004                     TST4:   SCOPE
(2)  003326  012737  000100  001160             MOV     #100,$TIMES     ;;DO 100 ITERATIONS
(1)
(1)  003334  005077  176060             CLR     @ASR            ;/CLEAR THE STATUS REGISTER.
(1)  003340  052777  040000  176052     BIS     #BIT14,@ASR     ;/SET BIT 14.
(1)  003346  012737  040000  001124     MOV     #BIT14,$GDDAT   ;/SET FOR ERROR TYPEOUT S/B.
(1)  003354  017737  176040  001126     MOV     @ASR,$BDDAT     ;/READ THE STATUS REGISTER.
(1)  003362  023737  001124  001126     CMP     $GDDAT,$BDDAT   ;/DID BIT 14 AND ONLY BIT 14 SET?
(1)  003370  001402                     BEQ     1$              ;/IF SO-LETS TRY CLEARING IT.
(2)
                                        ;;$$$$$$$$$$$$$$$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$

(1)  003372  104002                     ERROR   2               ;/ERROR CLOCK AS STATUS REGISTER
(1)                                     ;/BIT 14 FAILED TO BIT SET.
(2)
                                        ;;$$$$$$$$$$$$$$$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$

(1)  003374  000412                     BR      2$              ;/BR TO END SUBTEST.
(1)
(1)  003376  042777  040000  176014  1$:    BIC     #BIT14,@ASR     ;/TRY CLEARING BIT 14.
(1)  003404  005037  001124             CLR     $GDDAT          ;/CLEAR S/B FOR TYPEOUT IF ANY.
(1)  003410  017737  176004  001126     MOV     @ASR,$BDDAT     ;/NOW READ IT BACK.
(1)  003416  001401                     BEQ     2$              ;/IF ZERO - NO ERROR!
(1)
(2)
                                        ;;$$$$$$$$$$$$$$$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$

(1)  003420  104002                     ERROR   2               ;/ERROR - CLOCK A STATUS REGISTER.
(1)                                     ;/BIT 14 FAILED TO CLEAR.
(1)
(2)
                                        ;;$$$$$$$$$$$$$$$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$

(1)  003422                             2$:
(1)
5999
```

```
(1)                                             ;/#
(5)                                             ;;*****************************************************
(4)                                             ;*TEST 5        *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)  003422  000004                             TST5:   SCOPE
(2)  003424  012737  000100  001160                     MOV     #100,$TIMES     ;;DO 100 ITERATIONS
(1)
(1)  003432  005077  175762                      CLR     @ASR                ;/CLEAR THE STATUS REGISTER.
(1)  003436  052777  020000  175754              BIS     #BIT13,@ASR         ;/SET BIT 13.
(1)  003444  012737  020000  001124              MOV     #BIT13,$GDDAT       ;/SET FOR ERROR TYPEOUT S/B.
(1)  003452  017737  175742  001126              MOV     @ASR,$BDDAT         ;/READ THE STATUS REGISTER.
(1)  003460  023737  001124  001126              CMP     $GDDAT,$BDDAT       ;/DID BIT 13 AND ONLY BIT 13 SET?
(1)  003466  001402                              BEQ     1$                  ;/IF SO-LETS TRY CLEARING IT.
(2)
                                                ;;$$$$$$$$$$$$$$$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$

(1)  003470  104002                              ERROR   2                   ;/ERROR CLOCK AS STATUS REGISTER
(1)                                                                         ;/BIT 13 FAILED TO BIT SET.
(2)
                                                ;;$$$$$$$$$$$$$$$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$

(1)  003472  000412                              BR      2$                  ;/BR TO END SUBTEST.
(1)
(1)  003474  042777  020000  175716  1$:        BIC     #BIT13,@ASR         ;/TRY CLEARING BIT 13.
(1)  003502  005037  001124                      CLR     $GDDAT              ;/CLEAR S/B FOR TYPEOUT IF ANY.
(1)  003506  017737  175706  001126              MOV     @ASR,$BDDAT         ;/NOW READ IT BACK.
(1)  003514  001401                              BEQ     2$                  ;/IF ZERO - NO ERROR!
(1)
(2)
                                                ;;$$$$$$$$$$$$$$$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$

(1)  003516  104002                              ERROR   2                   ;/ERROR - CLOCK A STATUS REGISTER.
(1)                                                                         ;/BIT 13 FAILED TO CLEAR.
(1)
(2)
                                                ;;$$$$$$$$$$$$$$$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$

(1)  003520                                      2$:
(1)
6000
```

```
                                        ;/#
                                ;;**********  **********************************************
                                ;*TEST 0         *TEST THAT CLOCK A STATUS REGISTER BIT 11 CAN BE SET AND CLEARED
                                ;*
                                ;*CLOCK STATUS REGISTER BIT EXERCISE. ON FAILURE-SUSPECT INDIVIDUAL
                                ;*F/FS OR GATES
                                ;*

                                ;;*****************************************************************
003520  000004                  TST6:   SCOPE
003522  012737  000100  001160          MOV     #100,$TIMES     ;;DO 100 ITERATIONS

003530  005077  175664          CLR     @ASR            ;/CLEAR THE STATUS REGISTER.
003534  052777  004000  175656  BIS     #BIT11,@ASR     ;/SET BIT 11.
003542  012737  004000  001124  MOV     #BIT11,$GDDAT   ;/SET FOR ERROR TYPEOUT S/B.
003550  017737  175644  001126  MOV     @ASR,$BDDAT     ;/READ THE STATUS REGISTER.
003556  023737  001124  001126  CMP     $GDDAT,$BDDAT   ;/DID BIT 11 AND ONLY BIT 11 SET?
003564  001402                  BEQ     1$              ;/IF SO-LETS TRY CLEARING IT.

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

003566  104002                  ERROR   2               ;/ERROR CLOCK AS STATUS REGISTER
                                                        ;/BIT 11 FAILED TO BIT SET.

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

003570  000412                  BR      2$              ;/BR TO END SUBTEST.

003572  042777  004000  175620  1$:     BIC     #BIT11,@ASR     ;/TRY CLEARING BIT 11.
003600  005037  001124          CLR     $GDDAT          ;/CLEAR S/B FOR TYPEOUT IF ANY.
003604  017737  175610  001126  MOV     @ASR,$BDDAT     ;/NOW READ IT BACK.
003612  001401                  BEQ     2$              ;/IF ZERO - NO ERROR!

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

003614  104002                  ERROR   2               ;/ERROR - CLOCK A STATUS REGISTER.
                                                        ;/BIT 11 FAILED TO CLEAR.

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

003616                          2$:
6001
```

```
 (1)                                                     ;/#
 (5)                                             ;;*************************************************************************
 (4)                                             ;*TEST 7        *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)  003616  000004                             TST7:   SCOPE
 (2)  003620  012737  000100  001160                     MOV     #100,$TIMES       ;;DO 100 ITERATIONS
 (1)
 (1)  003626  005077  175566                             CLR     @ASR              ;/CLEAR THE STATUS REGISTER.
 (1)  003632  052777  000100  175560                     BIS     #BIT6,@ASR        ;/SET BIT 6.
 (1)  003640  012737  000100  001124                     MOV     #BIT6,$GDDAT      ;/SET FOR ERROR TYPEOUT S/B.
 (1)  003646  017737  175546  001126                     MOV     @ASR,$BDDAT       ;/READ THE STATUS REGISTER.
 (1)  003654  023737  001124  001126                     CMP     $GDDAT,$BDDAT     ;/DID BIT 6 AND ONLY BIT 6 SET?
 (1)  003662  001402                                     BEQ     1$                ;/IF SO-LETS TRY CLEARING IT.
 (2)
                                                 ;;$$$$$$$$$$$$$$$$$$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$

 (1)  003664  104002                                     ERROR   2                 ;/ERROR CLOCK AS STATUS REGISTER
 (1)                                                                               ;/BIT 6 FAILED TO BIT SET.
 (2)
                                                 ;;$$$$$$$$$$$$$$$$$$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$

 (1)  003666  000412                                     BR      2$                ;/BR TO END SUBTEST.
 (1)
 (1)  003670  042777  000100  175522     1$:             BIC     #BIT6,@ASR        ;/TRY CLEARING BIT 6.
 (1)  003676  005037  001124                             CLR     $GDDAT            ;/CLEAR S/B FOR TYPEOUT IF ANY.
 (1)  003702  017737  175512  001126                     MOV     @ASR,$BDDAT       ;/NOW READ IT BACK.
 (1)  003710  001401                                     BEQ     2$                ;/IF ZERO - NO ERROR!
 (1)
 (2)
                                                 ;;$$$$$$$$$$$$$$$$$$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$

 (1)  003712  104002                                     ERROR   2                 ;/ERROR - CLOCK A STATUS REGISTER.
 (1)                                                                               ;/BIT 6 FAILED TO CLEAR.
 (1)
 (2)
                                                 ;;$$$$$$$$$$$$$$$$$$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$

 (1)  003714                                     2$:
 (1)
6002
```

```
                                        ;/#
                                ;;**********.**********************************************
                                ;*TEST 10        *TEST THAT CLOCK A STATUS REGISTER BIT 5 CAN BE SET AND CLEARED
                                ;*
                                ;*CLOCK STATUS REGISTER BIT EXERCISE. ON FAILURE-SUSPECT INDIVIDUAL
                                ;*F/FS OR GATES
                                ;*
                                ;;**************************************************************
003714  000004                  TST10:  SCOPE
003716  012737  000100  001160          MOV     #100,$TIMES     ;;DO 100 ITERATIONS

003724  005077  175470          CLR     @ASR            ;/CLEAR THE STATUS REGISTER.
003730  052777  000040  175462  BIS     #BIT5,@ASR      ;/SET BIT 5.
003736  012737  000040  001124  MOV     #BIT5,$GDDAT    ;/SET FOR ERROR TYPEOUT S/B.
003744  017737  175450  001126  MOV     @ASR,$BDDAT     ;/READ THE STATUS REGISTER.
003752  023737  001124  001126  CMP     $GDDAT,$BDDAT   ;/DID BIT 5 AND ONLY BIT 5 SET?
003760  001402                  BEQ     1$              ;/IF SO-LETS TRY CLEARING IT.

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

003762  104002                  ERROR   2               ;/ERROR CLOCK AS STATUS REGISTER
                                                        ;/BIT 5 FAILED TO BIT SET.

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

003764  000412                  BR      2$              ;/BR TO END SUBTEST.

003766  042777  000040  175424  1$:     BIC     #BIT5,@ASR      ;/TRY CLEARING BIT 5.
003774  005037  001124          CLR     $GDDAT          ;/CLEAR S/B FOR TYPEOUT IF ANY.
004000  017737  175414  001126  MOV     @ASR,$BDDAT     ;/NOW READ IT BACK.
004006  001401                  BEQ     2$              ;/IF ZERO - NO ERROR!

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

004010  104002                  ERROR   2               ;/ERROR - CLOCK A STATUS REGISTER.
                                                        ;/BIT 5 FAILED TO CLEAR.

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

004012                          2$:
6003
```

```
                                        ;/#
                                    ;;**********.**********************************************
                                    ;*TEST 11        *TEST THAT CLOCK A STATUS REGISTER BIT 4 CAN BE SET AND CLEARED
                                    ;*
                                    ;*CLOCK STATUS REGISTER BIT EXERCISE. ON FAILURE-SUSPECT INDIVIDUAL
                                    ;*F/FS OR GATES
                                    ;*
                                    ;;*****************************************************************
004012  000004                      TST11:  SCOPE
004014  012737  000100  001160              MOV     #100,$TIMES     ;;DO 100 ITERATIONS

004022  005077  175372              CLR     @ASR            ;/CLEAR THE STATUS REGISTER.
004026  052777  000020  175364      BIS     #BIT4,@ASR      ;/SET BIT 4.
004034  012737  000020  001124      MOV     #BIT4,$GDDAT    ;/SET FOR ERROR TYPEOUT S/B.
004042  017737  175352  001126      MOV     @ASR,$BDDAT     ;/READ THE STATUS REGISTER.
004050  023737  001124  001126      CMP     $GDDAT,$BDDAT   ;/DID BIT 4 AND ONLY BIT 4 SET?
004056  001402                      BEQ     1$              ;/IF SO-LETS TRY CLEARING IT.

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

004060  104002                      ERROR   2               ;/ERROR CLOCK AS STATUS REGISTER
                                                            ;/BIT 4 FAILED TO BIT SET.

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

004062  000412                      BR      2$              ;/BR TO END SUBTEST.

004064  042777  000020  175326  1$: BIC     #BIT4,@ASR      ;/TRY CLEARING BIT 4.
004072  005037  001124              CLR     $GDDAT          ;/CLEAR S/B FOR TYPEOUT IF ANY.
004076  017737  175316  001126      MOV     @ASR,$BDDAT     ;/NOW READ IT BACK.
004104  001401                      BEQ     2$              ;/IF ZERO - NO ERROR!

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

004106  104002                      ERROR   2               ;/ERROR - CLOCK A STATUS REGISTER.
                                                            ;/BIT 4 FAILED TO CLEAR.

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

004110                              2$:

6004
```

```
                                        ;/#
                                ;;**********  ********************************************
                                ;*TEST 12        *TEST THAT CLOCK A STATUS REGISTER BIT 3 CAN BE SET AND CLEARED
                                ;*
                                ;*CLOCK STATUS REGISTER BIT EXERCISE. ON FAILURE-SUSPECT INDIVIDUAL
                                ;*F/FS OR GATES
                                ;*
                                ;;**************************************************************
004110  000004                TST12:  SCOPE
004112  012737  000100  001160        MOV     #100,$TIMES     ;;DO 100 ITERATIONS

004120  005077  175274              CLR     @ASR            ;/CLEAR THE STATUS REGISTER.
004124  052777  000010  175266      BIS     #BIT3,@ASR      ;/SET BIT 3.
004132  012737  000010  001124      MOV     #BIT3,$GDDAT    ;/SET FOR ERROR TYPEOUT S/B.
004140  017737  175254  001126      MOV     @ASR,$BDDAT     ;/READ THE STATUS REGISTER.
004146  023737  001124  001126      CMP     $GDDAT,$BDDAT   ;/DID BIT 3 AND ONLY BIT 3 SET?
004154  001402                      BEQ     1$              ;/IF SO-LETS TRY CLEARING IT.

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

004156  104002                      ERROR   2               ;/ERROR CLOCK AS STATUS REGISTER
                                                        ;/BIT 3 FAILED TO BIT SET.

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

004160  000412                      BR      2$              ;/BR TO END SUBTEST.

004162  042777  000010  175230  1$: BIC     #BIT3,@ASR      ;/TRY CLEARING BIT 3.
004170  005037  001124              CLR     $GDDAT          ;/CLEAR S/B FOR TYPEOUT IF ANY.
004174  017737  175220  001126      MOV     @ASR,$BDDAT     ;/NOW READ IT BACK.
004202  001401                      BEQ     2$              ;/IF ZERO - NO ERROR!

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

004204  104002                      ERROR   2               ;/ERROR - CLOCK A STATUS REGISTER.
                                                        ;/BIT 3 FAILED TO CLEAR.

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

004206                          2$:
6005
```

```
(1)                                             ;/#
(5)                                             ;;**********.**********.**********.**********
(4)                                             ;*TEST 13       *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)  004206  000004                             TST13:  SCOPE
(2)  004210  012737  000100  001160                     MOV     #100,$TIMES     ;;DO 100 ITERATIONS
(1)
(1)  004216  005077  175176                             CLR     @ASR            ;/CLEAR THE STATUS REGISTER.
(1)  004222  052777  000004  175170                     BIS     #BIT2,@ASR      ;/SET BIT 2.
(1)  004230  012737  000004  001124                     MOV     #BIT2,$GDDAT    ;/SET FOR ERROR TYPEOUT S/B.
(1)  004236  017737  175156  001126                     MOV     @ASR,$BDDAT     ;/READ THE STATUS REGISTER.
(1)  004244  023737  001124  001126                     CMP     $GDDAT,$BDDAT   ;/DID BIT 2 AND ONLY BIT 2 SET?
(1)  004252  001402                                     BEQ     1$              ;/IF SO-LETS TRY CLEARING IT.
(2)
                                                ;;$$$$$$$$$$$$$$$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$

(1)  004254  104002                                     ERROR   2               ;/ERROR CLOCK AS STATUS REGISTER
(1)                                                                             ;/BIT 2 FAILED TO BIT SET.
(2)
                                                ;;$$$$$$$$$$$$$$$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$

(1)  004256  000412                                     BR      2$              ;/BR TO END SUBTEST.
(1)
(1)  004260  042777  000004  175132  1$:       BIC     #BIT2,@ASR      ;/TRY CLEARING BIT 2.
(1)  004266  005037  001124                     CLR     $GDDAT          ;/CLEAR S/B FOR TYPEOUT IF ANY.
(1)  004272  017737  175122  001126             MOV     @ASR,$BDDAT     ;/NOW READ IT BACK.
(1)  004300  001401                             BEQ     2$              ;/IF ZERO - NO ERROR!
(1)
(2)
                                                ;;$$$$$$$$$$$$$$$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$

(1)  004302  104002                                     ERROR   2               ;/ERROR - CLOCK A STATUS REGISTER.
(1)                                                                             ;/BIT 2 FAILED TO CLEAR.
(1)
(2)
                                                ;;$$$$$$$$$$$$$$$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$

(1)  004304                                     2$:
(1)
6006
```

```
(1)                                         ;/#
(5)                                         ;;**********.**********************************************
(4)                                         ;*TEST 14       *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)  004304  000004                         TST14:  SCOPE
(2)  004306  012737  000100  001160                 MOV     #100,$TIMES     ;;DO 100 ITERATIONS
(1)
(1)  004314  005077  175100                 CLR     @ASR            ;/CLEAR THE STATUS REGISTER.
(1)  004320  052777  000002  175072         BIS     #BIT1,@ASR      ;/SET BIT 1.
(1)  004326  012737  000002  001124         MOV     #BIT1,$GDDAT    ;/SET FOR ERROR TYPEOUT S/B.
(1)  004334  017737  175060  001126         MOV     @ASR,$BDDAT     ;/READ THE STATUS REGISTER.
(1)  004342  023737  001124  001126         CMP     $GDDAT,$BDDAT   ;/DID BIT 1 AND ONLY BIT 1 SET?
(1)  004350  001402                         BEQ     1$              ;/IF SO-LETS TRY CLEARING IT.
(2)
                                            ;;$$$$$$$$$$$$$$$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$

(1)  004352  104002                         ERROR   2               ;/ERROR CLOCK AS STATUS REGISTER
(1)                                                                 ;/BIT 1 FAILED TO BIT SET.
(2)
                                            ;;$$$$$$$$$$$$$$$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$

(1)  004354  000412                         BR      2$              ;/BR TO END SUBTEST.
(1)
(1)  004356  042777  000002  175034  1$:    BIC     #BIT1,@ASR      ;/TRY CLEARING BIT 1.
(1)  004364  005037  001124                 CLR     $GDDAT          ;/CLEAR S/B FOR TYPEOUT IF ANY.
(1)  004370  017737  175024  001126         MOV     @ASR,$BDDAT     ;/NOW READ IT BACK.
(1)  004376  001401                         BEQ     2$              ;/IF ZERO - NO ERROR!
(1)
(2)
                                            ;;$$$$$$$$$$$$$$$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$

(1)  004400  104002                         ERROR   2               ;/ERROR - CLOCK A STATUS REGISTER.
(1)                                                                 ;/BIT 1 FAILED TO CLEAR.
(1)
(2)
                                            ;;$$$$$$$$$$$$$$$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$

(1)  004402                                 2$:
(1)
6007
```

```
(1)                                             ;/#
(5)                                             ;;**********.**********.**********.**********.**********
(4)                                             ;*TEST 15       *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)  004402  000004                             TST15:  SCOPE
(2)  004404  012737  000100  001160                     MOV     #100,$TIMES     ;;DO 100 ITERATIONS
(1)
(1)  004412  005077  175002                             CLR     @ASR            ;/CLEAR THE STATUS REGISTER.
(1)  004416  052777  000001  174774                     BIS     #BIT0,@ASR      ;/SET BIT 0.
(1)  004424  012737  000001  001124                     MOV     #BIT0,$GDDAT    ;/SET FOR ERROR TYPEOUT S/B.
(1)  004432  017737  174762  001126                     MOV     @ASR,$BDDAT     ;/READ THE STATUS REGISTER.
(1)  004440  023737  001124  001126                     CMP     $GDDAT,$BDDAT   ;/DID BIT 0 AND ONLY BIT 0 SET?
(1)  004446  001402                                     BEQ     1$              ;/IF SO-LETS TRY CLEARING IT.
(2)
                                                ;;$$$$$$$$$$$$$$$$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$

(1)  004450  104002                                     ERROR   2               ;/ERROR CLOCK AS STATUS REGISTER
(1)                                                                             ;/BIT 0 FAILED TO BIT SET.
(2)
                                                ;;$$$$$$$$$$$$$$$$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$

(1)  004452  000412                                     BR      2$              ;/BR TO END SUBTEST.
(1)
(1)  004454  042777  000001  174736  1$:       BIC     #BIT0,@ASR      ;/TRY CLEARING BIT 0.
(1)  004462  005037  001124                     CLR     $GDDAT          ;/CLEAR S/B FOR TYPEOUT IF ANY.
(1)  004466  017737  174726  001126             MOV     @ASR,$BDDAT     ;/NOW READ IT BACK.
(1)  004474  001401                             BEQ     2$              ;/IF ZERO - NO ERROR!
(1)
(2)
                                                ;;$$$$$$$$$$$$$$$$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$

(1)  004476  104002                                     ERROR   2               ;/ERROR - CLOCK A STATUS REGISTER.
(1)                                                                             ;/BIT 0 FAILED TO CLEAR.
(1)
(2)
                                                ;;$$$$$$$$$$$$$$$$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$

(1)  004500                                     2$:
(1)
6008         000010                                     .RADIX  8
```

```
 6039
 6040
  (5)                                ;;*****************************************************************
  (4)                                ;*TEST 16       *TEST THAT PATERN 125252 WILL SET AND CLEAR IN BUFFER REG.
  (4)                                ;;*****************************************************************
  (3)  004500  000004                TST16:  SCOPE
  (1)
  (1)  004502  005077  174714                CLR     @ABR            ;/CLEAR THE BUFFER REG.
  (1)  004506  012737  125252  001124        MOV     #125252,$GDDAT  ;/RECORD PATTERN: 125252 .
  (1)  004514  013777  001124  174700        MOV     $GDDAT,@ABR     ;/SET PATTERN IN BUFFER REG.
  (1)  004522  017737  174674  001126        MOV     @ABR,$BDDAT     ;/READ THE BUFFER REG.
  (1)
  (1)  004530  023737  001124  001126        CMP     $GDDAT,$BDDAT   ;/DID THE PATTERN SET OK?
  (1)  004536  001402                        BEQ     1$              ;/YES-TRY CLEARING IT.
  (1)
  (2)
                                     ;;$$$$$$$$$$$$$$$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$

  (1)  004540  104003                        ERROR   3               ;/ERROR PATTERN 125252 FAILED TO
  (1)                                                                ;/SET PROPERLY IN BUFFER REG.
  (2)
                                     ;;$$$$$$$$$$$$$$$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$

  (1)  004542  000412                        BR      2$              ;/GOTO SCOPE LOOP.
  (1)
  (1)  004544  042777  125252  174650  1$:   BIC     #125252,@ABR    ;/TRY CLEARING PATTERN.
  (1)  004552  005037  001124                CLR     $GDDAT          ;/EXPECT ZERO BACK.
  (1)  004556  017737  174640  001126        MOV     @ABR,$BDDAT     ;/READ BUFFER REG.,WAS IT ZERO?
  (1)  004564  001401                        BEQ     2$              ;/YES-NEXT TEST.
  (1)
  (2)
                                     ;;$$$$$$$$$$$$$$$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$

  (1)  004566  104003                        ERROR   3               ;/BUFFER REG. COULD NOT BE LOADED
  (1)                                                                ;/TO A ZERO.
  (2)
                                     ;;$$$$$$$$$$$$$$$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$

  (1)  004570                        2$:
  (1)
```

```
 6042
  (5)                                ;;**********.**********************************************
  (4)                                ;*TEST 17       *TEST THAT PATERN 052525 WILL SET AND CLEAR IN BUFFER REG.
  (4)                                ;;*****************************************************************
  (3)  004570  000004                TST17:  SCOPE
  (1)
  (1)  004572  005077  174624                CLR     @ABR              ;/CLEAR THE BUFFER REG.
  (1)  004576  012737  052525  001124        MOV     #052525,$GDDAT    ;/RECORD PATTERN: 052525 .
  (1)  004604  013777  001124  174610        MOV     $GDDAT,@ABR       ;/SET PATTERN IN BUFFER REG.
  (1)  004612  017737  174604  001126        MOV     @ABR,$BDDAT       ;/READ THE BUFFER REG.
  (1)
  (1)  004620  023737  001124  001126        CMP     $GDDAT,$BDDAT     ;/DID THE PATTERN SET OK?
  (1)  004626  001402                        BEQ     1$                ;/YES-TRY CLEARING IT.
  (1)
  (2)
                                     ;;$$$$$$$$$$$$$$$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$

  (1)  004630  104003                        ERROR   3                 ;/ERROR PATTERN 052525 FAILED TO
  (1)                                                                  ;/SET PROPERLY IN BUFFER REG.
  (2)
                                     ;;$$$$$$$$$$$$$$$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$

  (1)  004632  000412                        BR      2$                ;/GOTO SCOPE LOOP.
  (1)
  (1)  004634  042777  052525  174560  1$:   BIC     #052525,@ABR      ;/TRY CLEARING PATTERN.
  (1)  004642  005037  001124                CLR     $GDDAT            ;/EXPECT ZERO BACK.
  (1)  004646  017737  174550  001126        MOV     @ABR,$BDDAT       ;/READ BUFFER REG.,WAS IT ZERO?
  (1)  004654  001401                        BEQ     2$                ;/YES-NEXT TEST.
  (1)
  (2)
                                     ;;$$$$$$$$$$$$$$$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$

  (1)  004656  104003                        ERROR   3                 ;/BUFFER REG. COULD NOT BE LOADED
  (1)                                                                  ;/TO A ZERO.
  (2)
                                     ;;$$$$$$$$$$$$$$$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$

  (1)  004660                        2$:
  (1)
```

```
6044                                            .SBTTL  *
6045                                            .SBTTL  * PHASE 2 ADVANCED BASIC LOGIC TESTS
6046                                            .SBTTL  *
6047
6056
6057                                    ;;**********************************************************************
 (3)                                    ;*TEST 20        *TEST THE LOW BYTE OPERATION OF CLOCK'S STATUS REGISTER
 (4)                                    ;
 (4)                                    ;*
 (4)                                    ;*WE CAN SUCCESSFULLY WRITE EVERY BIT IN STATUS REG A
 (4)                                    ;*NOW LETS CHECK THE BYTE OPERATION OF THIS REGISTER.
 (4)                                    ;*
 (4)                                    ;
 (3)                                    ;;**********************************************************************
 (2) 004660  000004                     TST20:  SCOPE
 (1) 004662  012737  000050  001160             MOV     #50,$TIMES      ;;DO 50 ITERATIONS
6058
6059 004670  005077  174524                     CLR     @ASR            ;MAKE SURE THE STATUS REGISTER IS CLEAR.
6060 004674  112777  127677  174516             MOVB    #127677,@ASR    ;TRY WRITING ALL BITS IN THE
6061                                                                     ;STATUS REGISTER. LOGIC SHOULD PREVENT IT
6062                                                                     ;FROM BEING WRITTEN INTO BECAUSE
6063                                                                     ;WE ARE USING A DATOB INSTRUCTION.
6064
6065 004702  017777  174512  174216             MOV     @ASR,@$BDDAT    ;NOW EXAMINE THE
6066                                                                     ;STATUS REGISTER.
6067 004710  013737  001126  001124             MOV     $BDDAT,$GDDAT   ;FIX $GDDAT FOR ERROR TYPEOUT IF
6068 004716  105037  001125                     CLRB    $GDDAT+1        ;ANY RROR HAS OCCURRED, UPPER BYTE CLEARED.
6069
6070 004722  105737  001127                     TSTB    $BDDAT+1        ;ARE ANY BITS IN THE UPPER BYTE
6071                                                                     ;OF THE STATUS REGISTER SET?
6072 004726  001401                             BEQ     1$              ;BRANCH NEXT TEST IF UPPER BYTE=0.
6073
6074
                                        ;;$$$$$$$$$$$$$$$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$

6075 004730  104001                             ERROR   1               ;ERROR - WROTE INTO UPPER BYTE OF
6076                                                                     ;CLOCK'S STATUS WHEN
6077                                                                     ;DOING A DATOB TO THE LOW BYTE.
6078
6079
                                        ;;$$$$$$$$$$$$$$$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$

6080 004732                             1$:
6081
```

```
                                ;;*****************************************************************
                                ;*TEST 21       *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.
                                ;*
                                ;;*****************************************************************
004732  000004                TST21:  SCOPE
004734  012737  000050  001160        MOV     #50,$TIMES      ;;DO 50 ITERATIONS

004742  005077  174452                CLR     @ASR            ;CLEAR THE STATUS REGISTER.

004746  005237  001420                INC     ASR             ;ADD #1 TO THE STATUS REGISTER'S ADDRESS
                                                              ;SO THAT WE WILL BE WRITING INTO
                                                              ;THE HIGH BYTE.

004752  112777  177213  174440        MOVB    #177213,@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.

004760  005337  001420                DEC     ASR             ;FIX ADDRESS OF THE STATUS REGISTER ADDR.
                                                              ;SO WE CAN LOOK AT THE WHOLE WORD.
004764  017737  174430  001126        MOV     @ASR,$BDDAT     ;READ BACK WHAT THE STATUS REG. CONTAINS
004772  013737  001126  001124        MOV     $BDDAT,$GDDAT   ;FIX $GDDAT FOR ERROR TYPEOUT IF AN ERROR
005000  105037  001124                CLRB    $GDDAT          ;OCCURRED, LOWER BYTE CLEARED.
005004  105737  001126                TSTB    $BDDAT          ;IS LOWER BYTE CLEAR?
005010  001401                        BEQ     1$              ;BR IF YES TO NEXT SUBTEST.

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

005012  104001                        ERROR   1               ;ERROR - WROTE INTO LOWER BYTE
                                                              ;OF CLOCKS STATUS REGISTER WHEN
                                                              ;DOING A DATOB TO THE HIGH BYTE.

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

005014                          1$:
```

```
 6112                                   ;;*********************************************************************
  (3)                                   ;*TEST 22       *TEST CLOCK'S COUNT REGISTER WITH 125252 PATTERN
  (3)                                   ;;*********************************************************************
  (2)  005014  000004                   TST22:  SCOPE
  (1)  005016  012737  000040  001160            MOV     #40,$TIMES      ;;DO 40 ITERATIONS
 6113
 6114  005024  005077  174370                    CLR     @ASR            ;SELECT MODE 0.
 6115  005030  012777  125252  174364            MOV     #125252,@ABR    ;LOAD THE BUFFER REGISTER WITH
 6116                                                                    ;PATTERN 125252. IT WILL BE
 6117                                                                    ;TRANSFERRED TO THE COUNT REGISTER
 6118                                                                    ;SINCE THIS IS MODE 0.
 6119  005036  052777  000001  174354            BIS     #BIT0,@ASR      ;SET GO BIT(ALLOWS BUFFER-COUNT REG XFER).
 6120
 6121  005044  012737  125252  001124            MOV     #125252,$GDDAT  ;SET EXPECTED TO PATTERN IN CASE OF
 6122                                                                    ;NEED OF ERROR TYPEOUT.
 6123                                                                    ;/-RDCLK-
  (1)  005052  017746  174342                    MOV     @ASR,-(SP)      ;/SAVE CSR
  (1)  005056  052777  004007  174334            BIS     #4007,@ASR      ;/SET MODE 3,DIS INTR OSC NO RATE
  (1)                                                                   ;/THIS MUST BE DONE IN
  (1)                                                                   ;/ORDER TO XFERR COUNTER
  (1)                                                                   ;/TO BUFFER ON ST2.
  (1)  005064  052777  001000  174326            BIS     #BIT9,@ASR      ;/GENERATE ON ST2 PULSE
  (1)  005072  012746  000010                    MOV     #8.,-(SP)       ;/NOW GENERATE
  (1)  005076  052777  000400  174314  64$:      BIS     #BIT8,@ASR
  (1)  005104  005316                            DEC     (SP)            ;/EIGHT ST1 PULSES
  (1)  005106  001373                            BNE     64$
  (1)  005110  005726                            TST     (SP)+           ;/RESET STACK
  (1)  005112  017737  174304  001126            MOV     @ABR,$BDDAT     ;/READ THE PRESET BUFFER,
  (1)                                                                   ;/PREVIOUS COUNTER
  (1)  005120  012677  174274                    MOV     (SP)+,@ASR      ;/CONTENTS ARE IN $BDDAT.
  (1)  005124  005737  001126                    TST     $BDDAT          ;/RESTORE CSR
 6124
 6125  005130  023737  001124  001126            CMP     $GDDAT,$BDDAT   ;DID ALL THE BITS AND NO OTHER BITS
 6126                                                                    ;COME THROUGH?
 6127  005136  001401                            BEQ     1$              ;BR IF YES TO NEXT TEST.
 6128
 6129
                                        ;;$$$$$$$$$$$$$$$$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$

 6130  005140  104005                            ERROR   5               ;DATA ERROR CLOCK - PATTERN ''125252''
 6131                                                                    ;FAILED TO TRANSFER PROPERLY BETWEEN
 6132                                                                    ;BUFFER AND COUNT REGISTERS.
 6133
 6134
                                        ;;$$$$$$$$$$$$$$$$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$

 6135  005142                            1$:
```

```
                        ;;*********************************************************************
                        ;*TEST 23       *TEST CLOCKS COUNTER REGISTER WITH 052525 PATTERN
                        ;;*********************************************************************
                        TST23:  SCOPE
005144  012737  000040  001160          MOV     #40,$TIMES      ;;DO 40 ITERATIONS

005152  005077  174242                  CLR     @ASR            ;SELECT MODE 0.
005156  012777  052525  174236          MOV     #052525,@ABR    ;LOAD THE BUFFER REGISTER WITH
                                                                ;PATTERN 052525. IT WILL BE
                                                                ;TRANSFERRED TO THE COUNT REGISTER
                                                                ;SINCE THIS IS MODE 0.
005164  052777  000001  174226          BIS     #BIT0,@ASR      ;SET BO BIT(ALLOWS BUFFER-COUNT REG XFER).

005172  012737  052525  001124          MOV     #052525,$GDDAT  ;SET EXPECTED TO PATTERN IN CASE OF
                                                                ;NEED OF ERROR TYPEOUT.
                                                                ;/-RDCLK-
005200  017746  174214                  MOV     @ASR,-(SP)      ;/SAVE CSR
005204  052777  004007  174206          BIS     #4007,@ASR      ;/SET MODE 3,DIS INTR OSC NO RATE
                                                                ;/THIS MUST BE DONE IN
                                                                ;/ORDER TO XFERR COUNTER
                                                                ;/TO BUFFER ON ST2.
005212  052777  001000  174200          BIS     #BIT9,@ASR      ;/GENERATE ON ST2 PULSE
005220  012746  000010                  MOV     #8.,-(SP)       ;/NOW GENERATE
005224  052777  000400  174166  64$:    BIS     #BIT8,@ASR
005232  005316                          DEC     (SP)            ;/EIGHT ST1 PULSES
005234  001373                          BNE     64$
005236  005726                          TST     (SP)+           ;/RESET STACK
005240  017737  174156  001126          MOV     @ABR,$BDDAT     ;/READ THE PRESET BUFFER,
                                                                ;/PREVIOUS COUNTER
005246  012677  174146                  MOV     (SP)+,@ASR      ;/CONTENTS ARE IN $BDDAT.
005252  005737  001126                  TST     $BDDAT          ;/RESTORE CSR

005256  023737  001124  001126          CMP     $GDDAT,$BDDAT   ;DID ALL THE BITS AND NO OTHER BITS
                                                                ;COME THROUGH?
005264  001401                          BEQ     1$              ;BR IF YES TO NEXT TEST.


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

005266  104005                          ERROR   5               ;DATA ERROR CLOCK - PATTERN '052525''
                                                                ;FAILED TO TRANSFER PROPERLY BETWEEN
                                                                ;BUFFER AND COUNT REGISTERS.


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

005270                  1$:
```

```
                                ;;*****************************************************************
                                ;*TEST 24       *TEST THAT INIT CLEARS STATUS REGISTER
                                ;*
                                ;*TESTING OF THE INIT LOGIC AS RECEIVED FROM THE QBUS AND BUFFERED
                                ;*TO STATUS REGISTER F/FS.
                                ;*
                                ;*****************************************************************
005270  000004                  TST24:  SCOPE
005272  012737  000005  001160          MOV     #5,$TIMES       ;;DO 5 ITERATIONS

005300  005037  001124          CLR     $GDDAT          ;EXPECTED DATA IS ZERO.
005304  012777  176377  174106  MOV     #176377,@ASR    ;SET ALL BITS IN THE STATUS REG.

005312  000005                  RESET                   ;SYSTEM INITIALIZE.
005314  052777  000100  173622  BIS     #BIT6,@$TKS     ;ENABLE TKB INTR.

005322  017737  174072  001126  MOV     @ASR,$BDDAT     ;READ THE STATUS REG., ALL BITS SHOULD
                                                        ;HAVE BEEN CLEARED BY INIT.
005330  001402                  BEQ     1$              ;BR IF YES TO NEXT TEST.


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

005332  104002                  ERROR   2               ;ERROR - SYSTEM INIT FAILED TO CLEAR
                                                        ;STATUS REGISTER CLOCK A.


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

005334  000414                  BR      TST25           ;;
005336                  1$:
005336  005737  001476          TST     DWARF           ;TEST DWARF/TESTOR INDICATOR
005342  001411                  BEQ     TST25           ;;
005344  100010                  BPL     TST25           ;;
005346  052777  016002  174064  BIS     #BIT11!BIT12!BIT10!BIT1,@DR2    ;ENABLE ST1,ST2 TO LATCH.
005354  032777  000006  174054  BIT     #6,@DR          ;ST1,ST2, OVERFLOW SET?
005362  001401                  BEQ     TST25           ;;


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

005364  104006                  ERROR   6               ;INIT FAILED TO CLEAR
                                                        ;ST1,ST2, AND/OR OVERFLOW


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

```
 6207                                   ;;*********************************************************************
  (3)                                   ;*TEST 25       *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) 005366  000004                    TST25:  SCOPE
  (1) 005370  012737  000005  001160            MOV     #5,$TIMES       ;;DO 5 ITERATIONS
 6208
 6209 005376  005037  001124            CLR     $GDDAT          ;CLEAR EXPECTED DATA.
 6210 005402  012777  177777  174012    MOV     #177777,@ABR    ;SET ALL BITS IN THE BUFFER REGISTER.
 6211
 6212 005410  000005                    RESET                   ;ISSUE SYSTEM INITIALIZE.
 6213 005412  052777  000100  173524    BIS     #BIT6,@$TKS     ;ENABLE TKB INTR.
 6214
 6215 005420  017737  173776  001126    MOV     @ABR,$BDDAT     ;READ THE BUFFER REGISTER, ALL BITS
 6216                                                            ;SHOULD HAVE BEEN CLEARED BY INIT.
 6217 005426  001401                    BEQ     1$              ;BR IF YES TO NEXT SUBTEST.
 6218
 6219
                                        ;;$$$$$$$$$$$$$$$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$

 6220 005430  104003                    ERROR   3               ;ERROR - SYSTEM INIT FAILED
 6221                                                           ;TO CLEAR BUFFER REGISTER A.
 6222
 6223
                                        ;;$$$$$$$$$$$$$$$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$

 6224 005432                            1$:
 6225 005432  005737  001476                    TST     DWARF           ;CHECK DWARF/TESTOR INDICATOR
 6226 005436  001404                            BEQ     TST26           ;;BR IF NO DWARF/TESTER
 6227 005440  100003                            BPL     TST26           ;;BR IF ONLY DWARF
 6228 005442  052777  016000  173770            BIS     #BIT11!BIT12!BIT10,@DR2 ;ENABLE THEM
```

```
                        ;;*****************************************************************
                        ;*TEST 26       *TEST THE SETTING OF MAINTENANCE ST2 IN CLOCK BIT 15 TO SET
                        ;;*****************************************************************
(2) 005450  000004      TST26:  SCOPE

6232 005452  005077  173742        CLR     @ASR            ;2 CLEAR THE CSR
6233 005456  012777  000001 173734 MOV     #1,@ASR         ;SET THE GO BIT(ENABLES ST2 TO SET FLG).
6234 005464  052777  001000 173726 BIS     #BIT9,@ASR      ;SET MAINTENANCE ST2.
6235
6236 005472  005777  173722        TST     @ASR            ;DID BIT15 (ST2 FLAG) SET?
6237 005476  100402                BMI     1$              ;BR IF YES - NEXT TEST
6238
6239
                        ;;$$$$$$$$$$$$$$$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$

6240 005500  104001                ERROR   1               ;ERROR - MAINTENANCE ST2 (BIT9)
6241                                                        ;DID NOT SET BIT15 (ST2 FLAG).
6242
6243
                        ;;$$$$$$$$$$$$$$$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$

6244 005502  000422                BR      TST27           ;;
6245 005504  005737  001476 1$:    TST     DWARF           ;CHECK DWRAF/TESTOR INDICATOR
6246 005510  001407                BEQ     2$              ;;BR IF NONE
6247 005512  100016                BPL     TST27           ;;BR IF DWARF
6248 005514  032777  000004 173714 BIT     #BIT2,@DR       ;DID EXTERNAL ST2 GET SET?
6249 005522  001002                BNE     2$
6250
                        ;;$$$$$$$$$$$$$$$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$

6251 005524  104006                ERROR   6               ;ST2 OUT NOT DETECTED
6252                                                        ;BY TESTOR
6253
                        ;;$$$$$$$$$$$$$$$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$

6254 005526  000410                BR      TST27           ;;
6255
6256 005530  042777  100000 173662 2$:    BIC     #BIT15,@ASR     ;NOW TRY CLEARING ST2 FLAG.
6257 005536  032777  100000 173654        BIT     #BIT15,@ASR     ;DID IT CLEAR??
6258 005544  001401                BEQ     TST27           ;;
6259
                        ;;$$$$$$$$$$$$$$$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$

6260 005546  104001                ERROR   1               ;ST2 FLAG FAILED TO CLEAR.
6261
                        ;;$$$$$$$$$$$$$$$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$
```

```
                        ;;*****************************************************************
                        ;*TEST 27        *TEST THAT ST1 FLAG SETS ON MAINTENANCE ST1
                        ;;*****************************************************************
 (2) 005550 000004      TST27:  SCOPE
6264 005552 005077 173642       CLR     @ASR            ;2 CLEAR THE CSR
6265 005556 052777 000400 173634        BIS     #BIT8,@ASR      ;2 SET MAIN. ST1
6266 005564 032777 002000 173626        BIT     #BIT10,@ASR     ;2 DID ST1 FLAG SET?
6267 005572 001001              BNE     1$              ;2 YES - CONTINUE
6268
                        ;;$$$$$$$$$$$$$$$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$

6269 005574 104001              ERROR   1               ;2 ST1 FLAG FAILED TO SET
6270
                        ;;$$$$$$$$$$$$$$$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$

6271 005576 042777 002000 173614 1$:    BIC     #BIT10,@ASR     ;2 NOW TRY CLEARING IT.
6272 005604 032777 002000 173606        BIT     #BIT10,@ASR     ;2 DID IT CLEAR?
6273 005612 001401              BEQ     TST30           ;;
6274
                        ;;$$$$$$$$$$$$$$$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$

6275 005614 104001              ERROR   1               ;2 ST1 FLAG FAILED TO CLEAR
6276
                        ;;$$$$$$$$$$$$$$$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$

6277
6278                    ;;*****************************************************************
                        ;*TEST 30        *TEST THAT BIT00 IN CLOCK STATUS REG. WILL SET WHEN BIT13 AND MAIN. ST2
                        ;;*****************************************************************
 (2) 005616 000004      TST30:  SCOPE
6279 005620 012777 020000 173572        MOV     #BIT13,@ASR     ;SET ''ST2 ENB COUNTER'' IN CLK  STATUS REG.
6280 005626 052777 001000 173564        BIS     #BIT9,@ASR      ;GENERATE A MAINTENANCE ST2.
6281 005634 032777 000001 173556        BIT     #BIT00,@ASR     ;DID BIT00 (GO) SET?
6282 005642 001001              BNE     1$              ;BR IF YES - NEXT TEST.
6283
                        ;;$$$$$$$$$$$$$$$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$

6284 005644 104001              ERROR   1               ;ERROR - BIT00 OF CLOCK'S STATUS REGISTER
6285                                                    ;FAILED TO SET WHEN BIT13 WAS SET
6286                                                    ;AND A MAINTENANCE ST2 GENERATED.
6287
                        ;;$$$$$$$$$$$$$$$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$

6288 005646 032777 020000 173544 1$:    BIT     #BIT13,@ASR     ;DID BIT 13 CLEAR ITSELF??
6289 005654 001401              BEQ     2$              ;YES GO AHEAD.
6290
                        ;;$$$$$$$$$$$$$$$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$

6291 005656 104001              ERROR   1               ;BIT 13 FAILED TO CLEAR.
6292
                        ;;$$$$$$$$$$$$$$$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$

6293 005660 005077 173534 2$:   CLR     @ASR            ;LEAVE SUBTEST WITH CLOCK CLEAR.
```

```
                                        .SBTTL  *
                                        .SBTTL  *PHASE 3 COUNT TESTS
                                        .SBTTL  *

                                ;;**********************************************************************
                                ;*TEST 31        *TEST TO SEE IF THE COUNTER WILL INCREMENT
                                ;;**********************************************************************
 (2)  005664  000004            TST31:  SCOPE
 (1)  005666  012737  000010  001160    MOV     #10,$TIMES      ;;DO 10 ITERATIONS

 6301 005674  005077  173520            CLR     @ASR            ;CLEAR THE CSR.
 6302 005700  005077  173516            CLR     @ABR            ;CLEAR THE BUFFER
 6303 005704  052777  000061  173506    BIS     #BIT5!BIT4!BIT0,@ASR ;SET RATE:ST1, GO.
 6304 005712  052777  000400  173500    BIS     #BIT8,@ASR      ;GENERATE A MAINTENANCE ST1.
                                                                ;DID THE CLOCK COUNT?
                                                                ;/-RDCLK-
 (1)  005720  017746  173474            MOV     @ASR,-(SP)      ;/SAVE CSR
 (1)  005724  052777  004007  173466    BIS     #4007,@ASR      ;/SET MODE 3,DIS INTR OSC NO RATE
 (1)                                                            ;/THIS MUST BE DONE IN
 (1)                                                            ;/ORDER TO XFERR COUNTER
 (1)                                                            ;/TO BUFFER ON ST2.
 (1)  005732  052777  001000  173460    BIS     #BIT9,@ASR      ;/GENERATE ON ST2 PULSE
 (1)  005740  012746  000010            MOV     #8.,-(SP)       ;/NOW GENERATE
 (1)  005744  052777  000400  173446  64$:    BIS     #BIT8,@ASR
 (1)  005752  005316                    DEC     (SP)            ;/EIGHT ST1 PULSES
 (1)  005754  001373                    BNE     64$
 (1)  005756  005726                    TST     (SP)+           ;/RESET STACK
 (1)  005760  017737  173436  001126    MOV     @ABR,$BDDAT     ;/READ THE PRESET BUFFER,
 (1)                                                            ;/PREVIOUS COUNTER
 (1)  005766  012677  173426            MOV     (SP)+,@ASR      ;/CONTENTS ARE IN $BDDAT.
 (1)  005772  005737  001126            TST     $BDDAT          ;/RESTORE CSR
 6307 005776  001001                    BNE     1$              ;YES, NEXT TEST.

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

 6309 006000  104006                    ERROR   6               ;CLOCK FAILED TO INCREMENT.

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

 6312 006002                    1$:
```

```
 6323                                   ;;*********************************************************************
  (3)                                   ;*TEST 32        *SEE IF CLOCK WILL COUNT UP FROM A ZERO BASE, RATE:ST1
  (4)                                   ;*
  (4)                                   ;*      NOTE:    IN THIS TEST, LOOP ON ERROR WILL CAUSE A LOOP
  (4)                                   ;*               ON THE FAILING COUNT PATTERN;
  (4)                                   ;*               WHILE LOOP ON TEST WILL START THE TEST
  (4)                                   ;*               AND THE CLOCK FROM ZERO TO THE FAILING COUNT.
  (4)                                   ;*
  (3)                                   ;*********************************************************************
  (2)  006002  000004                   TST32:  SCOPE
  (1)  006004  012737  000010  001160            MOV     #10,$TIMES      ;;DO 10 ITERATIONS
 6324
 6325  006012  005077  173402                    CLR     @ASR            ;CLEAR THE CSR.
 6326  006016  005077  173400                    CLR     @ABR            ;CLEAR THE BUFFER REG
 6327  006022  012737  000000  001124            MOV     #0,$GDDAT       ;CLEAR EXPECTED.
 6328  006030  012737  006170  001110            MOV     #2$,$LPERR
 6329
 6330  006036  012777  000061  173354  1$:       MOV     #BIT5!BIT4!BIT0,@ASR ;START CLOCK, RATE:ST1.
 6331
 6332  006044  052777  000400  173346            BIS     #BIT8,@ASR      ;GENERATE A MAINTENANCE ST1
 6333                                                                    ;CLOCK SHOULD COUNT ONCE.
 6334  006052  005737  001476                    TST     DWARF           ;CHECK THE DWARF/TESTER INDICATOR
 6335  006056  001407                            BEQ     10$             ;;BR IF NONE
 6336  006060  100056                            BPL     TST33           ;;BR IF DWARF
 6337  006062  032777  000002  173346            BIT     #BIT1,@DR       ;YES - DID ST1 GET SET?
 6338  006070  001002                            BNE     10$             ;YES
 6339

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

 6340  006072  104006                            ERROR   6               ;ST1 OUT NOT DETECTED
 6341                                                                    ;BY TESTOR
 6342

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

 6343  006074  000450                            BR      TST33           ;;
 6344  006076                         10$:
 6345                                                                    ;/-RDCLK1-
  (1)  006076  017746  173316                    MOV     @ASR,-(SP)      ;/SAVE CSR CONTENTS.
  (1)  006102  052777  000005  173310            BIS     #5,@ASR         ;/SET TO MODE 2,GO
  (1)  006110  042777  100000  173302            BIC     #BIT15,@ASR     ;/CLR ST FLAG.
  (1)  006116  052777  001000  173274            BIS     #BIT9,@ASR      ;/GENERATE ST2 PULSE.
  (1)  006124  017737  173272  001126            MOV     @ABR,$BDDAT     ;/READ COUNT REG.
  (1)  006132  052677  173262                    BIS     (SP)+,@ASR      ;/RESTORE CSR.
  (1)  006136  005737  001126                    TST     $BDDAT          ;/PREVIOUS CONTENTS OF COUNT REG
  (1)                                                                   ;/IN $BDDAT.
 6346  006142  005237  001124                    INC     $GDDAT          ;COUNT=OLD COUNT+1
 6347  006146  013737  001124  001446            MOV     $GDDAT,$TMP0    ;FOR ERROR TYPEOUT.
 6348  006154  023737  001124  001126            CMP     $GDDAT,$BDDAT   ;COUNT READ=COUNT EXP'ED?
 6349  006162  001402                            BEQ     2$              ;YES - SEE IF WE'RE THROUGH.
 6350

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

 6351  006164  104011                            ERROR   11              ;CLOCK FAILED TO COUNT UP PROPERLY.
 6352

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

```
 6353  006166  000413                          BR      3$              ;GOTO SCOPE LOOP.
 6354
 6355  006170  005077  173224          2$:     CLR     @ASR
 6356  006174  005737  001202                  TST     $PASS           ;TEST IF FIRST PASS
 6357  006200  001406                          BEQ     TST33           ;;BR IF FIRST
 6358  006202  013777  001124  173212          MOV     $GDDAT,@ABR
 6359  006210  005737  001124                  TST     $GDDAT          ;ALL DONE?
 6360  006214  001310                          BNE     1$              ;NO DO NEXT INCREMENT.
 6361  006216                          3$:
 6362                                  ;;*****************************************************************
   (3)                                 ;*TEST 33       *TEST THAT OVERFLOW (CSR BIT07) WILL SET ON OVERFLOW
   (3)                                 ;;*****************************************************************
   (2)  006216  000004                  TST33:  SCOPE
 6363
 6364  006220  005737  001476                  TST     DWARF           ;TEST DWARF/TESTER INDICATOR
 6365  006224  001406                          BEQ     2$              ;;BR IF NONE
 6366  006226  100040                          BPL     TST34           ;;BR IF DWARF
 6367
 6368  006230  052777  020002  173202          BIS     #BIT13!BIT1,@DR2
 6369  006236  012700  000010                  MOV     #8.,R0          ;SET TIME OUT NUMBER.
 6370  006242                          2$:
 6371  006242  005077  173152                  CLR     @ASR            ;CLEAR THE CSR
 6372  006246  012777  177777  173146          MOV     #-1,@ABR        ;SET PRESET BUFFER TO ALL ONES.
 6373
 6374  006254  052777  000061  173136          BIS     #BIT5!BIT4!BIT0,@ASR ;START CLOCK, RATE ST1.
 6375
 6376  006262  052777  000400  173130          BIS     #BIT8,@ASR      ;COUNT CLOCK ONCE, OVERFLOW
 6377                                                                  ;SHOULD OCCUR.
 6378  006270  105777  173124                  TSTB    @ASR            ;DID OVERFLOW SET?
 6379  006274  100402                          BMI     1$              ;YES - THEN NEXT TEST
 6380
 6381
                                  ;;$$$$$$$$$$$$$$$$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$

 6382  006276  104006                          ERROR   6               ;ERROR - OVERFLOW, CSR BIT0?
 6383                                                                  ;FAILED TO SET ON OVERFLOW
 6384  006300  000413                          BR      TST34           ;;
 6385  006302  005737  001476          1$:     TST     DWARF           ;CHECK DWARF/TESTER INDICATOR
 6386  006306  001410                          BEQ     TST34           ;;BR IF NONE
 6387  006310  100007                          BPL     TST34           ;;BR IF DWARF
 6388  006312  032777  000010  173116          BIT     #BIT3,@DR
 6389  006320  001003                          BNE     TST34           ;;
 6390  006322  005300                          DEC     R0              ;DID WE ALLOW ENOUGH TIME??
 6391  006324  001366                          BNE     1$              ;NO-THEN WAIT.
 6392
                                  ;;$$$$$$$$$$$$$$$$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$

 6393  006326  104006                          ERROR   6               ;OVERFLOW OUT NOT DETECTED
 6394                                                                  ;BY TESTOR
 6395
                                  ;;$$$$$$$$$$$$$$$$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$
```

```
 6397                                   ;;*****************************************************************
  (3)                                   ;*TEST 34       *TEST THAT OVERFLOW WILL CLEAR THE GO BIT
  (3)                                   ;;*****************************************************************
  (2)  006330  000004                   TST34:  SCOPE
 6398
 6399  006332  005077  173062                   CLR     @ASR            ;CLEAR THE CSR.
 6400
 6401  006336  012777  177777  173056           MOV     #-1,@ABR        ;PRESET CLOCK TO -1.
 6402
 6403  006344  052777  000061  173046           BIS     #BIT5!BIT4!BIT0,@ASR ;START CLOCK, RATE:ST1
 6404
 6405  006352  052777  000400  173040           BIS     #BIT8,@ASR      ;COUNT ONCE, OVERFLOW
 6406                                                                    ;SHOULD OCCUR CLEARING
 6407                                                                    ;ENABLE (CSR BIT00)
 6408
 6409  006360  032777  000001  173032           BIT     #BIT0,@ASR      ;DID THE ENABLE CLEAR?
 6410  006366  001401                           BEQ     1$              ;YES - NEXT TEST.
 6411
 6412                                   ;;$$$$$$$$$$$$$$$$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$

 6413  006370  104006                           ERROR   6               ;ERROR - OVERFLOW FAILED
 6414                                                                    ;TO CLEAR ENABLE (CSR BIT00)
 6415
 6416  006372                           1$:
 6417
 6418                                   ;;*****************************************************************
  (3)                                   ;*TEST 35       *TEST THAT GO BIT DOES NOT CLEAR ON OVERFLOW, IF MODE 1
  (3)                                   ;;*****************************************************************
  (2)  006372  000004                   TST35:  SCOPE
 6419
 6420  006374  005077  173020                   CLR     @ASR            ;CLEAR THE CSR.
 6421  006400  012777  177777  173014           MOV     #-1,@ABR        ;PRESET BUFFER=ONE COUNT FROM OVERFLOW.
 6422  006406  052777  000063  173004           BIS     #63,@ASR        ;MODE 1, RATE:ST1, GO.
 6423
 6424  006414  052777  000400  172776           BIS     #BIT8,@ASR      ;GENERATE MAINTENANCE ST1.
 6425
 6426  006422  032777  000001  172770           BIT     #BIT0,@ASR      ;DID ENABLE (GO BIT) CLEAR?
 6427  006430  001001                           BNE     1$              ;NO (GOOD) NEXT TEST.
 6428
                                       ;;$$$$$$$$$$$$$$$$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$

 6429  006432  104006                           ERROR   6               ;GO BIT CLEARED ON OVERFLOW
 6430                                                                    ;WHEN MODE 1 WAS SELECTED
 6431
                                       ;;$$$$$$$$$$$$$$$$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$

 6432
 6433  006434  005077  172760           1$:     CLR     @ASR            ;CLEAR THE CLOCK.
 6434
```

```
 6472
  (5)                                   ;;*****************************************************************
  (4)                                   ;*TEST 36        *TEST THE ABILITY OF CLOCK TO COUNT AT 1MHZ RATE
  (5)                                   ;*
  (5)                                   ;*THIS TEST IS DESIGNED TO TEST THE CLOCK'S ABILITY
  (5)                                   ;*TO COUNT AT 1MHZ RATE.
  (5)                                   ;*
  (4)                                   ;;*****************************************************************
  (3)  006440  000004                   TST36:  SCOPE
  (2)  006442  012737  000005  001160           MOV     #5,$TIMES       ;;DO 5 ITERATIONS
  (1)  006450  005077  172744           1$:     CLR     @ASR            ;/CLEAR CLOCK
  (1)  006454  005077  172742                   CLR     @ABR            ;/CLEAR PRESET BUFFER
  (1)  006460  012777  000011  172732           MOV     #BIT0!10,@ASR   ;/START CLOCK, MODE0, RATE:1MHZ
  (1)  006466  005000                           CLR     R0              ;/NOW WE'LL DO A LITTLE DELAY. THIS DELAY
  (1)  006470  005200                   1$:     INC     R0              ;/WILL AMOUNT TO APPROXIMATELY
  (1)  006472  001376                           BNE     1$              ;/369 MS.
  (1)
  (2)                                           ;/-RDCLK-
  (2)  006474  017746  172720                   MOV     @ASR,-(SP)      ;/SAVE CSR
  (2)  006500  052777  004007  172712           BIS     #4007,@ASR      ;/SET MODE 3,DIS INTR OSC NO RATE
  (2)                                           ;/THIS MUST BE DONE IN
  (2)                                           ;/ORDER TO XFERR COUNTER
  (2)                                           ;/TO BUFFER ON ST2.
  (2)  006506  052777  001000  172704           BIS     #BIT9,@ASR      ;/GENERATE ON ST2 PULSE
  (2)  006514  012746  000010                   MOV     #8.,-(SP)       ;/NOW GENERATE
  (2)  006520  052777  000400  172672  64$:     BIS     #BIT8,@ASR
  (2)  006526  005316                           DEC     (SP)            ;/EIGHT ST1 PULSES
  (2)  006530  001373                           BNE     64$
  (2)  006532  005726                           TST     (SP)+           ;/RESET STACK
  (2)  006534  017737  172662  001126           MOV     @ABR,$BDDAT     ;/READ THE PRESET BUFFER,
  (2)                                           ;/PREVIOUS COUNTER
  (2)  006542  012677  172652                   MOV     (SP)+,@ASR      ;/CONTENTS ARE IN $BDDAT.
  (2)  006546  005737  001126                   TST     $BDDAT          ;/RESTORE CSR
  (1)  006552  001004                           BNE     2$              ;/YES - NEXT TEST.
  (1)  006554  105766  177776                   TSTB    -2(SP)          ;/AT HIGH RATE MAY HAVE HAD OVERFLOW
  (1)                                           ;/NOTE: CSR HAD BEEN PUT ON STACK.
  (1)  006560  100401                           BMI     2$              ;/NEXT TEST IF OVERFLOW.
  (2)
                                        ;;$$$$$$$$$$$$$$$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$

  (1)  006562  104006                           ERROR   6               ;/CLOCK FAILED TO COUNT AT
  (1)                                           ;/RATE:1MHZ
  (2)
                                        ;;$$$$$$$$$$$$$$$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$

  (1)  006564  005077  172630           2$:     CLR     @ASR            ;/CLEAR THE CLOCK.
  (1)
  (1)
```

```
 6474
  (5)                                ;;**********.*************************************************
  (4)                                ;*TEST 37       *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)  006570  000004                TST37:  SCOPE
  (2)  006572  012737  000005  001160        MOV     #5,$TIMES       ;;DO 5 ITERATIONS
  (1)  006600  005077  172614                 CLR     @ASR            ;/CLEAR CLOCK
  (1)  006604  005077  172612                 CLR     @ABR            ;/CLEAR PRESET BUFFER
  (1)  006610  012777  000021  172602         MOV     #BIT0!20,@ASR   ;/START CLOCK, MODE0, RATE:100KHZ
  (1)  006616  005000                         CLR     R0              ;/NOW WE'LL DO A LITTLE DELAY. THIS DELAY
  (1)  006620  005200                1$:      INC     R0              ;/WILL AMOUNT TO APPROXIMATELY
  (1)  006622  001376                         BNE     1$              ;/369 MS.
  (1)
  (2)                                                                 ;/-RDCLK-
  (2)  006624  017746  172570                 MOV     @ASR,-(SP)      ;/SAVE CSR
  (2)  006630  052777  004007  172562         BIS     #4007,@ASR      ;/SET MODE 3,DIS INTR OSC NO RATE
  (2)                                                                 ;/THIS MUST BE DONE IN
  (2)                                                                 ;/ORDER TO XFERR COUNTER
  (2)                                                                 ;/TO BUFFER ON ST2.
  (2)  006636  052777  001000  172554         BIS     #BIT9,@ASR      ;/GENERATE ON ST2 PULSE
  (2)  006644  012746  000010                 MOV     #8.,-(SP)       ;/NOW GENERATE
  (2)  006650  052777  000400  172542  64$:    BIS     #BIT8,@ASR
  (2)  006656  005316                         DEC     (SP)            ;/EIGHT ST1 PULSES
  (2)  006660  001373                         BNE     64$
  (2)  006662  005726                         TST     (SP)+           ;/RESET STACK
  (2)  006664  017737  172532  001126         MOV     @ABR,$BDDAT     ;/READ THE PRESET BUFFER,
  (2)                                                                 ;/PREVIOUS COUNTER
  (2)  006672  012677  172522                 MOV     (SP)+,@ASR      ;/CONTENTS ARE IN $BDDAT.
  (2)  006676  005737  001126                 TST     $BDDAT          ;/RESTORE CSR
  (1)  006702  001004                         BNE     2$              ;/YES - NEXT TEST.
  (1)  006704  105766  177776                 TSTB    -2(SP)          ;/AT HIGH RATE MAY HAVE HAD OVERFLOW
  (1)                                                                 ;/NOTE: CSR HAD BEEN PUT ON STACK.
  (1)  006710  100401                         BMI     2$              ;/NEXT TEST IF OVERFLOW.
  (2)
                                     ;;$$$$$$$$$$$$$$$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$

  (1)  006712  104006                         ERROR   6               ;/CLOCK FAILED TO COUNT AT
  (1)                                                                 ;/RATE:100KHZ
  (2)
                                     ;;$$$$$$$$$$$$$$$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$

  (1)  006714  005077  172500        2$:      CLR     @ASR            ;/CLEAR THE CLOCK.
  (1)
  (1)
```

```
 6476
  (5)                                   ;;**********.*************************************************
  (4)                                   ;*TEST 40       *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)  006720  000004                   TST40:  SCOPE
  (2)  006722  012737  000005  001160           MOV     #5,$TIMES       ;;DO 5 ITERATIONS
  (1)  006730  005077  172464           CLR     @ASR            ;/CLEAR CLOCK
  (1)  006734  005077  172462           CLR     @ABR            ;/CLEAR PRESET BUFFER
  (1)  006740  012777  000031  172452   MOV     #BIT0!30,@ASR   ;/START CLOCK, MODE0, RATE:10KHZ
  (1)  006746  005000                   CLR     R0              ;/NOW WE'LL DO A LITTLE DELAY. THIS DELAY
  (1)  006750  005200                   1$:     INC     R0              ;/WILL AMOUNT TO APPROXIMATELY
  (1)  006752  001376                   BNE     1$              ;/369 MS.
  (1)
  (2)                                                           ;/-RDCLK-
  (2)  006754  017746  172440           MOV     @ASR,-(SP)      ;/SAVE CSR
  (2)  006760  052777  004007  172432   BIS     #4007,@ASR      ;/SET MODE 3,DIS INTR OSC NO RATE
  (2)                                                           ;/THIS MUST BE DONE IN
  (2)                                                           ;/ORDER TO XFERR COUNTER
  (2)                                                           ;/TO BUFFER ON ST2.
  (2)  006766  052777  001000  172424   BIS     #BIT9,@ASR      ;/GENERATE ON ST2 PULSE
  (2)  006774  012746  000010           MOV     #8.,-(SP)       ;/NOW GENERATE
  (2)  007000  052777  000400  172412   64$:    BIS     #BIT8,@ASR
  (2)  007006  005316                   DEC     (SP)            ;/EIGHT ST1 PULSES
  (2)  007010  001373                   BNE     64$
  (2)  007012  005726                   TST     (SP)+           ;/RESET STACK
  (2)  007014  017737  172402  001126   MOV     @ABR,$BDDAT     ;/READ THE PRESET BUFFER,
  (2)                                                           ;/PREVIOUS COUNTER
  (2)  007022  012677  172372           MOV     (SP)+,@ASR      ;/CONTENTS ARE IN $BDDAT.
  (2)  007026  005737  001126           TST     $BDDAT          ;/RESTORE CSR
  (1)  007032  001004                   BNE     2$              ;/YES - NEXT TEST.
  (1)  007034  105766  177776           TSTB    -2(SP)          ;/AT HIGH RATE MAY HAVE HAD OVERFLOW
  (1)                                                           ;/NOTE: CSR HAD BEEN PUT ON STACK.
  (1)  007040  100401                   BMI     2$              ;/NEXT TEST IF OVERFLOW.
  (2)
                                        ;;$$$$$$$$$$$$$$$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$

  (1)  007042  104006                   ERROR   6               ;/CLOCK FAILED TO COUNT AT
  (1)                                                           ;/RATE:10KHZ
  (2)
                                        ;;$$$$$$$$$$$$$$$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$

  (1)  007044  005077  172350           2$:     CLR     @ASR            ;/CLEAR THE CLOCK.
  (1)
  (1)
```

```
 6478
  (5)                                   ;;**********.**********************************************
  (4)                                   ;*TEST 41       *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)  007050  000004                   TST41:  SCOPE
  (2)  007052  012737  000005  001160           MOV     #5,$TIMES       ;;DO 5 ITERATIONS
  (1)  007060  005077  172334                   CLR     @ASR            ;/CLEAR CLOCK
  (1)  007064  005077  172332                   CLR     @ABR            ;/CLEAR PRESET BUFFER
  (1)  007070  012777  000041  172322           MOV     #BIT0!40,@ASR   ;/START CLOCK, MODE0, RATE:1KHZ
  (1)  007076  005000                           CLR     R0              ;/NOW WE'LL DO A LITTLE DELAY. THIS DELAY
  (1)  007100  005200                   1$:     INC     R0              ;/WILL AMOUNT TO APPROXIMATELY
  (1)  007102  001376                           BNE     1$              ;/369 MS.
  (1)
  (2)                                                                   ;/-RDCLK-
  (2)  007104  017746  172310                   MOV     @ASR,-(SP)      ;/SAVE CSR
  (2)  007110  052777  004007  172302           BIS     #4007,@ASR      ;/SET MODE 3,DIS INTR OSC NO RATE
  (2)                                                                   ;/THIS MUST BE DONE IN
  (2)                                                                   ;/ORDER TO XFERR COUNTER
  (2)                                                                   ;/TO BUFFER ON ST2.
  (2)  007116  052777  001000  172274           BIS     #BIT9,@ASR      ;/GENERATE ON ST2 PULSE
  (2)  007124  012746  000010                   MOV     #8.,-(SP)       ;/NOW GENERATE
  (2)  007130  052777  000400  172262  64$:     BIS     #BIT8,@ASR
  (2)  007136  005316                           DEC     (SP)            ;/EIGHT ST1 PULSES
  (2)  007140  001373                           BNE     64$
  (2)  007142  005726                           TST     (SP)+           ;/RESET STACK
  (2)  007144  017737  172252  001126           MOV     @ABR,$BDDAT     ;/READ THE PRESET BUFFER,
  (2)                                                                   ;/PREVIOUS COUNTER
  (2)  007152  012677  172242                   MOV     (SP)+,@ASR      ;/CONTENTS ARE IN $BDDAT.
  (2)  007156  005737  001126                   TST     $BDDAT          ;/RESTORE CSR
  (1)  007162  001004                           BNE     2$              ;/YES - NEXT TEST.
  (1)  007164  105766  177776                   TSTB    -2(SP)          ;/AT HIGH RATE MAY HAVE HAD OVERFLOW
  (1)                                                                   ;/NOTE: CSR HAD BEEN PUT ON STACK.
  (1)  007170  100401                           BMI     2$              ;/NEXT TEST IF OVERFLOW.
  (2)
                                        ;;$$$$$$$$$$$$$$$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$

  (1)  007172  104006                           ERROR   6               ;/CLOCK FAILED TO COUNT AT
  (1)                                                                   ;/RATE:1KHZ
  (2)
                                        ;;$$$$$$$$$$$$$$$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$

  (1)  007174  005077  172220           2$:     CLR     @ASR            ;/CLEAR THE CLOCK.
  (1)
  (1)
```

```
 6480
  (5)                                ;;**********.**********************************************
  (4)                                ;*TEST 42       *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)  007200  000004                TST42:  SCOPE
  (2)  007202  012737  000005  001160        MOV     #5,$TIMES       ;;DO 5 ITERATIONS
  (1)  007210  005077  172204                CLR     @ASR            ;/CLEAR CLOCK
  (1)  007214  005077  172202                CLR     @ABR            ;/CLEAR PRESET BUFFER
  (1)  007220  012777  000051  172172        MOV     #BIT0!50,@ASR   ;/START CLOCK, MODE0, RATE:100HZ
  (1)  007226  005000                        CLR     R0              ;/NOW WE'LL DO A LITTLE DELAY. THIS DELAY
  (1)  007230  005200                1$:     INC     R0              ;/WILL AMOUNT TO APPROXIMATELY
  (1)  007232  001376                        BNE     1$              ;/369 MS.
  (1)
  (2)                                                                ;/-RDCLK-
  (2)  007234  017746  172160                MOV     @ASR,-(SP)      ;/SAVE CSR
  (2)  007240  052777  004007  172152        BIS     #4007,@ASR      ;/SET MODE 3,DIS INTR OSC NO RATE
  (2)                                                                ;/THIS MUST BE DONE IN
  (2)                                                                ;/ORDER TO XFERR COUNTER
  (2)                                                                ;/TO BUFFER ON ST2.
  (2)  007246  052777  001000  172144        BIS     #BIT9,@ASR      ;/GENERATE ON ST2 PULSE
  (2)  007254  012746  000010                MOV     #8.,-(SP)       ;/NOW GENERATE
  (2)  007260  052777  000400  172132  64$:   BIS     #BIT8,@ASR
  (2)  007266  005316                        DEC     (SP)            ;/EIGHT ST1 PULSES
  (2)  007270  001373                        BNE     64$
  (2)  007272  005726                        TST     (SP)+           ;/RESET STACK
  (2)  007274  017737  172122  001126        MOV     @ABR,$BDDAT     ;/READ THE PRESET BUFFER,
  (2)                                                                ;/PREVIOUS COUNTER
  (2)  007302  012677  172112                MOV     (SP)+,@ASR      ;/CONTENTS ARE IN $BDDAT.
  (2)  007306  005737  001126                TST     $BDDAT          ;/RESTORE CSR
  (1)  007312  001004                        BNE     2$              ;/YES - NEXT TEST.
  (1)  007314  105766  177776                TSTB    -2(SP)          ;/AT HIGH RATE MAY HAVE HAD OVERFLOW
  (1)                                                                ;/NOTE: CSR HAD BEEN PUT ON STACK.
  (1)  007320  100401                        BMI     2$              ;/NEXT TEST IF OVERFLOW.
  (2)
                                     ;;$$$$$$$$$$$$$$$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$

  (1)  007322  104006                        ERROR   6               ;/CLOCK FAILED TO COUNT AT
  (1)                                                                ;/RATE:100HZ
  (2)
                                     ;;$$$$$$$$$$$$$$$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$

  (1)  007324  005077  172070        2$:     CLR     @ASR            ;/CLEAR THE CLOCK.
  (1)
  (1)
```

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 (5)                                         ;;*********************************************************************
 (4)                                         ;*TEST 43        *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)  007330  000004                         TST43:  SCOPE
 (2)  007332  012737  000005  001160                 MOV     #5,$TIMES          ;;DO 5 ITERATIONS
 (1)  007340  005077  172054                         CLR     @ASR               ;/CLEAR CLOCK
 (1)  007344  005077  172052                         CLR     @ABR               ;/CLEAR PRESET BUFFER
 (1)  007350  032777  002000  171562                 BIT     #SW10,@SWR         ;TEST IT LINE FREQ IS ENABLED
 (3)  007356  001452                                 BEQ     TST44              ;;BR IF SW10=0
 (1)  007360  052777  000100  172030                 BIS     #BIT6,@KWL         ;NO- ENABLE LINE CLOCK
 (1)  007366                                 10$:
 (1)  007366  012777  000071  172024                 MOV     #BIT0!70,@ASR      ;/START CLOCK, MODE0, RATE:LINEFREQ
 (1)  007374  005000                                 CLR     R0                 ;/NOW WE'LL DO A LITTLE DELAY. THIS DELAY
 (1)  007376  005200                         1$:     INC     R0                 ;/WILL AMOUNT TO APPROXIMATELY
 (1)  007400  001376                                 BNE     1$                 ;/369 MS.
 (1)
 (2)                                                                            ;/-RDCLK-
 (2)  007402  017746  172012                         MOV     @ASR,-(SP)         ;/SAVE CSR
 (2)  007406  052777  004007  172004                 BIS     #4007,@ASR         ;/SET MODE 3,DIS INTR OSC NO RATE
 (2)                                                                            ;/THIS MUST BE DONE IN
 (2)                                                                            ;/ORDER TO XFERR COUNTER
 (2)                                                                            ;/TO BUFFER ON ST2.
 (2)  007414  052777  001000  171776                 BIS     #BIT9,@ASR         ;/GENERATE ON ST2 PULSE
 (2)  007422  012746  000010                         MOV     #8.,-(SP)          ;/NOW GENERATE
 (2)  007426  052777  000400  171764  64$:           BIS     #BIT8,@ASR
 (2)  007434  005316                                 DEC     (SP)               ;/EIGHT ST1 PULSES
 (2)  007436  001373                                 BNE     64$
 (2)  007440  005726                                 TST     (SP)+              ;/RESET STACK
 (2)  007442  017737  171754  001126                 MOV     @ABR,$BDDAT        ;/READ THE PRESET BUFFER,
 (2)                                                                            ;/PREVIOUS COUNTER
 (2)  007450  012677  171744                         MOV     (SP)+,@ASR         ;/CONTENTS ARE IN $BDDAT.
 (2)  007454  005737  001126                         TST     $BDDAT             ;/RESTORE CSR
 (1)  007460  001004                                 BNE     2$                 ;/YES - NEXT TEST.
 (1)  007462  105766  177776                         TSTB    -2(SP)             ;/AT HIGH RATE MAY HAVE HAD OVERFLOW
 (1)                                                                            ;/NOTE: CSR HAD BEEN PUT ON STACK.
 (1)  007466  100401                                 BMI     2$                 ;/NEXT TEST IF OVERFLOW.
 (2)
                                             ;;$$$$$$$$$$$$$$$$$$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$

 (1)  007470  104006                                 ERROR   6                  ;/CLOCK FAILED TO COUNT AT
 (1)                                                                            ;/RATE:LINEFREQ
 (2)
                                             ;;$$$$$$$$$$$$$$$$$$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$

 (1)  007472  005077  171722                 2$:     CLR     @ASR               ;/CLEAR THE CLOCK.
 (1)
 (1)
      007476  042777  000100  171712                 BIC     #BIT6,@KWL         ;DISABLE LINE CLOCK


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

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  (3)                                   ;*TEST 44       *TEST THAT COUNTER DOESN'T COUNT WHEN ''SLAVE IN'' RATE IS SELECTED
  (3)                                   ;;**********************************************************************
  (2) 007504 000004                     TST44:  SCOPE
  (1) 007506 012737 000020 001160               MOV     #20,$TIMES      ;;DO 20 ITERATIONS
 6486
 6487 007514 005077 171700                      CLR     @ASR            ;CLEAR CSR.
 6488 007520 005077 171676                      CLR     @ABR            ;CLEAR PRESET BUFFER.
 6489
 6490 007524 052777 000001 171666              BIS     #BIT0,@ASR      ;SET GO BIT, RATE:''SLAVE IN''
 6491
 6492 007532 052777 000400 171660              BIS     #BIT8,@ASR      ;GENERATE A MAINTENANCE ST1.
 6493 007540 005000                             CLR     R0
 6494
 6495 007542 005200                     1$:     INC     R0              ;NOW DO A SHORT DELAY.
 6496 007544 001376                             BNE     1$
 6497
 6498                                                                   ;/-RDCLK-
  (1) 007546 017746 171646                      MOV     @ASR,-(SP)      ;/SAVE CSR
  (1) 007552 052777 004007 171640               BIS     #4007,@ASR      ;/SET MODE 3,DIS INTR OSC NO RATE
  (1)                                                                   ;/THIS MUST BE DONE IN
  (1)                                                                   ;/ORDER TO XFERR COUNTER
  (1)                                                                   ;/TO BUFFER ON ST2.
  (1) 007560 052777 001000 171632               BIS     #BIT9,@ASR      ;/GENERATE ON ST2 PULSE
  (1) 007566 012746 000010                      MOV     #8.,-(SP)       ;/NOW GENERATE
  (1) 007572 052777 000400 171620       64$:    BIS     #BIT8,@ASR
  (1) 007600 005316                             DEC     (SP)            ;/EIGHT ST1 PULSES
  (1) 007602 001373                             BNE     64$
  (1) 007604 005726                             TST     (SP)+           ;/RESET STACK
  (1) 007606 017737 171610 001126               MOV     @ABR,$BDDAT     ;/READ THE PRESET BUFFER,
  (1)                                                                   ;/PREVIOUS COUNTER
  (1) 007614 012677 171600                      MOV     (SP)+,@ASR      ;/CONTENTS ARE IN $BDDAT.
  (1) 007620 005737 001126                      TST     $BDDAT          ;/RESTORE CSR
 6499 007624 001003                             BNE     2$              ;IF ANY COUNT, ERROR.
 6500 007626 105777 171566                      TSTB    @ASR            ;CHECK FOR OVERFLOW.
 6501 007632 100003                             BPL     3$              ;IF NO OVERFLOW, NEXT TEST
 6502
 6503 007634 005037 001124              2$:     CLR     $GDDAT          ;CLEAR FOR TYPEOUT, EXP'D ZERO.
 6504
                                        ;;$$$$$$$$$$$$$$$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$

 6505 007640 104011                             ERROR   11              ;CLOCK COUNTED WHEN RATE:''SLAVE IN''
 6506                                                                   ;WAS SELECTED.
 6507
                                        ;;$$$$$$$$$$$$$$$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$

 6508 007642 005077 171552              3$:     CLR     @ASR            ;CLEAR CLOCK'S CSR.
```

```
6510                                    ;;*****************************************************************
 (3)                                    ;*TEST 45       *TEST THAT THE CLOCK WILL COUNT IN MODE 1
 (3)                                    ;;*****************************************************************
 (2) 007646  000004                     TST45:  SCOPE
 (1) 007650  012737  000020  001160             MOV     #20,$TIMES      ;;DO 20 ITERATIONS
6511
6512 007656  005077  171536                     CLR     @ASR            ;CLEAR THE CSR.
6513 007662  012777  177777  171532             MOV     #-1,@ABR        ;PRESET BUFFER REG.
6514 007670  052777  000013  171522             BIS     #13,@ASR        ;START CLOCK,RATE:1 MHZ,MODE 1.
6515 007676  005000                             CLR     R0
6516 007700  105200                     1$:     INCB    R0              ;NOW DO A SHORT DELAY SO THAT THE
6517 007702  001376                             BNE     1$              ;CLOCK CAN COUNT TO OVERFLOW.
6518
6519 007704  105777  171510                     TSTB    @ASR            ;OVERFLOW SHOULD HAVE SET.
6520 007710  100401                             BMI     2$              ;GOTO NEXT TEST IF SO.
6521
6522
                                        ;;$$$$$$$$$$$$$$$$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$

6523 007712  104006                             ERROR   6               ;CLOCK FAILED TO COUNT UP AND SET
6524                                                                    ;OVERFLOW IN MODE 1.
6525
                                        ;;$$$$$$$$$$$$$$$$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$

6526 007714                             2$:
6527
6528
6529                                            .SBTTL  *
6530                                            .SBTTL  *PHASE 4 CLOCK INTERRUPT TEST.
6531                                            .SBTTL  *
6532
6540
6541                                    ;;*****************************************************************
 (3)                                    ;*TEST 46       *TEST THAT THE CLOCK WILL INTERRUPT ON OVERFLOW
 (3)                                    ;;*****************************************************************
 (2) 007714  000004                     TST46:  SCOPE
 (1) 007716  012737  000020  001160             MOV     #20,$TIMES      ;;DO 20 ITERATIONS
6542
6543
 (1) 007724  012746  000340                     MOV     #340,-(SP)      ;PUT PRIORITY ON STACK.
 (1) 007730  012746  007736                     MOV     #64$,-(SP)      ;PUT RETURN ADDRESS ON STACK
 (1) 007734  000002                             RTI                     ;DO AN RTI, PUTS PRIORITY IN CPU.
 (1) 007736                             64$:
6544
6545 007736  005077  171456                     CLR     @ASR            ;CLEAR CLOCK'S CSR.
6546 007742  012777  177777  171452             MOV     #-1,@ABR        ;SET PRESET BUFFER TO ALL ONES.
6547
6548 007750  012777  000161  171442             MOV     #161,@ASR       ;START CLOCK, RATE:ST1.
6549 007756  052777  000400  171434             BIS     #BIT8,@ASR      ;GENERATE A MAINTENANCE ST1.
6550 007764  012777  010022  171432             MOV     #1$,@VECT1      ;SET INTERRUPT ADDR.
6551
 (1) 007772  012746  000000                     MOV     #0,-(SP)        ;PUT PRIORITY ON STACK.
 (1) 007776  012746  010004                     MOV     #65$,-(SP)      ;PUT RETURN ADDRESS ON STACK
 (1) 010002  000002                             RTI                     ;DO AN RTI, PUTS PRIORITY IN CPU.
 (1) 010004                             65$:
6552
```

```
 6553  010004  000240                        NOP                     ;STALL TIME
 6554  010006  000240                        NOP
 6555  010010  000240                        NOP
 6556  010012  005077  171402                CLR     @ASR            ;REMOVE IRQ. ENABLE
 6557
                                        ;;$$$$$$$$$$$$$$$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$

 6558  010016  104007                        ERROR   7               ;CLOCK FAILED TO INTERRUPT.
 6559
                                        ;;$$$$$$$$$$$$$$$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$

 6560  010020  000402                        BR      2$
 6561  010022                        1$:
  (1)  010022  062706  000004                ADD     #4,SP                   ;/ADD #4 TO STACK POINTER.
 6562  010026  005077  171366        2$:     CLR     @ASR            ;CLEAR THE CLOCK.
 6563  010032  013777  001426  171364        MOV     VECTP,@VECT1    ;2 RESTORE VECTOR.
 6564
 6565                                   ;;*****************************************************************
  (3)                                   ;*TEST 47        *TEST THAT ST2 WILL CAUSE AN INTERRUPT
  (3)                                   ;;*****************************************************************
  (2)  010040  000004                   TST47:  SCOPE
  (1)  010042  012737  000020  001160           MOV     #20,$TIMES      ;;DO 20 ITERATIONS
 6566
 6567
  (1)  010050  012746  000340                   MOV     #340,-(SP)      ;PUT PRIORITY ON STACK.
  (1)  010054  012746  010062                   MOV     #64$,-(SP)      ;PUT RETURN ADDRESS ON STACK
  (1)  010060  000002                           RTI                     ;DO AN RTI, PUTS PRIORITY IN CPU.
  (1)  010062                           64$:
 6568
 6569  010062  005077  171332                CLR     @ASR            ;CLEAR CLOCKS CSR.
 6570  010066  012777  010140  171334        MOV     #1$,@VECT2      ;SET UP INTERRUPT VECTOR.
 6571  010074  012777  040001  171316        MOV     #BIT14!BIT0,@ASR;SET ''INT2'',AND GO BIT.
 6572  010102  052777  001000  171310        BIS     #BIT9,@ASR      ;GENERATE A MAINTENANCE ST2.
 6573
  (1)  010110  012746  000000                   MOV     #0,-(SP)        ;PUT PRIORITY ON STACK.
  (1)  010114  012746  010122                   MOV     #65$,-(SP)      ;PUT RETURN ADDRESS ON STACK
  (1)  010120  000002                           RTI                     ;DO AN RTI, PUTS PRIORITY IN CPU.
  (1)  010122                           65$:
 6574
 6575  010122  000240                        NOP                     ;STALL TIME
 6576  010124  000240                        NOP
 6577  010126  000240                        NOP
 6578  010130  005077  171264                CLR     @ASR            ;REMOVE IRQ. ENABLE
 6579
                                        ;;$$$$$$$$$$$$$$$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$

 6580  010134  104007                        ERROR   7               ;CLOCK FAILED TO INTERRUPT ON ST2.
 6581
                                        ;;$$$$$$$$$$$$$$$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$

 6582  010136  000402                        BR      2$
 6583  010140                        1$:
  (1)  010140  062706  000004                ADD     #4,SP                   ;/ADD #4 TO STACK POINTER.
 6584  010144  005077  171250        2$:     CLR     @ASR            ;CLEAR CLOCK'S CSR.
 6585  010150  013777  001432  171252        MOV     VECT2P,@VECT2   ;2 RESTORE VECTOR.
 6586
```

```
6587                                    ;;*********************************************************************
 (3)                                    ;*TEST 50        *TEST THAT ST1 WILL CAUSE AN INTERRUPT
 (3)                                    ;;*********************************************************************
 (2) 010156 000004                      TST50:  SCOPE
 (1) 010160 012737 000020 001160                MOV     #20,$TIMES      ;;DO 20 ITERATIONS
6588
6589
 (1) 010166 012746 000340               MOV     #340,-(SP)      ;PUT PRIORITY ON STACK.
 (1) 010172 012746 010200               MOV     #64$,-(SP)      ;PUT RETURN ADDRESS ON STACK
 (1) 010176 000002                      RTI                     ;DO AN RTI, PUTS PRIORITY IN CPU.
 (1) 010200                             64$:
6590 010200 005077 171214               CLR     @ASR            ;2 CLEAR CSR
6591 010204 012777 010250 171216        MOV     #1$,@VECT2      ;2 SET UP INTR. VECTOR.
6592 010212 052777 040400 171200        BIS     #BIT14!BIT8,@ASR ;2 INTR ENABLE AND ST1.
6593
 (1) 010220 012746 000000               MOV     #0,-(SP)        ;PUT PRIORITY ON STACK.
 (1) 010224 012746 010232               MOV     #65$,-(SP)      ;PUT RETURN ADDRESS ON STACK
 (1) 010230 000002                      RTI                     ;DO AN RTI, PUTS PRIORITY IN CPU.
 (1) 010232                             65$:
6594 010232 000240                      NOP                     ;2 INTR. FROM HERE.
6595 010234 000240                      NOP
6596 010236 000240                      NOP
6597 010240 005077 171154               CLR     @ASR            ;REMOVE IRQ. ENABLE
6598
                                        ;;$$$$$$$$$$$$$$$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$

6599 010244 104007                      ERROR   7               ;2 CLOCK FAILED TO INTR. ON ST1.
6600 010246 000402                      BR      2$
6601 010250                             1$:
 (1) 010250 062706 000004               ADD     #4,SP                   ;/ADD #4 TO STACK POINTER.
6602 010254 005077 171140               2$:     CLR     @ASR            ;2 CLEAR CSR.
6603 010260 013777 001432 171142        MOV     VECT2P,@VECT2   ;2 RESTORE INTR. VECTOR.
6604
 (1) 010266 012746 000000               MOV     #0,-(SP)        ;PUT PRIORITY ON STACK.
 (1) 010272 012746 010300               MOV     #66$,-(SP)      ;PUT RETURN ADDRESS ON STACK
 (1) 010276 000002                      RTI                     ;DO AN RTI, PUTS PRIORITY IN CPU.
 (1) 010300                             66$:
6605
6606                                    .SBTTL  *
6607                                    .SBTTL  *PHASE 5 ADVANCED TESTING
6608                                    .SBTTL  *
6609
```

```
 6697                                   ;;*****************************************************************
  (3)                                   ;*TEST 51       *TEST THAT THE 'FOR' BIT WILL SET ON 2 ST2'S
  (3)                                   ;;*****************************************************************
  (2)  010300  000004                   TST51:  SCOPE
 6698  010302  005077  171112                   CLR     @ASR            ;START WITH CSR CLEAR.
 6699  010306  005277  171106                   INC     @ASR            ;SET GO BIT.
 6700  010312  052777  001000  171100           BIS     #BIT9,@ASR      ;GENERATE THE 1ST ST2 PULSE.
 6701  010320  052777  001000  171072           BIS     #BIT9,@ASR      ;GENERATE 2ND ST2 PULSE.
 6702                                                                   ;THIS SHOULD CAUSE FOR BIT TO SET.
 6703  010326  032777  010000  171064           BIT     #BIT12,@ASR     ;DID FOR BIT SET?
 6704  010334  001007                           BNE     1$              ;YES-THEN NEXT TEST.
 6705
 6706  010336  017737  171056  001126           MOV     @ASR,$BDDAT     ;RECORD CSR.
 6707  010344  012737  110001  001124           MOV     #BIT15!BIT12!BIT0,$GDDAT        ;RECORD S/B.
 6708
                                       ;;$$$$$$$$$$$$$$$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$

 6709  010352  104001                           ERROR   1               ;ERROR-'FOR' BIT FAILED TO SET ON
 6710                                                                   ;ON TWO SUCCESIVE ST2 PULSES.
 6711
                                       ;;$$$$$$$$$$$$$$$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$

 6712  010354                           1$:
 6713                                   ;;*****************************************************************
  (3)                                   ;*TEST 52       *TEST THAT THE 'FOR' BIT WILL SET ON 2 ST1'S
  (3)                                   ;;*****************************************************************
  (2)  010354  000004                   TST52:  SCOPE
 6714  010356  005077  171036                   CLR     @ASR            ;START WITH THE CSR CLEAR.
 6715  010362  005277  171032                   INC     @ASR            ;SET GO BIT.
 6716  010366  052777  000400  171024           BIS     #BIT08,@ASR     ;GENERATE AN ST1.
 6717  010374  052777  000400  171016           BIS     #BIT08,@ASR     ;GENERATE ANOTHER ST1.
 6718                                                                   ;AT THIS POINT THE 'FOR' BIT SHOULD HAVE SET
 6719  010402  032777  010000  171010           BIT     #BIT12,@ASR     ;DID THE FOR BIT SET?
 6720  010410  001007                           BNE     TST53           ;;
 6721  010412  017737  171002  001126           MOV     @ASR,$BDDAT     ;RECORD CSR.
 6722  010420  012737  012001  001124           MOV     #BIT10!BIT12!BIT0,$GDDAT        ;RECORD S/B.
 6723
                                       ;;$$$$$$$$$$$$$$$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$

 6724  010426  104001                           ERROR   1               ;ERROR- 'FOR' BIT FAILED TO SET ON
 6725                                                                   ;TWO SUCCESIVE ST1 PULSES.
 6726
                                       ;;$$$$$$$$$$$$$$$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$
```

```
                                ;;*******************************************************************
                                ;*TEST 53        *TEST THAT FOR BIT WILL SET ON TWO OVERFLOWS
                                ;;*******************************************************************
                        TST53:  SCOPE
010430  000004
010432  012737  000002  001160          MOV     #2,$TIMES       ;;DO 2 ITERATIONS

010440  005077  170754                  CLR     @ASR            ;START WITH CSR CLEAR.
010444  012777  177777  170750          MOV     #-1,@ABR        ;PRELOAD BUFFER REG.
010452  052777  000013  170740          BIS     #13,@ASR        ;START CLOCK,MODE 1,1MHZ.
010460  005000                          CLR     R0              ;NOW DO A SHORT DELAY.
010462  105200                  1$:     INCB    R0              ;DURING THIS DELAY, THE CLOCK WILL
010464  001376                          BNE     1$              ;HAVE OVERFLOWED TWICE-
                                                                ;THIS SHOULD CAUSE THE FOR BIT TO SET.
010466  032777  010000  170724          BIT     #BIT12,@ASR     ;DID FOR SET?
010474  001007                          BNE     2$              ;YES-NEXT TEST.
010476  017737  170716  001126          MOV     @ASR,$BDDAT     ;NO-RECORD THE CSR.
010504  012737  010213  001124          MOV     #010213,$GDDAT  ;RECORD S/B.

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

010512  104001                          ERROR   1               ;ERROR FOR BIT FAILED TO SET ON
                                                                ; TWO SUCCESSIVE OVERFLOWS.

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

010514                          2$:
                                ;;*******************************************************************
                                ;*TEST 54        *TEST THAT FOR BIT WILL CLEAR IF GO BIT IS SET
                                ;;*******************************************************************
010514  000004                  TST54:  SCOPE
010516  012777  000001  170674          MOV     #BIT0,@ASR      ;CLEAR CSR,SET GO BIT.
010524  052777  001000  170666          BIS     #BIT9,@ASR      ;SET 1ST ST2 PULSE.
010532  052777  001000  170660          BIS     #BIT9,@ASR      ;GENERATE 2ND ST2 PULSE.
                                                                ;FOR BIT SETS HERE.
010540  042777  100001  170652          BIC     #BIT0!BIT15,@ASR        ;CLEAR GO BITAND ST2 FLAG.
010546  052777  000001  170644          BIS     #BIT0,@ASR      ;SET THE ''GO'' BIT AGAIN -
                                                                ;SHOULD CLEAR FOR BIT.
010554  017737  170640  001126          MOV     @ASR,$BDDAT     ;READ THE CSR.
010562  012737  100001  001124          MOV     #100001,$GDDAT  ;RECORD WHAT CSR S/B.
010570  032737  010000  001126          BIT     #BIT12,$BDDAT   ;DID FOR BIT CLEAR?
010576  001401                          BEQ     1$              ;YES NEXT TEST.

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

010600  104001                          ERROR   1               ;FOR BIT FALED TO CLEAR
                                                                ;WHEN ''GO'' BIT WAS SET.

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

010602  005077  170612          1$:     CLR     @ASR            ;CLEAR THE CSR.
```

```
                                ;;*****************************************************************
                                ;*TEST 55        *TEST THAT WE CAN DISABLE THE INTERNAL OSC
                                ;;*****************************************************************
                        TST55:  SCOPE
                                MOV     #5,$TIMES       ;;DO 5 ITERATIONS

                                CLR     @ASR            ;CLEAR THE CSR
                                CLR     @ABR            ;CLEAR THE PRESET BUFFER
                                CLR     $GDDAT          ;CLEAR EXPED.

                                MOV     #BIT11,@ASR     ;DISABLE THE INTERNAL OSC.
                                BIS     #BIT3!BIT0,@ASR ;START CLOCK:RATE 1MHZ.
                                CLR     R0
                        1$:     INCB    R0              ;DELAY A SHORT TIME.
                                BNE     1$
                                                        ;/-RDCLK-
                                MOV     @ASR,-(SP)      ;/SAVE CSR
                                BIS     #4007,@ASR      ;/SET MODE 3,DIS INTR OSC NO RATE
                                                        ;/THIS MUST BE DONE IN
                                                        ;/ORDER TO XFERR COUNTER
                                                        ;/TO BUFFER ON ST2.
                                BIS     #BIT9,@ASR      ;/GENERATE ON ST2 PULSE
                                MOV     #8.,-(SP)       ;/NOW GENERATE
                        64$:    BIS     #BIT8,@ASR
                                DEC     (SP)            ;/EIGHT ST1 PULSES
                                BNE     64$
                                TST     (SP)+           ;/RESET STACK
                                MOV     @ABR,$BDDAT     ;/READ THE PRESET BUFFER,
                                                        ;/PREVIOUS COUNTER
                                MOV     (SP)+,@ASR      ;/CONTENTS ARE IN $BDDAT.
                                TST     $BDDAT          ;/RESTORE CSR
                                BEQ     2$              ;NO - GOOD - NEXT TEST.

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

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

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

                        2$:     CLR     @ASR            ;CLEAR THE CSR.
```

```
 6783                                   ;;*****************************************************************
  (3)                                   ;*TEST 56       *TEST THAT CLOCK CAN BE COUNTED USING MAINTENANCE OSC
  (3)                                   ;;*****************************************************************
  (2)  010742  000004                   TST56:  SCOPE
 6784
 6785  010744  005077  170450                   CLR     @ASR            ;CLEAR THE CSR.
 6786  010750  005077  170446                   CLR     @ABR            ;CLEAR THE PRESET BUFFER.
 6787  010754  052777  004000  170436           BIS     #BIT11,@ASR     ;DISABLE THE INTERNAL OSC.
 6788  010762  052777  000011  170430           BIS     #BIT3!BIT0,@ASR ;START CLOCK, 1MHZ, GO.
 6789  010770  012700  177754                   MOV     #-20.,R0        ;SET TO COUNT 20 TIMES
 6790
 6791  010774  052777  000400  170416  1$:      BIS     #BIT8,@ASR      ;2 GENERATE 1 MAINTENANCE OSC.
 6792                                                                   ;NOTE: AT 1MHZ, IT TAKES 10
 6793                                                                   ;MAINT. OSC TO EQUAL 1 COUNT
 6794  011002  005200                           INC     R0              ;DO 20 MAINTENANCE OSC.
 6795  011004  001373                           BNE     1$
 6796
 6797                                                                   ;/-RDCLK-
  (1)  011006  017746  170406                   MOV     @ASR,-(SP)      ;/SAVE CSR
  (1)  011012  052777  004007  170400           BIS     #4007,@ASR      ;/SET MODE 3,DIS INTR OSC NO RATE
  (1)                                                                   ;/THIS MUST BE DONE IN
  (1)                                                                   ;/ORDER TO XFERR COUNTER
  (1)                                                                   ;/TO BUFFER ON ST2.
  (1)  011020  052777  001000  170372           BIS     #BIT9,@ASR      ;/GENERATE ON ST2 PULSE
  (1)  011026  012746  000010                   MOV     #8.,-(SP)       ;/NOW GENERATE
  (1)  011032  052777  000400  170360  64$:     BIS     #BIT8,@ASR
  (1)  011040  005316                           DEC     (SP)            ;/EIGHT ST1 PULSES
  (1)  011042  001373                           BNE     64$
  (1)  011044  005726                           TST     (SP)+           ;/RESET STACK
  (1)  011046  017737  170350  001126           MOV     @ABR,$BDDAT     ;/READ THE PRESET BUFFER,
  (1)                                                                   ;/PREVIOUS COUNTER
  (1)  011054  012677  170340                   MOV     (SP)+,@ASR      ;/CONTENTS ARE IN $BDDAT.
  (1)  011060  005737  001126                   TST     $BDDAT          ;/RESTORE CSR
 6798  011064  001001                           BNE     2$              ;YES - NEXT TEST.
 6799
 6800
                                       ;;$$$$$$$$$$$$$$$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$

 6801  011066  104011                           ERROR   11              ;ERROR COULD NOT COUNT USING
 6802                                                                   ;MAINTENANCE OSC.
 6803
                                       ;;$$$$$$$$$$$$$$$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$

 6804  011070  005077  170324           2$:     CLR     @ASR            ;CLEAR THE CSR.
 6805
 6935
```

```
6937
 (1)
 (5)                                ;;*********************************************************************
 (4)                                ;*TEST 57        *TEST THE CLOCK'S 1MHZ DIVIDER
 (5)                                ;*
 (5)                                ;*IN THIS TEST WE WILL CHECH OUT PART OF THE DIVIDER CHAIN LOGIC.
 (5)                                ;*THERE ARE SEVERAL TESTS THAT ARE USED TO DO THIS,THIS TEST CHECKS
 (5)                                ;*THAT 100,000 MAIN OSC PULSES GIVES US 10000. COUNTS AT 1MHZ RATE.
 (4)                                ;;*********************************************************************
 (3)  011074  000004                TST57:  SCOPE
 (2)  011076  012737  000005  001160        MOV     #5,$TIMES       ;;DO 5 ITERATIONS
 (1)                                                                ;/-DIVCH-
 (1)  011104  012700  000012        MOV     #10.,R0
 (1)  011110  005077  170304        CLR     @ASR
 (1)  011114  005077  170302        CLR     @ABR
 (1)  011120  052777  004000  170272        BIS     #BIT11,@ASR             ;/DISABLE INTERNAL OSC.
 (1)  011126  052777  000017  170264        BIS     #7!10,@ASR              ;/SET GO,RATE: 1MHZ.,MODE 3.
 (1)
 (1)  011134  012701  023420        1$:     MOV     #10000.,R1              :/DO THAT MANY TIMES.
 (1)  011140  052777  000400  170252  2$:     BIS     #BIT8,@ASR              ;/GENERATE AN OSC PULSE.
 (1)  011146  005301                        DEC     R1
 (1)  011150  001373                        BNE     2$
 (1)  011152  005300                        DEC     R0
 (1)  011154  001367                        BNE     1$
 (1)  011156  052777  001000  170234        BIS     #BIT9,@ASR      ;/ST2
 (1)  011164  012700  000010        MOV     #8.,R0
 (1)  011170  052777  000400  170222  3$:     BIS     #BIT8,@ASR
 (1)  011176  005300                        DEC     R0
 (1)  011200  001373                        BNE     3$
 (1)
 (1)  011202  017737  170214  001126        MOV     @ABR,$BDDAT             ;/READ COUNT.
 (1)  011210  012737  023420  001446        MOV     #10000.,$TMP0           ;/EXPECT THESE MANY COUNTS.
 (1)  011216  023737  001446  001126        CMP     $TMP0,$BDDAT            ;/DID WE GET THEM??
 (3)  011224  001401                        BEQ     TST60           ;;
 (1)  011226  104011                        ERROR   11                      ;/ERROR  100,000. OSC PULSES
 (1)                                                                ;/DID NOT GENERATE 10000.
 (1)                                                                ;/COUNTS AT RATE 1MHZ
 (1)
```

```
 6939
  (1)
  (5)                                   ;;*********************************************************************
  (4)                                   ;*TEST 60        *TEST THE CLOCK'S 100KHZ DIVIDER
  (5)                                   ;*
  (5)                                   ;*IN THIS TEST WE WILL CHECH OUT PART OF THE DIVIDER CHAIN LOGIC.
  (5)                                   ;*THERE ARE SEVERAL TESTS THAT ARE USED TO DO THIS,THIS TEST CHECKS
  (5)                                   ;*THAT 100,000 MAIN OSC PULSES GIVES US 1000. COUNTS AT 100KHZ RATE.
  (4)                                   ;;*********************************************************************
  (3)  011230  000004                   TST60:  SCOPE
  (2)  011232  012737  000005  001160           MOV     #5,$TIMES       ;;DO 5 ITERATIONS
  (1)                                                                   ;/-DIVCH-
  (1)  011240  012700  000012           1$:     MOV     #10.,R0
  (1)  011244  005077  170150                   CLR     @ASR
  (1)  011250  005077  170146                   CLR     @ABR
  (1)  011254  052777  004000  170136           BIS     #BIT11,@ASR             ;/DISABLE INTERNAL OSC.
  (1)  011262  052777  000027  170130           BIS     #7!20,@ASR              ;/SET GO,RATE: 100KHZ.,MODE 3.
  (1)
  (1)  011270  012701  023420           1$:     MOV     #10000.,R1              ;/DO THAT MANY TIMES.
  (1)  011274  052777  000400  170116   2$:     BIS     #BIT8,@ASR              ;/GENERATE AN OSC PULSE.
  (1)  011302  005301                           DEC     R1
  (1)  011304  001373                           BNE     2$
  (1)  011306  005300                           DEC     R0
  (1)  011310  001367                           BNE     1$
  (1)  011312  052777  001000  170100           BIS     #BIT9,@ASR      ;/ST2
  (1)  011320  012700  000010                   MOV     #8.,R0
  (1)  011324  052777  000400  170066   3$:     BIS     #BIT8,@ASR
  (1)  011332  005300                           DEC     R0
  (1)  011334  001373                           BNE     3$
  (1)
  (1)  011336  017737  170060  001126           MOV     @ABR,$BDDAT             ;/READ COUNT.
  (1)  011344  012737  001750  001446           MOV     #1000.,$TMP0            ;/EXPECT THESE MANY COUNTS.
  (1)  011352  023737  001446  001126           CMP     $TMP0,$BDDAT            ;/DID WE GET THEM??
  (3)  011360  001401                           BEQ     TST61           ;;
  (1)  011362  104011                           ERROR   11              ;/ERROR  100,000. OSC PULSES
  (1)                                                                   ;/DID NOT GENERATE 1000.
  (1)                                                                   ;/COUNTS AT RATE 100KHZ
  (1)
```

```
 6941
  (1)
  (5)                                   ;;*********************************************************************
  (4)                                   ;*TEST 61        *TEST THE CLOCK'S 10KHZ DIVIDER
  (5)                                   ;*
  (5)                                   ;*IN THIS TEST WE WILL CHECH OUT PART OF THE DIVIDER CHAIN LOGIC.
  (5)                                   ;*THERE ARE SEVERAL TESTS THAT ARE USED TO DO THIS,THIS TEST CHECKS
  (5)                                   ;*THAT 100,000 MAIN OSC PULSES GIVES US 100. COUNTS AT 10KHZ RATE.
  (4)                                   ;;*********************************************************************
  (3)  011364  000004                   TST61:  SCOPE
  (2)  011366  012737  000005  001160           MOV     #5,$TIMES       ;;DO 5 ITERATIONS
  (1)                                                                   ;/-DIVCH-
  (1)  011374  012700  000012           MOV     #10.,R0
  (1)  011400  005077  170014           CLR     @ASR
  (1)  011404  005077  170012           CLR     @ABR
  (1)  011410  052777  004000  170002   BIS     #BIT11,@ASR             ;/DISABLE INTERNAL OSC.
  (1)  011416  052777  000037  167774   BIS     #7!30,@ASR              ;/SET GO,RATE: 10KHZ.,MODE 3.
  (1)
  (1)  011424  012701  023420   1$:     MOV     #10000.,R1              ;/DO THAT MANY TIMES.
  (1)  011430  052777  000400  167762   2$:     BIS     #BIT8,@ASR      ;/GENERATE AN OSC PULSE.
  (1)  011436  005301                   DEC     R1
  (1)  011440  001373                   BNE     2$
  (1)  011442  005300                   DEC     R0
  (1)  011444  001367                   BNE     1$
  (1)  011446  052777  001000  167744   BIS     #BIT9,@ASR      ;/ST2
  (1)  011454  012700  000010           MOV     #8.,R0
  (1)  011460  052777  000400  167732   3$:     BIS     #BIT8,@ASR
  (1)  011466  005300                   DEC     R0
  (1)  011470  001373                   BNE     3$
  (1)
  (1)  011472  017737  167724  001126   MOV     @ABR,$BDDAT             ;/READ COUNT.
  (1)  011500  012737  000144  001446   MOV     #100.,$TMP0             ;/EXPECT THESE MANY COUNTS.
  (1)  011506  023737  001446  001126   CMP     $TMP0,$BDDAT            ;/DID WE GET THEM??
  (3)  011514  001401                   BEQ     TST62           ;;
  (1)  011516  104011                   ERROR   11                      ;/ERROR  100,000. OSC PULSES
  (1)                                                                   ;/DID NOT GENERATE 100.
  (1)                                                                   ;/COUNTS AT RATE 10KHZ
  (1)
```

```
 6943
  (1)
  (5)                                   ;;*********************************************************************
  (4)                                   ;*TEST 62        *TEST THE CLOCK'S 1KHZ DIVIDER
  (5)                                   ;*
  (5)                                   ;*IN THIS TEST WE WILL CHECH OUT PART OF THE DIVIDER CHAIN LOGIC.
  (5)                                   ;*THERE ARE SEVERAL TESTS THAT ARE USED TO DO THIS,THIS TEST CHECKS
  (5)                                   ;*THAT 100,000 MAIN OSC PULSES GIVES US 10. COUNTS AT 1KHZ RATE.
  (4)                                   ;;*********************************************************************
  (3)  011520  000004                   TST62:  SCOPE
  (2)  011522  012737  000005  001160           MOV     #5,$TIMES       ;;DO 5 ITERATIONS
  (1)                                                                   ;/-DIVCH-
  (1)  011530  012700  000012           MOV     #10.,R0
  (1)  011534  005077  167660           CLR     @ASR
  (1)  011540  005077  167656           CLR     @ABR
  (1)  011544  052777  004000  167646   BIS     #BIT11,@ASR             ;/DISABLE INTERNAL OSC.
  (1)  011552  052777  000047  167640   BIS     #7!40,@ASR              ;/SET GO,RATE: 1KHZ.,MODE 3.
  (1)
  (1)  011560  012701  023420           1$:     MOV     #10000.,R1              ;/DO THAT MANY TIMES.
  (1)  011564  052777  000400  167626   2$:     BIS     #BIT8,@ASR              ;/GENERATE AN OSC PULSE.
  (1)  011572  005301                           DEC     R1
  (1)  011574  001373                           BNE     2$
  (1)  011576  005300                           DEC     R0
  (1)  011600  001367                           BNE     1$
  (1)  011602  052777  001000  167610           BIS     #BIT9,@ASR      ;/ST2
  (1)  011610  012700  000010           MOV     #8.,R0
  (1)  011614  052777  000400  167576   3$:     BIS     #BIT8,@ASR
  (1)  011622  005300                           DEC     R0
  (1)  011624  001373                           BNE     3$
  (1)
  (1)  011626  017737  167570  001126           MOV     @ABR,$BDDAT             ;/READ COUNT.
  (1)  011634  012737  000012  001446           MOV     #10.,$TMP0              ;/EXPECT THESE MANY COUNTS.
  (1)  011642  023737  001446  001126           CMP     $TMP0,$BDDAT            ;/DID WE GET THEM??
  (3)  011650  001401                           BEQ     TST63           ;;
  (1)  011652  104011                           ERROR   11              ;/ERROR  100,000. OSC PULSES
  (1)                                                                   ;/DID NOT GENERATE 10.
  (1)                                                                   ;/COUNTS AT RATE 1KHZ
  (1)
```

```
6945
 (1)
 (5)                                    ;;*********************************************************************
 (4)                                    ;*TEST 63       *TEST THE CLOCK'S 100HZ DIVIDER
 (5)                                    ;*
 (5)                                    ;*IN THIS TEST WE WILL CHECH OUT PART OF THE DIVIDER CHAIN LOGIC.
 (5)                                    ;*THERE ARE SEVERAL TESTS THAT ARE USED TO DO THIS,THIS TEST CHECKS
 (5)                                    ;*THAT 100,000 MAIN OSC PULSES GIVES US 1 COUNTS AT 100HZ RATE.
 (4)                                    ;;*********************************************************************
 (3)  011654  000004                    TST63:  SCOPE
 (2)  011656  012737  000005  001160            MOV     #5,$TIMES       ;;DO 5 ITERATIONS
 (1)                                                                    ;/-DIVCH-
 (1)  011664  012700  000012            1$:     MOV     #10.,R0
 (1)  011670  005077  167524                    CLR     @ASR
 (1)  011674  005077  167522                    CLR     @ABR
 (1)  011700  052777  004000  167512            BIS     #BIT11,@ASR             ;/DISABLE INTERNAL OSC.
 (1)  011706  052777  000057  167504            BIS     #7!50,@ASR              ;/SET GO,RATE: 100HZ.,MODE 3.
 (1)
 (1)  011714  012701  023420            1$:     MOV     #10000.,R1              ;/DO THAT MANY TIMES.
 (1)  011720  052777  000400  167472    2$:     BIS     #BIT8,@ASR              ;/GENERATE AN OSC PULSE.
 (1)  011726  005301                            DEC     R1
 (1)  011730  001373                            BNE     2$
 (1)  011732  005300                            DEC     R0
 (1)  011734  001367                            BNE     1$
 (1)  011736  052777  001000  167454            BIS     #BIT9,@ASR      ;/ST2
 (1)  011744  012700  000010                    MOV     #8.,R0
 (1)  011750  052777  000400  167442    3$:     BIS     #BIT8,@ASR
 (1)  011756  005300                            DEC     R0
 (1)  011760  001373                            BNE     3$
 (1)
 (1)  011762  017737  167434  001126            MOV     @ABR,$BDDAT             ;/READ COUNT.
 (1)  011770  012737  000001  001446            MOV     #1,$TMP0                ;/EXPECT THESE MANY COUNTS.
 (1)  011776  023737  001446  001126            CMP     $TMP0,$BDDAT            ;/DID WE GET THEM??
 (3)  012004  001401                            BEQ     TST64           ;;
 (1)  012006  104011                            ERROR   11                      ;/ERROR  100,000. OSC PULSES
 (1)                                                                    ;/DID NOT GENERATE 1
 (1)                                                                    ;/COUNTS AT RATE 100HZ
 (1)
6946
```

```
6965
6966                                    ;;**********.**********.**********
 (3)                                    ;*TEST 64       *TEST THE CLOCK'S MODE 2 OPERATION
 (4)                                    ;*
 (4)                                    ;*IN THIS TEST WE'LL CHECK MODE 2 OPERATION
 (4)                                    ;*MODE 2: EXTERNAL EVENTS TIMING MODE
 (4)                                    ;*SETTING THE GO BIT CAUSES THE COUNTER TO BEGIN COUNTING FROM
 (4)                                    ;*ZERO AND TO FREE-RUN UNTIL THE GO BIT IS WRITTEN
 (4)                                    ;*TO A ZERO THE COUNTER WILL CONTINUE COUNTING AFTER
 (4)                                    ;*OVERFLOW. AN EXTERNAL PULSE FROM SCHMITZ TRIGGER 2
 (4)                                    ;*(WHEN ST2 GO ENABLE IS A '0') CAUSES DATA TO
 (4)                                    ;*TRANSFER FROM THE COUNTER TO THE BUFFER/PRESET REG.
 (4)                                    ;*WHILE THE COUNTER CONTINUES TO RUN.
 (4)                                    ;*
 (4)                                    ;*TO TEST THIS MODE, WE'LL DISABLE THE INTERNAL OSC AND USE
 (4)                                    ;*MAINTENANCE OSC PULSES AS WELL AS A MAINTENANCE
 (4)                                    ;*ST2.
 (4)                                    ;*
 (3)                                    ;;**********.**********.**********
 (2)  012010  000004                    TST64:  SCOPE
 (1)  012012  012737  000020  001160            MOV     #20,$TIMES      ;;DO 20 ITERATIONS
6967
6968  012020  005077  167374                    CLR     @ASR            ;CLEAR THE CSR.
6969  012024  005077  167372                    CLR     @ABR            ;CLEAR THE PRESET REG.
6970  012030  012777  000060  167362            MOV     #60,@ASR        ;SET RATE ST1
6971  012036  052777  000005  167354            BIS     #5,@ASR         ;START CLOCK MODE 2.
6972
6973  012044  012700  177776          1$:       MOV     #-2.,R0         ;SET TO GIVE 2 ST1 PULSES.
6974  012050  052777  000400  167342  2$:       BIS     #BIT8,@ASR      ; GENERATE AN ST1 PULSE
6975  012056  005200                            INC     R0
6976  012060  001373                            BNE     2$              ;IF NOT DONE 2 TIMES, LOOP.
6977
6978  012062                          3$:
6979  012062  052777  001000  167330            BIS     #BIT9,@ASR      ;HERE'S THE BIGGIE! AN ST2 HAS BEEN GENERATED
6980  012070  012737  000002  001124            MOV     #2,$GDDAT       ;THE PRESET BUFFER SHOULD BE 2.
6981  012076  017737  167320  001126            MOV     @ABR,$BDDAT     ;READ THE PRESET BUFFER.
6982  012104  023737  001126  001124            CMP     $BDDAT,$GDDAT   ;DID A COUNTER TO PRESET BUFFER OCCUR?
6983  012112  001402                            BEQ     4$              ;YES - NEXT SUBTEST.
6984
                                        ;;$$$$$$$$$$$$$$$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$

6985  012114  104005                            ERROR   5               ;A COUNTER TO PRESET BUFFER DID NOT
6986                                                                    ;HAPPEN PROPERLY.
6987
                                        ;;$$$$$$$$$$$$$$$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$

6988  012116  000427                            BR      5$
6989
6990  012120                          4$:
 (1)                                                                    ;/-RDCLK1-
 (1)  012120  017746  167274                    MOV     @ASR,-(SP)      ;/SAVE CSR CONTENTS.
 (1)  012124  052777  000005  167266            BIS     #5,@ASR         ;/SET TO MODE 2,GO
 (1)  012132  042777  100000  167260            BIC     #BIT15,@ASR     ;/CLR ST FLAG.
 (1)  012140  052777  001000  167252            BIS     #BIT9,@ASR      ;/GENERATE ST2 PULSE.
 (1)  012146  017737  167250  001126            MOV     @ABR,$BDDAT     ;/READ COUNT REG.
 (1)  012154  052677  167240                    BIS     (SP)+,@ASR      ;/RESTORE CSR.
```

```
  (1)  012160  005737  001126          TST     $BDDAT          ;/PREVIOUS CONTENTS OF COUNT REG
  (1)                                                          ;/IN $BDDAT.
 6991  012164  023737  001124  001126  CMP     $GDDAT,$BDDAT   ;WAS THE COUNTER ACCIDENTLY ZEROED?
 6992  012172  001401                  BEQ     5$              ;NO - NEXT TEST.
 6993
                                      ;;$$$$$$$$$$$$$$$$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$

 6994  012174  104005                  ERROR   5               ;THE COUNT REGISTER SHOULD NOT
 6995                                                         ;HAVE BEEN EFFECTED BY THE ST2
 6996                                                         ;IN MODE 2.
 6997
                                      ;;$$$$$$$$$$$$$$$$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$

 6998  012176                          5$:
 6999  012176  042777  000070  167214          BIC     #70,@ASR        ;CLEAR THE RATE BITS.
 7000  012204  005037  001124                  CLR     $GDDAT
 7001  012210  052777  000400  167202          BIS     #BIT8,@ASR      ;SET ST1 SIM.
 7002                                                         ;/-RDCLK1-
  (1)  012216  017746  167176                  MOV     @ASR,-(SP)      ;/SAVE CSR CONTENTS.
  (1)  012222  052777  000005  167170          BIS     #5,@ASR         ;/SET TO MODE 2,GO
  (1)  012230  042777  100000  167162          BIC     #BIT15,@ASR     ;/CLR ST FLAG.
  (1)  012236  052777  001000  167154          BIS     #BIT9,@ASR      ;/GENERATE ST2 PULSE.
  (1)  012244  017737  167152  001126          MOV     @ABR,$BDDAT     ;/READ COUNT REG.
  (1)  012252  052677  167142                  BIS     (SP)+,@ASR      ;/RESTORE CSR.
  (1)  012256  005737  001126                  TST     $BDDAT          ;/PREVIOUS CONTENTS OF COUNT REG
  (1)                                                          ;/IN $BDDAT.
 7003  012262  001401                          BEQ     TST65           ;;
 7004
                                      ;;$$$$$$$$$$$$$$$$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$

 7005  012264  104001                  ERROR   1               ;CLOCK COUNT REG SHOULD BE ZERO
 7006
                                      ;;$$$$$$$$$$$$$$$$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$

 7007
 7015
 7016                                 ;;*****************************************************************
  (3)                                 ;*TEST 65       *TEST THE CLOCK'S MODE 3 OPERATION
  (4)                                 ;*
  (4)                                 ;*IN THIS TEST WE'LL CHECK MODE 3 OPERATION.
  (4)                                 ;*MODE 3 IS JUST LIKE MODE 2 EXCEPT THAT THE COUNT
  (4)                                 ;*REG IS ZEROED AFTER AN ST2.
  (4)                                 ;*
  (3)                                 ;;*****************************************************************
  (2)  012266  000004                 TST65:  SCOPE
  (1)  012270  012737  000020  001160          MOV     #20,$TIMES      ;;DO 20 ITERATIONS
 7017
 7018  012276  005077  167116                  CLR     @ASR            ;CLEAR THE CSR.
 7019  012302  005077  167114                  CLR     @ABR            ;CLEAR THE BUFFER REG.
 7020  012306  012777  000060  167104          MOV     #60,@ASR        ;SET RATE: ST1
 7021  012314  052777  000007  167076          BIS     #7,@ASR         ;START CLOCK: MODE 3
 7022
 7023  012322  012700  177776          1$:     MOV     #-2.,R0         ;SET TO GIVE 2 ST1 PULSES
 7024  012326  052777  000400  167064  2$:     BIS     #BIT8,@ASR      ;GENERATE AN ST1 PULSE
 7025  012334  005200                          INC     R0
 7026  012336  001373                          BNE     2$              ;IF NOT DONE 2 TIMES, LOOP.
```

```
 7027
 7028  012340                                  3$:
 7029  012340  052777  001000  167052            BIS     #BIT9,@ASR      ;HERE'S THE BIGGIE! AN ST2 HAS BEEN GENERATED
 7030  012346  012737  000002  001124            MOV     #2,$GDDAT       ;THE PRESET BUFFER SHOULD BE 2.
 7031  012354  017737  167042  001126            MOV     @ABR,$BDDAT     ;READ THE PRESET BUFFER.
 7032  012362  023737  001126  001124            CMP     $BDDAT,$GDDAT   ;DID A COUNTER TO PRESET BUFFER OCCUR?
 7033  012370  001402                            BEQ     4$              ;YES - NEXT SUBTEST.
 7034
                                              ;;$$$$$$$$$$$$$$$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$

 7035  012372  104005                            ERROR   5               ;A COUNTER TO PRESET BUFFER DID NOT
 7036                                                                    ;HAPPEN PROPERLY.
 7037
                                              ;;$$$$$$$$$$$$$$$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$

 7038  012374  000440                            BR      TST66           ;;
 7039  012376  005037  001124                4$: CLR     $GDDAT          ;EXPECT ZERO BACK FROM COUNT REG.
 7040                                                                    ;/-RDCLK1-
  (1)  012402  017746  167012                    MOV     @ASR,-(SP)      ;/SAVE CSR CONTENTS.
  (1)  012406  052777  000005  167004            BIS     #5,@ASR         ;/SET TO MODE 2,GO
  (1)  012414  042777  100000  166776            BIC     #BIT15,@ASR     ;/CLR ST FLAG.
  (1)  012422  052777  001000  166770            BIS     #BIT9,@ASR      ;/GENERATE ST2 PULSE.
  (1)  012430  017737  166766  001126            MOV     @ABR,$BDDAT     ;/READ COUNT REG.
  (1)  012436  052677  166756                    BIS     (SP)+,@ASR      ;/RESTORE CSR.
  (1)  012442  005737  001126                    TST     $BDDAT          ;/PREVIOUS CONTENTS OF COUNT REG
  (1)                                                                   ;/IN $BDDAT.
 7041  012446  001402                            BEQ     5$              ;IF SO - NEXT TEST.
 7042
                                              ;;$$$$$$$$$$$$$$$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$

 7043  012450  104005                            ERROR   5               ;THE CLOCK FORGOT TO ZERO THE COUNT
 7044                                                                    ;REG. AFTER AN ST2 OCCURRED ON
 7045                                                                    ;A MODE 3 COUNT.
 7046
                                              ;;$$$$$$$$$$$$$$$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$

 7047  012452  000411                            BR      TST66           ;;
 7048  012454                                  5$:
 7049  012454  005077  166740                    CLR     @ASR            ;NOW TRY CLEARING THE CSR.
 7050  012460  017737  166734  001126            MOV     @ASR,$BDDAT     ;READ THE CSR - DID IT CLEAR?
 7051  012466  001403                            BEQ     TST66           ;;
 7052  012470  005037  001124                    CLR     $GDDAT          ;NO - RECORD S/B.
 7053
                                              ;;$$$$$$$$$$$$$$$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$

 7054  012474  104002                            ERROR   2               ;CSR FAILED TO CLEAR
 7055
                                              ;;$$$$$$$$$$$$$$$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$

 7056
```

```
 7065                                   ;;*********************************************************************
  (3)                                   ;*TEST 66       *TEST MODULE TEST OF OVERFLOW OUT,ST2 IN AND OUT,AND ST1 IN
  (4)                                   ;*
  (4)                                   ;* IN THIS TEST WE WILL TEST OVERFLOW OUT,ST2 IN ST2 OUT, AND ST1
  (4)                                   ;* IN.   TO DO THIS WE CONNECTED THEM TOGETHER WITH THE TEST MODULE.
  (4)                                   ;*  NOTE: THIS TEST ONLY RAN IF TEST MODULE MODE SELECTED.
  (4)                                   ;*
  (3)                                   ;*********************************************************************
  (2) 012476 000004                     TST66:  SCOPE
  (1) 012500 012737 000010 001160               MOV     #10,$TIMES      ;;DO 10 ITERATIONS
 7066 012506 105737 001476                      TSTB    DWARF           ;DWARF MODE
 7067 012512 001541                             BEQ     TST67           ;;BR IF NOT
 7068 012514 012737 012740 001110               MOV     #1$,$LPERR
 7069 012522 012737 012740 001106               MOV     #1$,$LPADR
 7070 012530 104401 012536                      TYPE    ,65$             ;;TYPE ASCIZ STRING
  (1) 012534 000424                             BR      64$              ;;GET OVER THE ASCIZ
  (1)                                   ;;65$:  .ASCIZ  <200><7>'DWARF: ALL SWITCHES OFF, S2-1,S2-4 ON''
  (1) 012606                            64$:
 7071 012606 104401 012614                      TYPE    ,67$             ;;TYPE ASCIZ STRING
  (1) 012612 000422                             BR      66$              ;;GET OVER THE ASCIZ
  (1)                                   ;;67$:  .ASCIZ  <200>'PANEL: ST1 IN (TTL), SLOPE IN (+).''
  (1) 012660                            66$:
 7072 012660 104401 012666                      TYPE    ,69$             ;;TYPE ASCIZ STRING
  (1) 012664 000423                             BR      68$              ;;GET OVER THE ASCIZ
  (1)                                   ;;69$:  .ASCIZ  <200>''       ST2 IN (TTL), SLOPE IN (+).''<7>
  (1) 012734                            68$:
 7073 012734 004737 015166                      JSR PC,ANY2
 7074 012740 005077 166454              1$:     CLR     @ASR            ;CLEAR CSR
 7075 012744 012777 177777 166450               MOV     #-1,@ABR        ;PRESET FOR OVERFLOW.
 7076 012752 012777 000011 166440               MOV     #11,@ASR        ;SET 1 MHZ,GO.
 7077 012760 000240                             NOP
 7078 012762 000240                             NOP
 7079 012764 000240                             NOP
 7080 012766 000240                             NOP                     ;ALLOW TIME FOR OVERFLOW.
 7081 012770 012737 102210 001124               MOV     #102210,$GDDAT  ;EXPECT ST1 AND ST2 FLAGS TO BE SET.
 7082 012776 017737 166416 001126               MOV     @ASR,$BDDAT     ;READ CSR
 7083 013004 023737 001124 001126               CMP     $GDDAT,$BDDAT   ;OK?
 7084 013012 001401                             BEQ     TST67           ;;
 7085
                                        ;;$$$$$$$$$$$$$$$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$

 7086 013014 104001                             ERROR   1               ;ST1 AND/OR ST2 FLAG FAILED TO SET
 7087
                                        ;;$$$$$$$$$$$$$$$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$

 7088
```

```
 7096                                   ;;*********************************************************************
  (3)                                   ;*TEST 67       *DWARF TEST OF OVERFLOW OUT,ST1 IN AND OUT,AND ST2 IN.
  (4)                                   ;*
  (4)                                   ;*       IN THIS TEST,WE'LL TEST OVERFLOW OUT,ST1 IN,ST1 OUT, AND
  (4)                                   ;*       ST2 IN.
  (4)                                   ;*
  (3)                                   ;*********************************************************************
  (2) 013016 000004                     TST67:  SCOPE
  (1) 013020 012737 000010 001160               MOV     #10,$TIMES      ;;DO 10 ITERATIONS
 7097 013026 105737 001476                      TSTB    DWARF           ;DWARF TEST
 7098 013032 001510                             BEQ     TST70           ;;
 7099 013034 012737 013200 001106               MOV     #1$,$LPADR
 7100 013042 012737 013200 001110               MOV     #1$,$LPERR
 7101 013050 104401 013056                      TYPE    ,65$            ;;TYPE ASCIZ STRING
  (1) 013054 000426                             BR      64$             ;;GET OVER THE ASCIZ
  (1)                                   ;;65$:  .ASCIZ  <200><7>'DWARF: ALL SWITCHES OFF, S2-2 AND S2-3 ON''
  (1) 013132                            64$:
 7102 013132 104401 013140                      TYPE    ,67$            ;;TYPE ASCIZ STRING
  (1) 013136 000416                             BR      66$             ;;GET OVER THE ASCIZ
  (1)                                   ;;67$:  .ASCIZ  <200>'PANEL: SAME AS LAST TEST'<7>
  (1) 013174                            66$:
 7103 013174 004737 015166                      JSR PC,ANY2
 7104 013200 005077 166214              1$:     CLR     @ASR
 7105 013204 012777 177777 166210               MOV     #-1,@ABR                ;PRESET FOR OVERFLOW.
 7106 013212 012777 000011 166200               MOV     #11,@ASR                ;SET 1MHZ,GO.
 7107 013220 000240                             NOP
 7108 013222 000240                             NOP
 7109 013224 000240                             NOP
 7110 013226 012737 102210 001124               MOV     #102210,$GDDAT          ;EXPECT ST1,ST2 FLAGS SET.
 7111 013234 017737 166160 001126               MOV     @ASR,$BDDAT             ;READ CSR.
 7112 013242 023737 001124 001126               CMP     $GDDAT,$BDDAT
 7113 013250 001401                             BEQ     TST70           ;;
 7114
                                       ;;$$$$$$$$$$$$$$$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$

 7115 013252 104001                             ERROR 1                         ;ST1 AND/OR ST2 FLAG(S) FAIL TO SET.
 7116
                                       ;;$$$$$$$$$$$$$$$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$
```

```
 7118                                   ;;*********************************************************************
  (3)                                   ;*TEST 70       *IF ENABLED,CHECK THRESHOLD ST1 FROM TESTOR
  (3)                                   ;;*********************************************************************
  (2) 013254  000004                    TST70:  SCOPE
 7119
 7120 013256  005737  001202                    TST     $PASS           ;CHECK IF FIRST PASS
 7121 013262  001003                            BNE     1$              ;BR IF NOT
 7122 013264  005737  001476                    TST     DWARF           ;OPERATING IN TESTOR/DWARF MODE?
 7123 013270  001002                            BNE     2$              ;YES DO THIS TEST.
 7124 013272  000137  014512            1$:     JMP     ENDP            ;NO-END PASS
 7125 013276  100450                    2$:     BMI     4$              ;BR IF TESTER
 7126 013300  005737  001500                    TST     ASK             ;QUESTION       ALLREADY BEEN ASKED?
 7127 013304  001032                            BNE     3$
 7128 013306  104401  013314                    TYPE    ,65$            ;;TYPE ASCIZ STRING
  (1) 013312  000421                            BR      64$             ;;GET OVER THE ASCIZ
  (1)                                   ;;65$:  .ASCIZ  <200>#15 VOLT SUPPLY TO DWARF?(Y OR N)#
  (1) 013356                            64$:
 7129 013356  104411                            RDCHR
 7130 013360  012637  001500                    MOV     (SP)+,ASK
 7131 013364  042737  000240  001500            BIC     #240,ASK        ;STRIP PARITY AND LOWER CASE.
 7132 013372  123727  001500  000131    3$:     CMPB    ASK,#'Y         ;DID HE ANSWER YES?
 7133 013400  001407                            BEQ     4$
 7134 013402  123727  001500  000116            CMPB    ASK,#'N
 7135 013410  001730                            BEQ     1$
 7136 013412  005037  001500                    CLR     ASK
 7137 013416  000727                            BR      2$
 7138 013420                            4$:
  (1) 013420  104401  013426                    TYPE    ,67$            ;;TYPE ASCIZ STRING
  (1) 013424  000425                            BR      66$             ;;GET OVER THE ASCIZ
  (1)                                   ;;67$:  .ASCIZ  <200>#PANEL: ST1 AND ST2 POTS OUT AND TURN CCW#
  (1) 013500                            66$:
 7139 013500  104401  013506                    TYPE    ,69$            ;;TYPE ASCIZ STRING
  (1) 013504  000425                            BR      68$             ;;GET OVER THE ASCIZ
  (1)                                   ;;69$:  .ASCIZ  <200>#DWARF: S2-7 AND S2-8 ON, ALL OTHERS OFF#
  (1) 013560                            68$:
 7140 013560  005077  165634                    CLR     @ASR            ;CLEAR CSR
 7141 013564  004737  015166                    JSR PC,ANY2
 7142 013570  005077  165624                    CLR     @ASR
 7143 013574  004737  015120                    JSR PC,ANYKEY
 7144 013600  017737  165614  001126            MOV     @ASR,$BDDAT     ;READ CSR
 7145 013606  012737  000000  001124            MOV     #0,$GDDAT
 7146 013614  032737  102000  001126            BIT     #BIT15!BIT10,$BDDAT     ;DID ANY FLAG SET?
 7147 013622  001401                            BEQ     TST71           ;;
 7148 013624  104002                            ERROR 2                 ;ST1 OR ST2 THRESHOLD LEVEL ERROR
 7149                                                                    ;FLAGS SHOULD NOT HAVE SET!
```

```
 7151                                   ;;*****************************************************************
  (3)                                   ;*TEST 71        *ST1,ST2 THRESHOLD TEST #2,POTS CW
  (3)                                   ;;*****************************************************************
  (2)  013626  000004                   TST71:  SCOPE
 7152  013630  012737  013704  001110           MOV     #1$,$LPERR
 7153  013636  012737  013704  001106           MOV     #1$,$LPADR
 7154
 7155  013644  104401  013652                   TYPE    ,65$            ;;TYPE ASCIZ STRING
  (1)  013650  000415                           BR      64$             ;;GET OVER THE ASCIZ
  (1)                                   ;;65$:  .ASCIZ  <200>#PANEL: TURN BOTH POTS CW#
  (1)  013704                           64$:
 7156  013704  005077  165510           1$:     CLR     @ASR
 7157  013710  004737  015166                   JSR PC,ANY2
 7158  013714  005077  165500                   CLR     @ASR
 7159  013720  004737  015120                   JSR PC,ANYKEY
 7160  013724  017737  165470  001126           MOV     @ASR,$BDDAT
 7161  013732  032737  102000  001126           BIT     #BIT15!BIT10,$BDDAT     ;DID ANY FLAG SET?
 7162  013740  001401                           BEQ     TST72           ;;
 7163  013742  104002                           ERROR   2                       ;ST1 OR ST2 THRESHOLD ERROR.
 7164
 7165                                   ;;*****************************************************************
  (3)                                   ;*TEST 72        *ST1,ST2 THRESHOLD TEST #3 MID RANGE
  (3)                                   ;;*****************************************************************
  (2)  013744  000004                   TST72:  SCOPE
 7166  013746  012737  014044  001110           MOV     #1$,$LPERR
 7167  013754  012737  014044  001106           MOV     #1$,$LPADR
 7168  013762  104401  013770                   TYPE    ,65$            ;;TYPE ASCIZ STRING
  (1)  013766  000426                           BR      64$             ;;GET OVER THE ASCIZ
  (1)                                   ;;65$:  .ASCIZ  <200>#PANEL: SET ST1 AND ST2 POTS TO MID-RANGE.#
  (1)  014044                           64$:
 7169  014044  005077  165350           1$:     CLR     @ASR
 7170  014050  004737  015166                   JSR PC,ANY2
 7171  014054  005077  165340                   CLR     @ASR
 7172  014060  004737  015120                   JSR PC,ANYKEY
 7173  014064  017737  165330  001126           MOV     @ASR,$BDDAT
 7174  014072  012737  102000  001124           MOV     #BIT15!BIT10,$GDDAT
 7175  014100  042737  075777  001126           BIC     #075777,$BDDAT
 7176  014106  023737  001124  001126           CMP     $GDDAT,$BDDAT           ;AT MID RANGE THEY BOTH SHOLD SET.
 7177  014114  001401                           BEQ     TST73           ;;
 7178  014116  104002                           ERROR   2                       ;ST1 OR ST2 FAILED TO SET.
```

```
 7180                                   ;;*********************************************************************
  (3)                                   ;*TEST 73        *TEST CLOCK REPEATABILITY IF ON TESTOR
  (3)                                   ;;*********************************************************************
  (2)  014120  000004                   TST73:  SCOPE
  (1)  014122  012737  000010  001160            MOV     #10,$TIMES      ;;DO 10 ITERATIONS
 7181  014130  005737  001476                    TST     DWARF           ;TESTOR MODE ENABLED??
 7182  014134  100402                            BMI     10$             ;BR IF YES
 7183  014136  000137  014512                    JMP     ENDP            ;NO REPORT END PASS.
 7184  014142  012737  014354  001110  10$:     MOV     #1$,$LPERR
 7185  014150  012737  014354  001106            MOV     #1$,$LPADR
 7186  014156  104401  014164                    TYPE    ,65$            ;;TYPE ASCIZ STRING
  (1)  014162  000416                            BR      64$             ;;GET OVER THE ASCIZ
  (1)                                   ;;65$:  .ASCIZ  <200>#PANEL: ST1 POT OUT AND CW#
  (1)  014220                           64$:
 7187  014220  104401  014226                    TYPE    ,67$            ;;TYPE ASCIZ STRING
  (1)  014224  000423                            BR      66$             ;;GET OVER THE ASCIZ
  (1)                                   ;;67$:  .ASCIZ  <200>#       ST2 POT IN AND SLOPE OUT (-)#
  (1)  014274                           66$:
 7188  014274  104401  014302                    TYPE    ,69$            ;;TYPE ASCIZ STRING
  (1)  014300  000423                            BR      68$             ;;GET OVER THE ASCIZ
  (1)                                   ;;69$:  .ASCIZ  <200>#DWARF: S2 ALL SWITCHES OFF, S2-6 ON#
  (1)  014350                           68$:
 7189  014350  004737  015166                    JSR PC,ANY2
 7190  014354  012777  020016  165036  1$:      MOV     #BIT13!16,@ASR  ;SET 1MHZ,MODE 3,ST2 GO ENABLE. TEST CLOCK
 7191  014362  005077  165054                    CLR     @TSCLC          ;CLEAR STATUS REG.
 7192  014366  012777  100000  165050            MOV     #100000,@TSCLD  ;PRESET COUNT REG.
 7193  014374  012777  000013  165040            MOV     #13,@TSCLC      ;SET 1MHZ,MODE 1,GO
 7194  014402  105777  165034          2$:       TSTB    @TSCLC          ;WAIT FOR CLOCK OVERFLOW.
 7195  014406  100375                            BPL     2$
 7196  014410  042777  100000  165002            BIC     #BIT15,@ASR
 7197  014416  042777  000200  165016            BIC     #200,@TSCLC     ;CLEAR OVERFLOW FLAG.
 7198  014424  105777  165012          3$:       TSTB    @TSCLC          ;WAIT FOR NEXT OVERFLOW.
 7199  014430  100375                            BPL     3$
 7200  014432  005077  164762                    CLR     @ASR            ;STOP CLOCK.
 7201  014436  005077  165000                    CLR     @TSCLC
 7202  014442  017737  164754  001126            MOV     @ABR,$BDDAT     ;READ RESULTS
 7203  014450  012737  100000  001124            MOV     #100000,$GDDAT  ;S/B COUNT
 7204  014456  013700  001124                    MOV     $GDDAT,R0
 7205  014462  163700  001126                    SUB     $BDDAT,R0
 7206  014466  100001                            BPL     4$              ;+DIF.
 7207  014470  005100                            COM     R0              ;OTHERWIZE MAKE IT
 7208  014472  020027  000007          4$:       CMP     R0,#7           ;SHOULD NOT VARY MORE THAN 7 COUNTS.
 7209  014476  003401                            BLE     TST74           ;;
 7210
 7211  014500  104010                            ERROR   10              ;CLOCK REPEATABLITY ERROR.
```

```
                                ;;*******************************************************************
                                ;*TEST 74              END OF TESTS
                                ;;*******************************************************************
014502  000004                  TST74:  SCOPE
014504  012737  000001  001160          MOV     #1,$TIMES       ;;DO 1 ITERATION
                                        ; WE'LL FIND OUT IF THERE ARE OTHER CLOCKS OUT THERE TO TEST.
                                        ;
014512                          ENDP:
014512  000005                          RESET
014514  052777  000100  164422          BIS     #BIT6,@$TKS     ;ENABLE TKB INTR.

014522  005737  001476                  TST     DWARF           ;CHECK TESTER/DWARF INDICATOR
014526  001407                          BEQ     5$              ;BR IF NOT
014530  005737  001202                  TST     $PASS           ;CHECK IF FIRST PASS
014534  001004                          BNE     5$              ;BR IF NOT
014536  104401  023056                  TYPE,   PRIME0          ;TELL OPER. TO RESET POTS/SWITCHES
014542  004737  015166                  JSR     PC,ANY2         ;WAIT FOR ANY CHAR
014546  005237  001206          5$:     INC     $UNIT           ;UPDATE # OF UNITS COUNTER
014552  123737  001206  001460          CMPB    $UNIT,EVER      ;FIND IF DONE
014560  001416                          BEQ     $EOP            ;;BR IF FINISHED
014562  063737  001454  001420          ADD     VADDR,ASR       ;UPDATE THE ADDRESSES
014570  063737  001456  001424          ADD     VVECTR,VECT1    ;UPDATE THE VECTOR
014576  004737  003016                  JSR     PC,FIXADR       ;FIX THE OTHER VECTORS AND ADDR.
014602  005037  001102                  CLR     $TSTNM          ;INIT THE TEST #
014606  006337  001450                  ASL     MASKNM          ;ROTATE THE UNIT INDICATOR
014612  000137  003106                  JMP     TST1            ;AND RUN THAT UNIT

                                .SBTTL  END OF PASS ROUTINE

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

014616                          $EOP:
014616  000240                          NOP
014620  005037  001102                  CLR     $TSTNM          ;;ZERO THE TEST NUMBER
014624  005037  001160                  CLR     $TIMES          ;;ZERO THE NUMBER OF ITERATIONS
014630  005237  001202                  INC     $PASS           ;;INCREMENT THE PASS NUMBER
014634  042737  100000  001202          BIC     #100000,$PASS   ;;DON'T ALLOW A NEG. NUMBER
014642  005327                          DEC     (PC)+           ;;LOOP?
014644  000001          $EOPCT: .WORD   1
014646  003022                  BGT     $DOAGN          ;;YES
014650  012737                  MOV     (PC)+,@(PC)+    ;;RESTORE COUNTER
014652  000001          $ENDCT: .WORD   1
014654  014644                  $EOPCT
014656  104401  014723          TYPE    ,$ENDMG         ;;TYPE 'END PASS #''
014662  013746  001202          MOV     $PASS,-(SP)     ;;SAVE $PASS FOR TYPEOUT
014666  104405                  TYPDS                   ;;GO TYPE--DECIMAL ASCII WITH SIGN
014670  104401  014720          TYPE    ,$ENULL         ;;TYPE A NULL CHARACTER
014674  013700  000042  $GET42: MOV     @#42,R0         ;;GET MONITOR ADDRESS
014700  001405                  BEQ     $DOAGN          ;;BRANCH IF NO MONITOR
014702  000005                  RESET                   ;;CLEAR THE WORLD
014704  004710          $ENDAD: JSR     PC,(R0)         ;;GO TO MONITOR
014706  000240                  NOP                     ;;SAVE ROOM
```

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  (1)  014710  000240                        NOP                     ;;FOR
  (1)  014712  000240                        NOP                     ;;ACT11
  (1)  014714                          $DOAGN:
  (1)  014714  000137                        JMP     @(PC)+          ;;RETURN
  (1)  014716  014740                  $RTNAD: .WORD   EXTMSG
  (1)  014720     377      377      000 $ENULL: .BYTE   -1,-1,0         ;;NULL CHARACTER STRING
  (1)  014723     015  042412  042116 $ENDMG: .ASCIZ  <15><12>/END PASS #/
  (1)  014730  050040  051501  020123
  (1)  014736  000043
 7237
 7238  014740  052777  000100  164176 EXTMSG: BIS     #BIT6,@$TKS     ;ENABLE TKB INTR.
 7239  014746  005737  001112             TST     $ERTTL          ;TEST IF ANY ERRORS
 7240  014752  001416                     BEQ     1$              ;BR IF NONE
 7241  014754  104401  024027             TYPE    ,ERRTOT
 7242  014760  013746  001112             MOV     $ERTTL,-(SP)
 7243  014764  104405                     TYPDS
 7244  014766  022737  000001  001450     CMP     #1,MASKNM       ;TEST IF ADDITIONAL UNITS
 7245  014774  001405                     BEQ     1$              ;BR IF NOT
 7246  014776  104401  024056             TYPE,   MESGD           ;INFORM OPER. OF BAD UNITS
 7247  015002  013746  001452             MOV     BADUNT,-(SP)
 7248  015006  104406                     TYPBN                   ;TYPE BIN MAP
 7249  015010  104401  014720       1$:   TYPE,   $ENULL          ;ENSURE ALL TEXT GOT TYPED
 7250  015014  004737  015260             JSR     PC,CTRLCG       ;TEST FOR CTRL C/G
 7251  015020  000137  002464             JMP     LOGIC
 7252
 7253                                ;SUBROUTINE TO CHANGE BASE OR VECTOR ADDRESS
 7254
 7255  015024  104401  023655 BASEXC: TYPE,   ADROUT          ;TYPE OUT STARTING
 7256  015030  013746  001250             MOV     $BASE,-(SP)     ;GET CURRENT DEFAULT
 7257  015034  104402                     TYPOC                   ;TELL OPER.
 7258  015036  104401  023753             TYPE,   ENDOUT          ;ADD END TEXT
 7259  015042  104413                     RDOCT                   ;GET INPUT
 7260  015044  005726                     TST     (SP)+           ;TEST INPUT
 7261  015046  001403                     BEQ     1$              ;BR IF NONE
 7262  015050  016637  177776  001250     MOV     -2(SP),$BASE    ;GET OPER. INPUT
 7263  015056  104401  023713       1$:   TYPE,   VECOUT          ;TYPE OUT STARTING VECTOR
 7264  015062  013746  001244             MOV     $VECT1,-(SP)    ;GET CURRENT DEFAULT
 7265  015066  104402                     TYPOC                   ;TELL OPER.
 7266  015070  104401  023753             TYPE,   ENDOUT          ;ADD END TEXT
 7267  015074  104413                     RDOCT                   ;GET INPUT
 7268  015076  005726                     TST     (SP)+           ;TEST INPUT
 7269  015100  001403                     BEQ     2$              ;BR IF NONE
 7270  015102  016637  177776  001244     MOV     -2(SP),$VECT1   ;GET OPER. INPUT
 7271  015110  004737  003002       2$:   JSR     PC,PRIADR       ;PRIME ADD AND VECTOR
 7272  015114  000137  002270             JMP     MTEST1          ;RETYPE DOT
```

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7274
7275                                            ;
7276                                            ;THIS ROUTINE TYPES LAST MESSAGE AND WAITS FOR AN  OPERATOR
7277                                            ;RESPONCE.
7278                                            ;
7279
7280  015120  105777  164022          ANYKEY: TSTB    @$TKB           ;CLEAR TTY READY FLAG.
7281  015124  104401  015132                  TYPE    ,65$            ;;TYPE ASCIZ STRING
 (1)  015130  000416                          BR      64$             ;;GET OVER THE ASCIZ
 (1)                                  ;;65$:  .ASCIZ  <200><7>#DWARF: SWITCH S1 3 TIMES#
 (1)  015166                          64$:
7282  015166                          ANY2:
 (1)  015166  104401  015174                  TYPE    ,65$            ;;TYPE ASCIZ STRING
 (1)  015172  000423                          BR      64$             ;;GET OVER THE ASCIZ
 (1)                                  ;;65$:  .ASCIZ  <200><7>#DEPRESS 'RETURN'' KEY WHEN DONE...#<7>
 (1)  015242                          64$:
7283  015242  104411                          RDCHR                   ;GET 'RETURN''
7284  015244  005726                          TST     (SP)+
7285  015246  104401  015254                  TYPE    ,67$            ;;TYPE ASCIZ STRING
 (1)  015252  000401                          BR      66$             ;;GET OVER THE ASCIZ
 (1)                                  ;;67$:  .ASCIZ  <200>##
 (1)  015256                          66$:
7286  015256  000207                          RTS PC
7287                                    ;SUBROUTINE TO TRAP CTRL C/G
7288  015260  000207                  CTRLCG: RTS     PC
7289  015262  105777  163656                  TSTB    @$TKS           ;TEST IF INPUT
7290  015266  100022                          BPL     2$              ;BR IF NONE
7291  015270  017737  163652  015336        MOV     @$TKB,CTRCHA    ;READ CHAR.
7292  015276  042737  177640  015336        BIC     #177640,CTRCHA  ;MASK OFF BITS
7293  015304  022737  000003  015336        CMP     #3,CTRCHA       ;TEST FOR CTRL C
7294  015312  001003                        BNE     1$              ;BR IF NOT
7295  015314  005726                        TST     (SP)+           ;CLEAN STACK
7296  015316  000137  002270                JMP     MTEST1          ;RETYPE DOT
7297  015322  022737  000007  015336  1$:   CMP     #7,CTRCHA       ;TEST FOR CTRL G
7298  015330  001001                        BNE     2$              ;BR IF NOT
7299  015332  104407                        GTSWR                   ;GET NEW SWITCHS
7300  015334  000207                  2$:   RTS     PC              ;EXIT
7301  015336  000000                  CTRCHA: 0               ;CHAR. THE OPER TYPED DURING RUNNING
7302
```

```
                                        .SBTTL
                                        .SBTTL  *SYSMAC ROUTINES
                                        .SBTTL

                                .SBTTL  BINARY TO OCTAL (ASCII) AND TYPE

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

015340  017646  000000          $TYPOS: MOV     @(SP),-(SP)     ;;PICKUP THE MODE
015344  116637  000001  015563          MOVB    1(SP),$OFILL    ;;LOAD ZERO FILL SWITCH
015352  112637  015565                  MOVB    (SP)+,$OMODE+1  ;;NUMBER OF DIGITS TO TYPE
015356  062716  000002                  ADD     #2,(SP)         ;;ADJUST RETURN ADDRESS
015362  000406                          BR      $TYPON
015364  112737  000001  015563  $TYPOC: MOVB    #1,$OFILL       ;;SET THE ZERO FILL SWITCH
015372  112737  000006  015565          MOVB    #6,$OMODE+1     ;;SET FOR SIX(6) DIGITS
015400  112737  000005  015562  $TYPON: MOVB    #5,$OCNT        ;;SET THE ITERATION COUNT
015406  010346                          MOV     R3,-(SP)        ;;SAVE R3
015410  010446                          MOV     R4,-(SP)        ;;SAVE R4
015412  010546                          MOV     R5,-(SP)        ;;SAVE R5
015414  113704  015565                  MOVB    $OMODE+1,R4     ;;GET THE NUMBER OF DIGITS TO TYPE
015420  005404                          NEG     R4
015422  062704  000006                  ADD     #6,R4           ;;SUBTRACT IT FOR MAX. ALLOWED
015426  110437  015564                  MOVB    R4,$OMODE       ;;SAVE IT FOR USE
015432  113704  015563                  MOVB    $OFILL,R4       ;;GET THE ZERO FILL SWITCH
015436  016605  000012                  MOV     12(SP),R5       ;;PICKUP THE INPUT NUMBER
015442  005003                          CLR     R3              ;;CLEAR THE OUTPUT WORD
015444  006105                  1$:     ROL     R5              ;;ROTATE MSB INTO ''C''
015446  000404                          BR      3$              ;;GO DO MSB
015450  006105                  2$:     ROL     R5              ;;FORM THIS DIGIT
015452  006105                          ROL     R5
015454  006105                          ROL     R5
015456  010503                          MOV     R5,R3
015460  006103                  3$:     ROL     R3              ;;GET LSB OF THIS DIGIT
015462  105337  015564                  DECB    $OMODE          ;;TYPE THIS DIGIT?
```

```
(1)  015466  100016                        BPL     7$              ;;BR IF NO
(1)  015470  042703  177770                BIC     #177770,R3      ;;GET RID OF JUNK
(1)  015474  001002                        BNE     4$              ;;TEST FOR 0
(1)  015476  005704                        TST     R4              ;;SUPPRESS THIS 0?
(1)  015500  001403                        BEQ     5$              ;;BR IF YES
(1)  015502  005204                 4$:    INC     R4              ;;DON'T SUPPRESS ANYMORE 0'S
(1)  015504  052703  000060                BIS     #'0,R3          ;;MAKE THIS DIGIT ASCII
(1)  015510  052703  000040         5$:    BIS     #' ,R3          ;;MAKE ASCII IF NOT ALREADY
(1)  015514  110337  015560                MOVB    R3,8$           ;;SAVE FOR TYPING
(1)  015520  104401  015560                TYPE    ,8$             ;;GO TYPE THIS DIGIT
(1)  015524  105337  015562         7$:    DECB    $OCNT           ;;COUNT BY 1
(1)  015530  003347                        BGT     2$              ;;BR IF MORE TO DO
(1)  015532  002402                        BLT     6$              ;;BR IF DONE
(1)  015534  005204                        INC     R4              ;;INSURE LAST DIGIT ISN'T A BLANK
(1)  015536  000744                        BR      2$              ;;GO DO THE LAST DIGIT
(1)  015540  012605                 6$:    MOV     (SP)+,R5        ;;RESTORE R5
(1)  015542  012604                        MOV     (SP)+,R4        ;;RESTORE R4
(1)  015544  012603                        MOV     (SP)+,R3        ;;RESTORE R3
(1)  015546  016666  000002  000004        MOV     2(SP),4(SP)     ;;SET THE STACK FOR RETURNING
(1)  015554  012616                        MOV     (SP)+,(SP)
(1)  015556  000002                        RTI                     ;;RETURN
(1)  015560     000                 8$:    .BYTE   0               ;;STORAGE FOR ASCII DIGIT
(1)  015561     000                        .BYTE   0               ;;TERMINATOR FOR TYPE ROUTINE
(1)  015562     000                 $OCNT: .BYTE   0               ;;OCTAL DIGIT COUNTER
(1)  015563     000                 $OFILL:.BYTE   0               ;;ZERO FILL SWITCH
(1)  015564  000000                 $OMODE:.WORD   0               ;;NUMBER OF DIGITS TO TYPE
7310                                .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)  015566  010146                 $TYPBN:MOV     R1,-(SP)        ;;SAVE R1 ON THE STACK
(1)  015570  016601  000006                MOV     6(SP),R1        ;;GET THE INPUT NUMBER
(1)  015574  000261                        SEC                     ;;SET "C" SO CAN KEEP TRACK OF THE NUMBER OF BITS
(1)  015576  112737  000060  015640 1$:    MOVB    #'0,$BIN        ;;SET CHARACTER TO AN ASCII "0".
(1)  015604  006101                        ROL     R1              ;;GET THIS BIT
(1)  015606  001406                        BEQ     2$              ;;DONE?
(1)  015610  105537  015640                ADCB    $BIN            ;;NO--SET THE CHARACTER EQUAL TO THIS BIT
(1)  015614  104401  015640                TYPE    ,$BIN           ;;GO TYPE THIS BIT
(1)  015620  000241                        CLC                     ;;CLEAR "C" SO CAN KEEP TRACK OF BITS
(1)  015622  000765                        BR      1$              ;;GO DO THE NEXT BIT
(1)  015624  012601                 2$:    MOV     (SP)+,R1        ;;POP THE STACK INTO R1
(1)  015626  016666  000002  000004        MOV     2(SP),4(SP)     ;;ADJUST THE STACK
(1)  015634  012616                        MOV     (SP)+,(SP)
(1)  015636  000002                        RTI                     ;;RETURN TO USER
(1)  015640     000     000         $BIN:  .BYTE   0,0             ;;STORAGE FOR ASCII CHAR. AND TERMINATOR
```

```
 7312                                   .SBTTL  CONVERT BINARY TO DECIMAL AND TYPE ROUTINE
  (1)
  (2)                                   ;;**********************************************************************
  (1)                                   ;*THIS ROUTINE IS USED TO CHANGE A 16-BIT BINARY NUMBER TO A 5-DIGIT
  (1)                                   ;*SIGNED DECIMAL (ASCII) NUMBER AND TYPE IT. DEPENDING ON WHETHER THE
  (1)                                   ;*NUMBER IS POSITIVE OR NEGATIVE A SPACE OR A MINUS SIGN WILL BE TYPED
  (1)                                   ;*BEFORE THE FIRST DIGIT OF THE NUMBER. LEADING ZEROS WILL ALWAYS BE
  (1)                                   ;*REPLACED WITH SPACES.
  (1)                                   ;*CALL:
  (1)                                   ;*      MOV     NUM,-(SP)       ;;PUT THE BINARY NUMBER ON THE STACK
  (1)                                   ;*      TYPDS                   ;;GO TO THE ROUTINE
  (1)
  (1)  015642                           $TYPDS:
  (3)  015642  010046                           MOV     R0,-(SP)        ;;PUSH R0 ON STACK
  (3)  015644  010146                           MOV     R1,-(SP)        ;;PUSH R1 ON STACK
  (3)  015646  010246                           MOV     R2,-(SP)        ;;PUSH R2 ON STACK
  (3)  015650  010346                           MOV     R3,-(SP)        ;;PUSH R3 ON STACK
  (3)  015652  010546                           MOV     R5,-(SP)        ;;PUSH R5 ON STACK
  (1)  015654  012746  020200                   MOV     #20200,-(SP)    ;;SET BLANK SWITCH AND SIGN
  (1)  015660  016605  000020                   MOV     20(SP),R5       ;;GET THE INPUT NUMBER
  (1)  015664  100004                           BPL     1$              ;;BR IF INPUT IS POS.
  (1)  015666  005405                           NEG     R5              ;;MAKE THE BINARY NUMBER POS.
  (1)  015670  112766  000055  000001           MOVB    #'-,1(SP)       ;;MAKE THE ASCII NUMBER NEG.
  (1)  015676  005000                   1$:     CLR     R0              ;;ZERO THE CONSTANTS INDEX
  (1)  015700  012703  016056                   MOV     #$DBLK,R3       ;;SETUP THE OUTPUT POINTER
  (1)  015704  112723  000040                   MOVB    #' ,(R3)+       ;;SET THE FIRST CHARACTER TO A BLANK
  (1)  015710  005002                   2$:     CLR     R2              ;;CLEAR THE BCD NUMBER
  (1)  015712  016001  016046                   MOV     $DTBL(R0),R1    ;;GET THE CONSTANT
  (1)  015716  160105                   3$:     SUB     R1,R5           ;;FORM THIS BCD DIGIT
  (1)  015720  002402                           BLT     4$              ;;BR IF DONE
  (1)  015722  005202                           INC     R2              ;;INCREASE THE BCD DIGIT BY 1
  (1)  015724  000774                           BR      3$
  (1)  015726  060105                   4$:     ADD     R1,R5           ;;ADD BACK THE CONSTANT
  (1)  015730  005702                           TST     R2              ;;CHECK IF BCD DIGIT=0
  (1)  015732  001002                           BNE     5$              ;;FALL THROUGH IF 0
  (1)  015734  105716                           TSTB    (SP)            ;;STILL DOING LEADING 0'S?
  (1)  015736  100407                           BMI     7$              ;;BR IF YES
  (1)  015740  106316                   5$:     ASLB    (SP)            ;;MSD?
  (1)  015742  103003                           BCC     6$              ;;BR IF NO
  (1)  015744  116663  000001  177777           MOVB    1(SP),-1(R3)    ;;YES--SET THE SIGN
  (1)  015752  052702  000060           6$:     BIS     #'0,R2          ;;MAKE THE BCD DIGIT ASCII
  (1)  015756  052702  000040           7$:     BIS     #' ,R2          ;;MAKE IT A SPACE IF NOT ALREADY A DIGIT
  (1)  015762  110223                           MOVB    R2,(R3)+        ;;PUT THIS CHARACTER IN THE OUTPUT BUFFER
  (1)  015764  005720                           TST     (R0)+           ;;JUST INCREMENTING
  (1)  015766  020027  000010                   CMP     R0,#10          ;;CHECK THE TABLE INDEX
  (1)  015772  002746                           BLT     2$              ;;GO DO THE NEXT DIGIT
  (1)  015774  003002                           BGT     8$              ;;GO TO EXIT
  (1)  015776  010502                           MOV     R5,R2           ;;GET THE LSD
  (1)  016000  000764                           BR      6$              ;;GO CHANGE TO ASCII
  (1)  016002  105726                   8$:     TSTB    (SP)+           ;;WAS THE LSD THE FIRST NON-ZERO?
  (1)  016004  100003                           BPL     9$              ;;BR IF NO
  (1)  016006  116663  177777  177776           MOVB    -1(SP),-2(R3)   ;;YES--SET THE SIGN FOR TYPING
  (1)  016014  105013                   9$:     CLRB    (R3)            ;;SET THE TERMINATOR
  (3)  016016  012605                           MOV     (SP)+,R5        ;;POP STACK INTO R5
  (3)  016020  012603                           MOV     (SP)+,R3        ;;POP STACK INTO R3
  (3)  016022  012602                           MOV     (SP)+,R2        ;;POP STACK INTO R2
```

```
   (3)  016024  012601                          MOV     (SP)+,R1        ;;POP STACK INTO R1
   (3)  016026  012600                          MOV     (SP)+,R0        ;;POP STACK INTO R0
   (1)  016030  104401  016056                  TYPE    ,$DBLK          ;;NOW TYPE THE NUMBER
   (1)  016034  016666  000002  000004          MOV     2(SP),4(SP)     ;;ADJUST THE STACK
   (1)  016042  012616                          MOV     (SP)+,(SP)
   (1)  016044  000002                          RTI                     ;;RETURN TO USER
   (1)  016046  023420                $DTBL:    10000.
   (1)  016050  001750                          1000.
   (1)  016052  000144                          100.
   (1)  016054  000012                          10.
   (1)  016056  000004                $DBLK:    .BLKW   4
  7313
```

```
 7327                                   .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)  016066                           $ERROR:
  (1)  016066  104410                           CKSWR                   ;;TEST FOR CHANGE IN SOFT-SWR
  (3)  016070  004737  015260                   JSR     PC,CTRLCG       ;TEST FOR CTRL C/G
  (3)  016074  053737  001450  001452           BIS     MASKNM,BADUNT           ;SET THE FAILING UNIT
  (3)  016102  013737  001450  016132           MOV     MASKNM,11$              ;SAVE IT
  (3)  016110  012737  000000  001504           MOV     #0,UNITBD               ;PRIME THE UNIT #
  (3)  016116  006237  016132           10$:    ASR     11$                     ;SHIFT LEFT
  (3)  016122  001404                           BEQ     12$                     ;BR IF FINISHED
  (3)  016124  005237  001504                   INC     UNITBD                  ;UPDATE BAD UNIT VALUE
  (3)  016130  000772                           BR      10$                     ;BR AGAIN
  (3)  016132  000000                   11$:    0
  (3)  016134  000240                   12$:    NOP
  (1)  016136  105237  001103           7$:     INCB    $ERFLG          ;;SET THE ERROR FLAG
  (1)  016142  001775                           BEQ     7$              ;;DON'T LET THE FLAG GO TO ZERO
  (1)  016144  013777  001102  162770           MOV     $TSTNM,@DISPLAY ;;DISPLAY TEST NUMBER AND ERROR FLAG
  (1)  016152  032777  002000  162760           BIT     #BIT10,@SWR     ;;BELL ON ERROR?
  (1)  016160  001402                           BEQ     1$              ;;NO - SKIP
  (1)  016162  104401  001164                   TYPE    ,$BELL          ;;RING BELL
  (1)  016166  005237  001112           1$:     INC     $ERTTL          ;;COUNT THE NUMBER OF ERRORS
  (1)  016172  011637  001116                   MOV     (SP),$ERRPC     ;;GET ADDRESS OF ERROR INSTRUCTION
  (1)  016176  162737  000002  001116           SUB     #2,$ERRPC
  (1)  016204  117737  162706  001114           MOVB    @$ERRPC,$ITEMB  ;;STRIP AND SAVE THE ERROR ITEM CODE
  (1)  016212  032777  020000  162720           BIT     #BIT13,@SWR     ;;SKIP TYPEOUT IF SET
  (1)  016220  001004                           BNE     20$             ;;SKIP TYPEOUTS
  (1)  016222  004737  016322                   JSR     PC,$ERRTYP      ;;GO TO USER ERROR ROUTINE
  (1)  016226  104401  001171                   TYPE    ,$CRLF
  (1)  016232                           20$:
  (1)  016232  122737  000001  001214           CMPB    #APTENV,$ENV    ;;RUNNING IN APT MODE
  (1)  016240  001007                           BNE     2$              ;;NO,SKIP APT ERROR REPORT
  (1)  016242  113737  001114  016254           MOVB    $ITEMB,21$      ;;SET ITEM NUMBER AS ERROR NUMBER
  (1)  016250  004737  020710                   JSR     PC,$ATY4        ;;REPORT FATAL ERROR TO APT
  (1)  016254     000                   21$:    .BYTE   0
  (1)  016255     000                           .BYTE   0
  (1)  016256  000777                   22$:    BR      22$             ;;APT ERROR LOOP
  (1)  016260  005777  162654           2$:     TST     @SWR            ;;HALT ON ERROR
  (1)  016264  100002                           BPL     3$              ;;SKIP IF CONTINUE
  (1)  016266  000000                           HALT                    ;;HALT ON ERROR!
  (1)  016270  104410                           CKSWR                   ;;TEST FOR CHANGE IN SOFT-SWR
  (1)  016272  032777  001000  162640   3$:     BIT     #BIT09,@SWR     ;;LOOP ON ERROR SWITCH SET?
  (1)  016300  001402                           BEQ     4$              ;;BR IF NO
  (1)  016302  013716  001110                   MOV     $LPERR,(SP)     ;;FUDGE RETURN FOR LOOPING
  (1)  016306  005737  001162           4$:     TST     $ESCAPE         ;;CHECK FOR AN ESCAPE ADDRESS
```

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(1)  016312  001402                        BEQ     5$                ;;BR IF NONE
(1)  016314  013716  001162                MOV     $ESCAPE,(SP)      ;;FUDGE RETURN ADDRESS FOR ESCAPE
(1)  016320                          5$:
(1)  016320  000002                        RTI                       ;;RETURN
7328                                 .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)  016322                          $ERRTYP:
(1)  016322  104401  001171                TYPE    ,$CRLF            ;;''CARRIAGE RETURN'' & 'LINE FEED''
(1)  016326  010046                        MOV     R0,-(SP)          ;;SAVE R0
(1)  016330  005000                        CLR     R0                ;;PICKUP THE ITEM INDEX
(1)  016332  153700  001114                BISB    @#$ITEMB,R0
(1)  016336  001004                        BNE     1$                ;;IF ITEM NUMBER IS ZERO, JUST
(1)                                                                  ;;TYPE THE PC OF THE ERROR
(2)  016340  013746  001116                MOV     $ERRPC,-(SP)      ;;SAVE $ERRPC FOR TYPEOUT
(2)                                                                  ;;ERROR ADDRESS
(2)  016344  104402                        TYPOC                     ;;GO TYPE--OCTAL ASCII(ALL DIGITS)
(1)  016346  000445                        BR      10$               ;;GET OUT
(1)  016350  005300                  1$:   DEC     R0                ;;ADJUST THE INDEX SO THAT IT WILL
(1)  016352  006300                        ASL     R0                ;;      WORK FOR THE ERROR TABLE
(1)  016354  006300                        ASL     R0
(1)  016356  006300                        ASL     R0
(1)  016360  062700  001256                ADD     #$ERRTB,R0        ;;FORM TABLE POINTER
(1)  016364  012037  016374                MOV     (R0)+,2$          ;;PICKUP 'ERROR MESSAGE'' POINTER
(1)  016370  001404                        BEQ     3$                ;;SKIP TYPEOUT IF NO POINTER
(1)  016372  104401                        TYPE                      ;;TYPE THE 'ERROR MESSAGE''
(1)  016374  000000                  2$:   .WORD   0                 ;;'ERROR MESSAGE'' POINTER GOES HERE
(1)  016376  104401  001171                TYPE    ,$CRLF            ;;''CARRIAGE RETURN'' & 'LINE FEED''
(1)  016402  012037  016412          3$:   MOV     (R0)+,4$          ;;PICKUP 'DATA HEADER'' POINTER
(1)  016406  001404                        BEQ     5$                ;;SKIP TYPEOUT IF 0
(1)  016410  104401                        TYPE                      ;;TYPE THE 'DATA HEADER''
(1)  016412  000000                  4$:   .WORD   0                 ;;'DATA HEADER'' POINTER GOES HERE
(1)  016414  104401  001171                TYPE    ,$CRLF            ;;''CARRIAGE RETURN'' & 'LINE FEED''
(1)  016420  010146                  5$:   MOV     R1,-(SP)          ;;SAVE R1
(1)  016422  012001                        MOV     (R0)+,R1          ;;PICKUP 'DATA TABLE'' POINTER
(1)  016424  001415                        BEQ     9$                ;;BR IF NO DATA TO BE TYPED
(1)  016426  012000                        MOV     (R0)+,R0          ;;PICKUP 'DATA FORMAT'' POINTER
(1)  016430  105720                  6$:   TSTB    (R0)+             ;;''OCTAL'' OR 'DECIMAL''
(1)  016432  001003                        BNE     7$                ;;BR IF DECIMAL
(2)  016434  013146                        MOV     @(R1)+,-(SP)      ;;SAVE @(R1)+ FOR TYPEOUT
(2)  016436  104402                        TYPOC                     ;;GO TYPE--OCTAL ASCII(ALL DIGITS)
(1)  016440  000402                        BR      8$
(1)  016442                          7$:
(2)  016442  013146                        MOV     @(R1)+,-(SP)      ;;SAVE @(R1)+ FOR TYPEOUT
(2)  016444  104405                        TYPDS                     ;;GO TYPE--DECIMAL ASCII WITH SIGN
(1)  016446  005711                  8$:   TST     (R1)              ;;IS THERE ANOTHER NUMBER?
(1)  016450  001403                        BEQ     9$                ;;BR IF NO
(1)  016452  104401  016472                TYPE    ,11$              ;;TYPE TWO(2) SPACES
(1)  016456  000764                        BR      6$                ;;LOOP
(1)
(1)  016460  012601                  9$:   MOV     (SP)+,R1          ;;RESTORE R1
(1)  016462  012600                  10$:  MOV     (SP)+,R0          ;;RESTORE R0
```

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(1)  016464  104401  001171              TYPE    ,$CRLF          ;;''CARRIAGE RETURN'' & 'LINE FEED''
(1)  016470  000207                      RTS     PC              ;;RETURN
(1)  016472  020040      000     11$:    .ASCIZ  /  /            ;;TWO(2) SPACES
(1)          016476                      .EVEN
7329                             .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)  016476                      $SCOPE:
(1)  016476  104410                      CKSWR                   ;;TEST  FOR CHANGE IN SOFT-SWR
(2)  016500  004737  015260              JSR     PC,CTRLCG       ;TEST FOR CTRL C/G
(1)  016504  032777  040000  162426 1$:  BIT     #BIT14,@SWR     ;;LOOP ON PRESENT TEST?
(1)  016512  001114                      BNE     $OVER           ;;YES IF SW14=1
(1)                              ;#####START OF CODE FOR THE XOR TESTER#####
(1)  016514  000416              $XTSTR: BR      6$              ;;IF RUNNING ON THE ''XOR'' TESTER CHANGE
(1)                                                              ;;THIS INSTRUCTION TO A ''NOP'' (NOP=240)
(1)  016516  013746  000004              MOV     @#ERRVEC,-(SP)  ;;SAVE THE CONTENTS OF THE ERROR VECTOR
(1)  016522  012737  016542  000004      MOV     #5$,@#ERRVEC    ;;SET FOR TIMEOUT
(1)  016530  005737  177060              TST     @#177060        ;;TIME OUT ON XOR?
(1)  016534  012637  000004              MOV     (SP)+,@#ERRVEC  ;;RESTORE THE ERROR VECTOR
(1)  016540  000463                      BR      $SVLAD          ;;GO TO THE NEXT TEST
(1)  016542  022626              5$:     CMP     (SP)+,(SP)+     ;;CLEAR THE STACK AFTER A TIME OUT
(1)  016544  012637  000004              MOV     (SP)+,@#ERRVEC  ;;RESTORE THE ERROR VECTOR
(1)  016550  000423                      BR      7$              ;;LOOP ON THE PRESENT TEST
(1)  016552                      6$:;#####END OF CODE FOR THE XOR TESTER#####
(1)  016552  032777  000400  162360      BIT     #BIT08,@SWR     ;;LOOP ON SPEC. TEST?
(1)  016560  001404                      BEQ     2$              ;;BR IF NO
(1)  016562  127737  162352  001102      CMPB    @SWR,$TSTNM     ;;ON THE RIGHT TEST?    SWR<7:0>
(1)  016570  001465                      BEQ     $OVER           ;;BR IF YES
(1)  016572  105737  001103      2$:     TSTB    $ERFLG          ;;HAS AN ERROR OCCURRED?
(1)  016576  001421                      BEQ     3$              ;;BR IF NO
(1)  016600  123737  001115  001103      CMPB    $ERMAX,$ERFLG   ;;MAX. ERRORS FOR THIS TEST OCCURRED?
(1)  016606  101015                      BHI     3$              ;;BR IF NO
(1)  016610  032777  001000  162322      BIT     #BIT09,@SWR     ;;LOOP ON ERROR?
(1)  016616  001404                      BEQ     4$              ;;BR IF NO
(1)  016620  013737  001110  001106 7$:  MOV     $LPERR,$LPADR   ;;SET LOOP ADDRESS TO LAST SCOPE
(1)  016626  000446                      BR      $OVER
(1)  016630  105037  001103      4$:     CLRB    $ERFLG          ;;ZERO THE ERROR FLAG
(1)  016634  005037  001160              CLR     $TIMES          ;;CLEAR THE NUMBER OF ITERATIONS TO MAKE
(1)  016640  000415                      BR      1$              ;;ESCAPE TO THE NEXT TEST
(1)  016642  032777  004000  162270 3$:  BIT     #BIT11,@SWR     ;;INHIBIT ITERATIONS?
(1)  016650  001011                      BNE     1$              ;;BR IF YES
(1)  016652  005737  001202              TST     $PASS           ;;IF FIRST PASS OF PROGRAM
(1)  016656  001406                      BEQ     1$              ;;      INHIBIT ITERATIONS
(1)  016660  005237  001104              INC     $ICNT           ;;INCREMENT ITERATION COUNT
(1)  016664  023737  001160  001104      CMP     $TIMES,$ICNT    ;;CHECK THE NUMBER OF ITERATIONS MADE
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```
(1)  016672  002024                          BGE     $OVER           ;;BR IF MORE ITERATION REQUIRED
(1)  016674  012737  000001  001104  1$:     MOV     #1,$ICNT        ;;REINITIALIZE THE ITERATION COUNTER
(1)  016702  013737  016760  001160          MOV     $MXCNT,$TIMES   ;;SET NUMBER OF ITERATIONS TO DO
(1)  016710  105237  001102            $SVLAD: INCB    $TSTNM          ;;COUNT TEST NUMBERS
(1)  016714  113737  001102  001200          MOVB    $TSTNM,$TESTN   ;;SET TEST NUMBER IN APT MAILBOX
(1)  016722  011637  001106                  MOV     (SP),$LPADR     ;;SAVE SCOPE LOOP ADDRESS
(1)  016726  011637  001110                  MOV     (SP),$LPERR     ;;SAVE ERROR LOOP ADDRESS
(1)  016732  005037  001162                  CLR     $ESCAPE         ;;CLEAR THE ESCAPE FROM ERROR ADDRESS
(1)  016736  112737  000001  001115          MOVB    #1,$ERMAX       ;;ONLY ALLOW ONE(1) ERROR ON NEXT TEST
(1)  016744  013777  001102  162170  $OVER:  MOV     $TSTNM,@DISPLAY ;;DISPLAY TEST NUMBER
(1)  016752  013716  001106                  MOV     $LPADR,(SP)     ;;FUDGE RETURN ADDRESS
(1)  016756  000002                          RTI                     ;;FIXES PS
(1)  016760  003720                  $MXCNT: 2000.                   ;;MAX. NUMBER OF ITERATIONS
```

```
 7331                                   .SBTTL  TTY INPUT ROUTINE
  (1)
  (2)                                   ;;*************************************************************************
  (1)                                   .ENABL  LSB
  (1)  016762  000000                   $TKCNT: .WORD   0               ;;NUMBER OF ITEMS IN QUEUE
  (1)  016764  000000                   $TKQIN: .WORD   0               ;;INPUT POINTER
  (1)  016766  000000                   $TKQOUT: .WORD  0               ;;OUTPUT POINTER
  (1)  016770  000040                   $TKQSRT: .BLKB  32.             ;;TTY KEYBOARD QUEUE
  (1)          017030                   $TKQEND=.
  (1)
  (1)                                   ;*TK INITIALIZE ROUTINE
  (1)                                   ;*THIS ROUTINE WILL INITIALIZE THE TTY KEYBOARD INPUT QUEUE
  (1)                                   ;*SETUP THE INTERRUPT VECTOR AND TURN ON THE KEYBOARD INTERRUPT
  (1)                                   ;
  (1)                                   ;*CALL:
  (1)                                   ;*      JSR     PC,$TKINT
  (1)                                   ;*      RETURN
  (1)                                   ;
  (1)  017030  005037  016762           $TKINT: CLR     $TKCNT          ;;CLEAR COUNT OF ITEMS IN QUEUE
  (1)  017034  012737  016770  016764           MOV     #$TKQSRT,$TKQIN ;;MOVE THE STARTING ADDRESS OF THE
  (1)  017042  013737  016764  016766           MOV     $TKQIN,$TKQOUT  ;;QUEUE INTO THE INPUT & OUTPUT POINTERS.
  (1)  017050  012737  017100  000060           MOV     #$TKSRV,@#TKVEC ;;INITIALIZE THE KEYBOARD VECTOR
  (1)  017056  012737  000200  000062           MOV     #200,@#TKVEC+2  ;;''BR'' LEVEL 4
  (1)  017064  005777  162056                   TST     @$TKB           ;;CLEAR DONE FLAG
  (1)  017070  012777  000100  162046           MOV     #100,@$TKS      ;;ENABLE TTY KEYBOARD INTERRUPT
  (1)  017076  000207                           RTS     PC              ;;RETURN TO CALLER
  (1)
  (1)                                   ;*TK SERVICE ROUTINE
  (1)                                   ;*THIS ROUTINE WILL SERVICE THE TTY KEYBOARD INTERRUPT
  (1)                                   ;*BY READING THE CHARACTER FROM THE INPUT BUFFER AND PUTTING
  (1)                                   ;*IT IN THE QUEUE.
  (1)                                   ;*IF THE CHARACTER IS A ''CONTROL-C'' (^C) $TKINT IS CALLED AND
  (1)                                   ;*UPON RETURN EXIT IS MADE TO THE ''CONTROL-C'' RESTART ADDRESS (MTEST1)
  (1)                                   ;
  (1)  017100  117746  162042           $TKSRV: MOVB    @$TKB,-(SP)     ;;PICKUP THE CHARACTER
  (1)  017104  042716  177600                   BIC     #^C177,(SP)     ;;STRIP THE JUNK
  (1)  017110  021627  000003                   CMP     (SP),#3         ;;IS IT A CONTROL C?
  (1)  017114  001007                           BNE     1$              ;;BRANCH IF NO
  (1)  017116  104401  020244                   TYPE    ,$CNTLC         ;;TYPE A CONTROL-C (^C)
  (1)  017122  004737  017030                   JSR     PC,$TKINT       ;;INIT THE KEYBOARD
  (1)  017126  005726                           TST     (SP)+           ;;CLEAN UP STACK
  (1)  017130  000137  002270                   JMP     MTEST1          ;;CONTROL C RESTART
  (1)  017134  021627  000007           1$:     CMP     (SP),#7         ;;IS IT A CONTROL G?
  (1)  017140  001004                           BNE     2$              ;;BRANCH IF NO
  (1)  017142  022737  000176  001140           CMP     #SWREG,SWR      ;;IS SOFT-SWR SELECTED?
  (1)  017150  001500                           BEQ     6$              ;;GO TO SWR CHANGE
  (1)
  (1)  017152                           2$:
  (1)  017152  022737  000040  016762           CMP     #32.,$TKCNT     ;;IS THE QUEUE FULL?
  (1)  017160  001004                           BNE     3$              ;;BRANCH IF NO
  (1)  017162  104401  001164                   TYPE    ,$BELL          ;;RING THE TTY BELL
  (1)  017166  005726                           TST     (SP)+           ;;CLEAN CHARACTER OFF OF STACK
  (1)  017170  000451                           BR      5$              ;;EXIT
  (1)  017172  021627  000023           3$:     CMP     (SP),#23        ;;IS IT A CONTROL-S?
  (1)  017176  001021                           BNE     32$             ;;BRANCH IF NO
  (1)  017200  005077  161740                   CLR     @$TKS           ;;DISABLE TTY KEYBOARD INTERRUPTS
```

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(1)  017204  005726                          TST     (SP)+              ;;CLEAN CHAR OFF STACK
(1)  017206  105777  161732          31$:    TSTB    @$TKS              ;;WAIT FOR A CHAR
(1)  017212  100375                          BPL     31$                ;;LOOP UNTIL ITS THERE
(1)  017214  117746  161726                  MOVB    @$TKB,-(SP)        ;;GET THE CHARACTER
(1)  017220  042716  177600                  BIC     #^C177,(SP)        ;;MAKE IT 7-BIT ASCII
(1)  017224  022627  000021                  CMP     (SP)+,#21          ;;IS IT A CONTROL-Q?
(1)  017230  001366                          BNE     31$                ;;BRANCH IF NO
(1)  017232  012777  000100  161704          MOV     #100,@$TKS         ;;REENABLE TTY KEYBOARD INTERRUPTS
(1)  017240  000002                          RTI                        ;;RETURN
(1)  017242  005237  016762          32$:    INC     $TKCNT             ;;COUNT THIS CHARACTER
(1)  017246  021627  000140                  CMP     (SP),#140          ;;IS IT UPPER CASE?
(1)* 017252  002405                          BLT     4$                 ;;BRANCH IF YES
(1)  017254  021627  000175                  CMP     (SP),#175          ;;IS IT A SPECIAL CHAR?
(1)  017260  003002                          BGT     4$                 ;;BRANCH IF YES
(1)  017262  042716  000040                  BIC     #40,(SP)           ;;MAKE IT UPPER CASE
(1)  017266  112677  177472          4$:     MOVB    (SP)+,@$TKQIN      ;;AND PUT IT IN QUEUE
(1)  017272  005237  016764                  INC     $TKQIN             ;;UPDATE THE POINTER
(1)  017276  023727  016764  017030          CMP     $TKQIN,#$TKQEND    ;;GO OFF THE END?
(1)  017304  001003                          BNE     5$                 ;;BRANCH IF NO
(1)  017306  012737  016770  016764          MOV     #$TKQSRT,$TKQIN    ;;RESET THE POINTER
(1)  017314  000002                  5$:     RTI                        ;;RETURN
(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
(1)                                  ;*CALL WHEN OPERATING IN TTY INTERRUPT MODE.
(1)  017316  022737  000176  001140  $CKSWR: CMP     #SWREG,SWR         ;;IS THE SOFT-SWR SELECTED
(1)  017324  001124                          BNE     15$                ;;EXIT IF NOT
(1)  017326  105777  161612                  TSTB    @$TKS              ;;IS A CHAR WAITING?
(1)  017332  100121                          BPL     15$                ;;IF NOT, EXIT
(1)  017334  117746  161606                  MOVB    @$TKB,-(SP)        ;;YES
(1)  017340  042716  177600                  BIC     #^C177,(SP)        ;;MAKE IT  7-BIT ASCII
(1)  017344  021627  000007                  CMP     (SP),#7            ;;IS IT A CONTROL-G?
(1)  017350  001300                          BNE     2$                 ;;IF NOT, PUT IT IN THE TTY QUEUE
(1)                                                                     ;;AND EXIT
(1)
(2)                                  ;;*****************************************************************
(1)                                  ;*CONTROL IS PASSED TO THIS POINT FROM EITHER THE TTY INTERRUPT SERVICE
(1)                                  ;*ROUTINE OR FROM THE SOFTWARE SWITCH REGISTER TRAP CALL, AS A RESULT OF A
(1)                                  ;*CONTROL-G BEING TYPED, AND THE SOFTWARE SWITCH REGISTER BEING SELECTED.
(1)  017352  123727  001134  000001  6$:     CMPB    $AUTOB,#1          ;;ARE WE RUNNING IN AUTO-MODE?
(1)  017360  001674                          BEQ     2$                 ;;BRANCH IF YES
(1)  017362  005726                          TST     (SP)+              ;;CLEAR CONTROL-G OFF STACK
(1)  017364  004737  017030                  JSR     PC,$TKINT          ;;FLUSH THE TTY INPUT QUEUE
(1)  017370  005077  161550                  CLR     @$TKS              ;;DISABLE TTY KEYBOARD INTERRUPTS
(1)  017374  112737  000001  001135          MOVB    #1,$INTAG          ;;SET INTERRUPT MODE INDICATOR
(1)
(1)  017402  104401  020256                  TYPE    ,$CNTLG            ;;ECHO THE CONTROL-G (^G)
(1)  017406  104401  020263          $GTSWR: TYPE    ,$MSWR             ;;TYPE CURRENT CONTENTS
(2)  017412  013746  000176                  MOV     SWREG,-(SP)        ;;SAVE SWREG FOR TYPEOUT
(2)  017416  104402                          TYPOC                      ;;GO TYPE--OCTAL ASCII(ALL DIGITS)
(1)  017420  104401  020274                  TYPE    ,$MNEW             ;;PROMPT FOR NEW SWR
(1)  017424  005046                  19$:    CLR     -(SP)              ;;CLEAR COUNTER
(1)  017426  005046                          CLR     -(SP)              ;;THE NEW SWR
(1)  017430  105777  161510          7$:     TSTB    @$TKS              ;;CHAR THERE?
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(1)  017434  100375                        BPL     7$              ;;IF NOT TRY AGAIN
(1)
(1)  017436  117746  161504                MOVB    @$TKB,-(SP)     ;;PICK UP CHAR
(1)  017442  042716  177600                BIC     #^C177,(SP)     ;;MAKE IT 7-BIT ASCII
(1)
(1)  017446  021627  000003                CMP     (SP),#3         ;;IS IT A CONTROL-C?
(1)  017452  001015                        BNE     9$              ;;BRANCH IF NOT
(1)  017454  104401  020244                TYPE    ,$CNTLC         ;;YES, ECHO CONTROL-C (^C)
(1)  017460  062706  000006                ADD     #6,SP           ;;CLEAN UP STACK
(1)  017464  123727  001135  000001        CMPB    $INTAG,#1       ;;REENABLE TTY KEYBOARD INTERRUPTS?
(1)  017472  001003                        BNE     8$              ;;BRANCH IF NO
(1)  017474  012777  000100  161442        MOV     #100,@$TKS      ;;ALLOW TTY KEYBOARD INTERRUPTS
(1)  017502  000137  002270          8$:   JMP     MTEST1          ;;CONTROL-C RESTART
(1)
(1)
(1)  017506  021627  000025          9$:   CMP     (SP),#25        ;;IS IT A CONTROL-U?
(1)  017512  001005                        BNE     10$             ;;BRANCH IF NOT
(1)  017514  104401  020251                TYPE    ,$CNTLU         ;;YES, ECHO CONTROL-U (^U)
(1)  017520  062706  000006          20$:  ADD     #6,SP           ;;IGNORE PREVIOUS INPUT
(1)  017524  000737                        BR      19$             ;;LET'S TRY IT AGAIN
(1)
(1)
(1)  017526  021627  000015          10$:  CMP     (SP),#15        ;;IS IT A <CR>?
(1)  017532  001022                        BNE     16$             ;;BRANCH IF NO
(1)  017534  005766  000004                TST     4(SP)           ;;YES, IS IT THE FIRST CHAR?
(1)  017540  001403                        BEQ     11$             ;;BRANCH IF YES
(1)  017542  016677  000002  161370        MOV     2(SP),@SWR      ;;SAVE NEW SWR
(1)  017550  062706  000006          11$:  ADD     #6,SP           ;;CLEAR UP STACK
(1)  017554  104401  001171          14$:  TYPE    ,$CRLF          ;;ECHO <CR> AND <LF>
(1)  017560  123727  001135  000001        CMPB    $INTAG,#1       ;;RE-ENABLE TTY KBD INTERRUPTS?
(1)  017566  001003                        BNE     15$             ;;BRANCH IF NOT
(1)  017570  012777  000100  161346        MOV     #100,@$TKS      ;;RE-ENABLE TTY KBD INTERRUPTS
(1)  017576  000002          15$:  RTI                             ;;RETURN
(1)  017600  004737  020622          16$:  JSR     PC,$TYPEC       ;;ECHO CHAR
(1)  017604  021627  000060                CMP     (SP),#60        ;;CHAR < 0?
(1)  017610  002420                        BLT     18$             ;;BRANCH IF YES
(1)  017612  021627  000067                CMP     (SP),#67        ;;CHAR > 7?
(1)  017616  003015                        BGT     18$             ;;BRANCH IF YES
(1)  017620  042726  000060                BIC     #60,(SP)+       ;;STRIP-OFF ASCII
(1)  017624  005766  000002                TST     2(SP)           ;;IS THIS THE FIRST CHAR
(1)  017630  001403                        BEQ     17$             ;;BRANCH IF YES
(1)  017632  006316                        ASL     (SP)            ;;NO, SHIFT PRESENT
(1)  017634  006316                        ASL     (SP)            ;;    CHAR OVER TO MAKE
(1)  017636  006316                        ASL     (SP)            ;;    ROOM FOR NEW ONE.
(1)  017640  005266  000002          17$:  INC     2(SP)           ;;KEEP COUNT OF CHAR
(1)  017644  056616  177776                BIS     -2(SP),(SP)     ;;SET IN NEW CHAR
(1)  017650  000667                        BR      7$              ;;GET THE NEXT ONE
(1)  017652  104401  001170          18$:  TYPE    ,$QUES          ;;TYPE ?<CR><LF>
(1)  017656  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                   ;;GET A CHARACTER FROM THE QUEUE
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(1)                                     ;*      RETURN HERE             ;;CHARACTER IS ON THE STACK
(1)                                     ;*                              ;;WITH PARITY BIT STRIPPED OFF
(1)                                     ;
(1)
(1)  017660  011646                     $RDCHR: MOV     (SP),-(SP)      ;;PUSH DOWN THE PC AND
(1)  017662  016666  000004  000002             MOV     4(SP),2(SP)     ;;THE PS
(1)  017670  005066  000004             64$:    CLR     4(SP)           ;;GET READY FOR A CHARACTER
(2)  017674  005046                             CLR     -(SP)           ;;PUT NEW PS ON STACK
(2)  017676  012746  017704                     MOV     #64$,-(SP)      ;;PUT NEW PC ON  STACK
(2)  017702  000002                             RTI                     ;;POP NEW PC AND PS
(2)  017704                              1$:    TST     $TKCNT          ;;WAIT ON A CHARACTER
(1)  017704  005737  016762                     BEQ     1$              ;;DECREMENT THE COUNTER
(1)  017710  001775                             DEC     $TKCNT          ;;GET ONE CHARACTER
(1)  017712  005337  016762                     MOVB    @$TKQOUT,4(SP)  ;;UPDATE THE POINTER
(1)  017716  117766  177044  000004             INC     $TKQOUT         ;;DID IT GO OFF OF THE END?
(1)  017724  005237  016766                     CMP     $TKQOUT,#$TKQEND ;;BRANCH IF NO
(1)  017730  023727  016766  017030             BNE     2$              ;;RESET THE POINTER
(1)  017736  001003                             MOV     #$TKQSRT,$TKQOUT ;;RETURN
(1)  017740  012737  016770  016766     2$:     RTI
(1)  017746  000002                     ;;**********************************************************************
(2)                                     ;*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)  017750  010346                     $RDLIN: MOV     R3,-(SP)        ;;SAVE R3
(1)  017752  005046                             CLR     -(SP)           ;;CLEAR THE RUBOUT KEY
(1)  017754  012703  020204             1$:     MOV     #$TTYIN,R3      ;;GET ADDRESS
(1)  017760  022703  020244             2$:     CMP     #$TTYIN+32.,R3  ;;BUFFER FULL?
(1)  017764  101456                             BLOS    4$              ;;BR IF YES
(1)  017766  104411                             RDCHR                   ;;GO READ ONE CHARACTER FROM THE TTY
(1)  017770  112613                             MOVB    (SP)+,(R3)      ;;GET CHARACTER
(1)  017772  122713  000177             10$:    CMPB    #177,(R3)       ;;IS IT A RUBOUT
(1)  017776  001022                             BNE     5$              ;;BR IF NO
(1)  020000  005716                             TST     (SP)            ;;IS THIS THE FIRST RUBOUT?
(1)  020002  001007                             BNE     6$              ;;BR IF NO
(1)  020004  112737  000134  020202             MOVB    #'\,9$          ;;TYPE A BACK SLASH
(1)  020012  104401  020202                     TYPE    ,9$
(1)  020016  012716  177777                     MOV     #-1,(SP)        ;;SET THE RUBOUT KEY
(1)  020022  005303                     6$:     DEC     R3              ;;BACKUP BY ONE
(1)  020024  020327  020204                     CMP     R3,#$TTYIN      ;;STACK EMPTY?
(1)  020030  103434                             BLO     4$              ;;BR IF YES
(1)  020032  111337  020202                     MOVB    (R3),9$         ;;SETUP TO TYPEOUT THE DELETED CHAR.
(1)  020036  104401  020202                     TYPE    ,9$             ;;GO TYPE
(1)  020042  000746                             BR      2$              ;;GO READ ANOTHER CHAR.
(1)  020044  005716                     5$:     TST     (SP)            ;;RUBOUT KEY SET?
(1)  020046  001406                             BEQ     7$              ;;BR IF NO
(1)  020050  112737  000134  020202             MOVB    #'\,9$          ;;TYPE A BACK SLASH
(1)  020056  104401  020202                     TYPE    ,9$
(1)  020062  005016                             CLR     (SP)            ;;CLEAR THE RUBOUT KEY
(1)  020064  122713  000025             7$:     CMPB    #25,(R3)        ;;IS CHARACTER A CTRL U?
(1)  020070  001003                             BNE     8$              ;;BR IF NO
(1)  020072  104401  020251                     TYPE    ,$CNTLU         ;;TYPE A CONTROL 'U'
(1)  020076  000726                             BR      1$              ;;GO START OVER
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(1)  020100  122713  000022          8$:    CMPB   #22,(R3)          ;;IS CHARACTER A ''^R''?
(1)  020104  001011                 BNE    3$                 ;;BRANCH IF NO
(1)  020106  105013                 CLRB   (R3)               ;;CLEAR THE CHARACTER
(1)  020110  104401  001171         TYPE   ,$CRLF             ;;TYPE A ''CR'' & ''LF''
(1)  020114  104401  020204         TYPE   ,$TTYIN            ;;TYPE THE INPUT STRING
(1)  020120  000717                 BR     2$                 ;;GO PICKUP ANOTHER CHACTER
(1)  020122  104401  001170         4$:    TYPE   ,$QUES             ;;TYPE A '?'
(1)  020126  000712                 BR     1$                 ;;CLEAR THE BUFFER AND LOOP
(1)  020130  111337  020202         3$:    MOVB   (R3),9$            ;;ECHO THE CHARACTER
(1)  020134  104401  020202         TYPE   ,9$
(1)  020140  122723  000015         CMPB   #15,(R3)+          ;;CHECK FOR RETURN
(1)  020144  001305                 BNE    2$                 ;;LOOP IF NOT RETURN
(1)  020146  105063  177777         CLRB   -1(R3)             ;;CLEAR RETURN (THE 15)
(1)  020152  104401  001172         TYPE   ,$LF               ;;TYPE A LINE FEED
(1)  020156  005726                 TST    (SP)+              ;;CLEAN RUBOUT KEY FROM THE STACK
(1)  020160  012603                 MOV    (SP)+,R3           ;;RESTORE R3
(1)  020162  011646                 MOV    (SP),-(SP)         ;;ADJUST THE STACK AND PUT ADDRESS OF THE
(1)  020164  016666  000004  000002  MOV    4(SP),2(SP)        ;;      FIRST ASCII CHARACTER ON IT
(1)  020172  012766  020204  000004  MOV    #$TTYIN,4(SP)
(1)  020200  000002                 RTI                       ;;RETURN
(1)  020202     000                 9$:    .BYTE  0                  ;;STORAGE FOR ASCII CHAR. TO TYPE
(1)  020203     000                 .BYTE  0                  ;;TERMINATOR
(1)  020204  000040                 $TTYIN: .BLKB  32.                ;;RESERVE 32. BYTES FOR TTY INPUT
(1)  020244  041536  005015     000 $CNTLC: .ASCIZ  /^C/<15><12>      ;;CONTROL ''C''
(1)  020251     136  006525  000012 $CNTLU: .ASCIZ  /^U/<15><12>      ;;CONTROL ''U''
(1)  020256  043536  005015     000 $CNTLG: .ASCIZ  /^G/<15><12>      ;;CONTROL ''G''
(1)  020263     015  051412  051127 $MSWR:  .ASCIZ  <15><12>/SWR = /
(1)  020270  036440  000040
(1)  020274  020040  042516  020127 $MNEW:  .ASCIZ  /  NEW = /
(1)  020302  020075     000
(1)          020306                 .EVEN
7332                                .SBTTL  READ AN OCTAL NUMBER FROM THE TTY
(1)
(2)                                 ;;*********************************************************************
(1)                                 ;*THIS ROUTINE WILL READ AN OCTAL (ASCII) NUMBER FROM THE TTY AND
(1)                                 ;*CHANGE IT TO BINARY.
(1)                                 ;*CALL:
(1)                                 ;*      RDOCT                      ;;READ AN OCTAL NUMBER
(1)                                 ;*      RETURN HERE                ;;LOW ORDER BITS ARE ON TOP OF THE STACK
(1)                                 ;*                                 ;;HIGH ORDER BITS ARE IN $HIOCT
(1)
(1)  020306  011646                 $RDOCT: MOV    (SP),-(SP)         ;;PROVIDE SPACE FOR THE
(1)  020310  016666  000004  000002         MOV    4(SP),2(SP)        ;;INPUT NUMBER
(3)  020316  010046                 MOV    R0,-(SP)           ;;PUSH R0 ON STACK
(3)  020320  010146                 MOV    R1,-(SP)           ;;PUSH R1 ON STACK
(3)  020322  010246                 MOV    R2,-(SP)           ;;PUSH R2 ON STACK
(1)  020324  104412                 1$:    RDLIN                     ;;READ AN ASCIZ LINE
(1)  020326  012600                 MOV    (SP)+,R0           ;;GET ADDRESS OF 1ST CHARACTER
(1)  020330  005001                 CLR    R1                 ;;CLEAR DATA WORD
(1)  020332  005002                 CLR    R2
(1)  020334  112046                 2$:    MOVB   (R0)+,-(SP)        ;;PICKUP THIS CHARACTER
(1)  020336  001412                 BEQ    3$                 ;;IF ZERO GET OUT
(1)  020340  006301                 ASL    R1                 ;;*2
(1)  020342  006102                 ROL    R2
(1)  020344  006301                 ASL    R1                 ;;*4
(1)  020346  006102                 ROL    R2
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(1)  020350  006301                    ASL     R1              ;;*8
(1)  020352  006102                    ROL     R2
(1)  020354  042716  177770            BIC     #^C7,(SP)       ;;STRIP THE ASCII JUNK
(1)  020360  062601                    ADD     (SP)+,R1        ;;ADD IN THIS DIGIT
(1)  020362  000764                    BR      2$              ;;LOOP
(1)  020364  005726                3$: TST     (SP)+           ;;CLEAN TERMINATOR FROM STACK
(1)  020366  010166  000012            MOV     R1,12(SP)       ;;SAVE THE RESULT
(1)  020372  010237  020406            MOV     R2,$HIOCT
(3)  020376  012602                    MOV     (SP)+,R2        ;;POP STACK INTO R2
(3)  020400  012601                    MOV     (SP)+,R1        ;;POP STACK INTO R1
(3)  020402  012600                    MOV     (SP)+,R0        ;;POP STACK INTO R0
(1)  020404  000002                    RTI                     ;;RETURN
(1)  020406  000000            $HIOCT: .WORD   0               ;;HIGH ORDER BITS GO HERE
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 7334                                ;CAUTION        THE FIRST 4 LOCATIONS ARE OVERLAYED TO LOWER CPU LEVEL
 7335                                ;       THIS OVERLAY OCCURS AFTER ''SETUP''
 7336                                .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)  020410  105737  001157       $TYPE:  TSTB    $TPFLG          ;;IS THERE A TERMINAL?
  (1)  020414  100002                       BPL     1$              ;;BR IF YES
  (1)  020416  000000                       HALT                    ;;HALT HERE IF NO TERMINAL
  (1)  020420  000430                       BR      3$              ;;LEAVE
  (1)  020422  010046                 1$:   MOV     R0,-(SP)        ;;SAVE R0
  (1)  020424  017600  000002               MOV     @2(SP),R0       ;;GET ADDRESS OF ASCIZ STRING
  (1)  020430  122737  000001  001214       CMPB    #APTENV,$ENV    ;;RUNNING IN APT MODE
  (1)  020436  001011                       BNE     62$             ;;NO,GO CHECK FOR APT CONSOLE
  (1)  020440  132737  000100  001215       BITB    #APTSPOOL,$ENVM ;;SPOOL MESSAGE TO APT
  (1)  020446  001405                       BEQ     62$             ;;NO,GO CHECK FOR CONSOLE
  (1)  020450  010037  020460               MOV     R0,61$          ;;SETUP MESSAGE ADDRESS FOR APT
  (1)  020454  004737  020700               JSR     PC,$ATY3        ;;SPOOL MESSAGE TO APT
  (1)  020460  000000                 61$:  .WORD   0               ;;MESSAGE ADDRESS
  (1)  020462  132737  000040  001215 62$:  BITB    #APTCSUP,$ENVM  ;;APT CONSOLE SUPPRESSED
  (1)  020470  001003                       BNE     60$             ;;YES,SKIP TYPE OUT
  (1)  020472  112046                 2$:   MOVB    (R0)+,-(SP)     ;;PUSH CHARACTER TO BE TYPED ONTO STACK
  (1)  020474  001005                       BNE     4$              ;;BR IF IT ISN'T THE TERMINATOR
  (1)  020476  005726                       TST     (SP)+           ;;IF TERMINATOR POP IT OFF THE STACK
  (1)  020500  012600                 60$:  MOV     (SP)+,R0        ;;RESTORE R0
  (1)  020502  062716  000002         3$:   ADD     #2,(SP)         ;;ADJUST RETURN PC
  (1)  020506  000002                       RTI                     ;;RETURN
  (1)  020510  122716  000011         4$:   CMPB    #HT,(SP)        ;;BRANCH IF <HT>
  (1)  020514  001430                       BEQ     8$
  (1)  020516  122716  000200               CMPB    #CRLF,(SP)      ;;BRANCH IF NOT <CRLF>
  (1)  020522  001006                       BNE     5$
  (1)  020524  005726                       TST     (SP)+           ;;POP  <CR><LF> EQUIV
  (1)  020526  104401                       TYPE                    ;;TYPE A CR AND LF
  (1)  020530  001171                       $CRLF
  (1)  020532  105037  020666               CLRB    $CHARCNT        ;;CLEAR CHARACTER COUNT
  (1)  020536  000755                       BR      2$              ;;GET NEXT CHARACTER
  (1)  020540  004737  020622         5$:   JSR     PC,$TYPEC       ;;GO TYPE THIS CHARACTER
  (1)  020544  123726  001156         6$:   CMPB    $FILLC,(SP)+    ;;IS IT TIME FOR FILLER CHARS.?
  (1)  020550  001350                       BNE     2$              ;;IF NO GO GET NEXT CHAR.
  (1)  020552  013746  001154               MOV     $NULL,-(SP)     ;;GET # OF FILLER CHARS. NEEDED
  (1)                                                               ;;AND THE NULL CHAR.
  (1)  020556  105366  000001         7$:   DECB    1(SP)           ;;DOES A NULL NEED TO BE TYPED?
  (1)  020562  002770                       BLT     6$              ;;BR IF NO--GO POP THE NULL OFF OF STACK
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(1)  020564  004737  020622                    JSR     PC,$TYPEC       ;;GO TYPE A NULL
(1)  020570  105337  020666                    DECB    $CHARCNT        ;;DO NOT COUNT AS A COUNT
(1)  020574  000770                            BR      7$              ;;LOOP
(1)
(1)                                  ;HORIZONTAL TAB PROCESSOR
(1)
(1)  020576  112716  000040          8$:       MOVB    #' ,(SP)        ;;REPLACE TAB WITH SPACE
(1)  020602  004737  020622          9$:       JSR     PC,$TYPEC       ;;TYPE A SPACE
(1)  020606  132737  000007  020666            BITB    #7,$CHARCNT     ;;BRANCH IF NOT AT
(1)  020614  001372                            BNE     9$              ;;TAB STOP
(1)  020616  005726                            TST     (SP)+           ;;POP SPACE OFF STACK
(1)  020620  000724                            BR      2$              ;;GET NEXT CHARACTER
(1)  020622  105777  160322          $TYPEC:   TSTB    @$TPS           ;;WAIT UNTIL PRINTER IS READY
(1)  020626  100375                            BPL     $TYPEC
(1)  020630  116677  000002  160314            MOVB    2(SP),@$TPB     ;;LOAD CHAR TO BE TYPED INTO DATA REG.
(1)  020636  122766  000015  000002            CMPB    #CR,2(SP)       ;;IS CHARACTER A CARRIAGE RETURN?
(1)  020644  001003                            BNE     1$              ;;BRANCH IF NO
(1)  020646  105037  020666                    CLRB    $CHARCNT        ;;YES--CLEAR CHARACTER COUNT
(1)  020652  000406                            BR      $TYPEX          ;;EXIT
(1)  020654  122766  000012  000002  1$:       CMPB    #LF,2(SP)       ;;IS CHARACTER A LINE FEED?
(1)  020662  001402                            BEQ     $TYPEX          ;;BRANCH IF YES
(1)  020664  105227                            INCB    (PC)+           ;;COUNT THE CHARACTER
(1)  020666  000000                  $CHARCNT:.WORD   0               ;;CHARACTER COUNT STORAGE
(1)  020670  000207                  $TYPEX:   RTS     PC
(1)
7337                                 .SBTTL  APT COMMUNICATIONS ROUTINE
(1)
(2)                                  ;;**************************************************************************
(1)  020672  112737  000001  021136  $ATY1:    MOVB    #1,$FFLG        ;;TO REPORT FATAL ERROR
(1)  020700  112737  000001  021134  $ATY3:    MOVB    #1,$MFLG        ;;TO TYPE A MESSAGE
(1)  020706  000403                            BR      $ATYC
(1)  020710  112737  000001  021136  $ATY4:    MOVB    #1,$FFLG        ;;TO ONLY REPORT FATAL ERROR
(1)  020716                          $ATYC:
(3)  020716  010046                            MOV     R0,-(SP)        ;;PUSH R0 ON STACK
(3)  020720  010146                            MOV     R1,-(SP)        ;;PUSH R1 ON STACK
(1)  020722  105737  021134                    TSTB    $MFLG           ;;SHOULD TYPE A MESSAGE?
(1)  020726  001450                            BEQ     5$              ;;IF NOT:  BR
(1)  020730  122737  000001  001214            CMPB    #APTENV,$ENV    ;;OPERATING UNDER APT?
(1)  020736  001031                            BNE     3$              ;;IF NOT:  BR
(1)  020740  132737  000100  001215            BITB    #APTSPOOL,$ENVM ;;SHOULD SPOOL MESSAGES?
(1)  020746  001425                            BEQ     3$              ;;IF NOT:  BR
(1)  020750  017600  000004                    MOV     @4(SP),R0       ;;GET MESSAGE ADDR.
(1)  020754  062766  000002  000004            ADD     #2,4(SP)                ;;BUMP RETURN ADDR.
(1)  020762  005737  001174          1$:       TST     $MSGTYPE        ;;SEE IF DONE W/ LAST XMISSION?
(1)  020766  001375                            BNE     1$              ;;IF NOT:  WAIT
(1)  020770  010037  001210                    MOV     R0,$MSGAD       ;;PUT ADDR IN MAILBOX
(1)  020774  105720                  2$:       TSTB    (R0)+           ;;FIND END OF MESSAGE
(1)  020776  001376                            BNE     2$
(1)  021000  163700  001210                    SUB     $MSGAD,R0       ;;SUB START OF MESSAGE
(1)  021004  006200                            ASR     R0              ;;GET MESSAGE LNGTH IN WORDS
(1)  021006  010037  001212                    MOV     R0,$MSGLGT      ;;PUT LENGTH IN MAILBOX
(1)  021012  012737  000004  001174            MOV     #4,$MSGTYPE     ;;TELL APT TO TAKE MSG.
(1)  021020  000413                            BR      5$
(1)  021022  017637  000004  021046  3$:       MOV     @4(SP),4$       ;;PUT MSG ADDR IN JSR LINKAGE
(1)  021030  062766  000002  000004            ADD     #2,4(SP)                ;;BUMP RETURN ADDRESS
(3)  021036  013746  177776                    MOV     177776,-(SP)    ;;PUSH 177776 ON STACK
```

```
(1)  021042  004737  020410                    JSR     PC,$TYPE        ;;CALL TYPE MACRO
(1)  021046  000000                      4$:   .WORD   0
(1)  021050                              5$:
(1)  021050  105737  021136                10$:  TSTB    $FFLG           ;;SHOULD REPORT FATAL ERROR?
(1)  021054  001416                             BEQ     12$             ;;IF NOT:  BR
(1)  021056  005737  001214                     TST     $ENV            ;;RUNNING UNDER APT?
(1)  021062  001413                             BEQ     12$             ;;IF NOT:  BR
(1)  021064  005737  001174                11$:  TST     $MSGTYPE        ;;FINISHED LAST MESSAGE?
(1)  021070  001375                             BNE     11$             ;;IF NOT:  WAIT
(1)  021072  017637  000004  001176              MOV     @4(SP),$FATAL   ;;GET ERROR #
(1)  021100  062766  000002  000004              ADD     #2,4(SP)                ;;BUMP RETURN ADDR.
(1)  021106  005237  001174                      INC     $MSGTYPE        ;;TELL APT TO TAKE ERROR
(1)  021112  105037  021136                12$:  CLRB    $FFLG           ;;CLEAR FATAL FLAG
(1)  021116  105037  021135                      CLRB    $LFLG           ;;CLEAR LOG FLAG
(1)  021122  105037  021134                      CLRB    $MFLG           ;;CLEAR MESSAGE FLAG
(3)  021126  012601                              MOV     (SP)+,R1        ;;POP STACK INTO R1
(3)  021130  012600                              MOV     (SP)+,R0        ;;POP STACK INTO R0
(1)  021132  000207                              RTS     PC              ;;RETURN
(1)  021134     000                 $MFLG:  .BYTE   0               ;;MESSG. FLAG
(1)  021135     000                 $LFLG:  .BYTE   0               ;;LOG FLAG
(1)  021136     000                 $FFLG:  .BYTE   0               ;;FATAL FLAG
(1)          021140                         .EVEN
(1)          000200                 APTSIZE=200
(1)          000001                 APTENV=001
(1)          000100                 APTSPOOL=100
(1)          000040                 APTCSUP=040
```

```
 7339                                   .SBTTL  POWER DOWN AND UP ROUTINES
  (1)
  (2)                                   ;;**********************************************************************
  (1)                                   ;POWER DOWN ROUTINE
  (1)  021140  012737  021300  000024   $PWRDN: MOV     #$ILLUP,@#PWRVEC ;;SET FOR FAST UP
  (1)  021146  012737  000340  000026          MOV     #340,@#PWRVEC+2 ;;PRIO:7
  (3)  021154  010046                          MOV     R0,-(SP)        ;;PUSH R0 ON STACK
  (3)  021156  010146                          MOV     R1,-(SP)        ;;PUSH R1 ON STACK
  (3)  021160  010246                          MOV     R2,-(SP)        ;;PUSH R2 ON STACK
  (3)  021162  010346                          MOV     R3,-(SP)        ;;PUSH R3 ON STACK
  (3)  021164  010446                          MOV     R4,-(SP)        ;;PUSH R4 ON STACK
  (3)  021166  010546                          MOV     R5,-(SP)        ;;PUSH R5 ON STACK
  (3)  021170  017746  157744                  MOV     @SWR,-(SP)      ;;PUSH @SWR ON STACK
  (1)  021174  010637  021304                  MOV     SP,$SAVR6       ;;SAVE SP
  (1)  021200  012737  021212  000024          MOV     #$PWRUP,@#PWRVEC ;;SET UP VECTOR
  (1)  021206  000000                          HALT
  (1)  021210  000776                          BR      .-2             ;;HANG UP
  (1)
  (2)                                   ;;**********************************************************************
  (1)                                   ;POWER UP ROUTINE
  (1)  021212  012737  021300  000024   $PWRUP: MOV     #$ILLUP,@#PWRVEC ;;SET FOR FAST DOWN
  (1)  021220  013706  021304                  MOV     $SAVR6,SP       ;;GET SP
  (1)  021224  005037  021304                  CLR     $SAVR6          ;;WAIT LOOP FOR THE TTY
  (1)  021230  005237  021304          1$:     INC     $SAVR6          ;;WAIT FOR THE INC
  (1)  021234  001375                          BNE     1$              ;;OF  WORD
  (3)  021236  012677  157676                  MOV     (SP)+,@SWR      ;;POP STACK INTO @SWR
  (3)  021242  012605                          MOV     (SP)+,R5        ;;POP STACK INTO R5
  (3)  021244  012604                          MOV     (SP)+,R4        ;;POP STACK INTO R4
  (3)  021246  012603                          MOV     (SP)+,R3        ;;POP STACK INTO R3
  (3)  021250  012602                          MOV     (SP)+,R2        ;;POP STACK INTO R2
  (3)  021252  012601                          MOV     (SP)+,R1        ;;POP STACK INTO R1
  (3)  021254  012600                          MOV     (SP)+,R0        ;;POP STACK INTO R0
  (1)  021256  012737  021140  000024          MOV     #$PWRDN,@#PWRVEC ;;SET UP THE POWER DOWN VECTOR
  (1)  021264  012737  000340  000026          MOV     #340,@#PWRVEC+2 ;;PRIO:7
  (1)  021272  104401                          TYPE                    ;REPORT THE POWER FAILURE
  (1)  021274  021306                  $PWRMG: .WORD   $POWER          ;;POWER FAIL MESSAGE POINTER
  (1)  021276  000002                          RTI
  (1)  021300  000000                  $ILLUP: HALT                    ;;THE POWER UP SEQUENCE WAS STARTED
  (1)  021302  000776                          BR      .-2             ;; BEFORE THE POWER DOWN WAS COMPLETE
  (1)  021304  000000                  $SAVR6: 0                       ;;PUT THE SP HERE
  (1)  021306  005015  047520  042527  $POWER: .ASCIZ   <15><12>'POWER'
  (1)  021314  000122
  (1)                                           .EVEN
```

```
                                        ;*
                                        ;*THIS ROUTINE WILL PROTECT THE PROGRAM
                                        ;*FROM INTERUPTS (BAD ONES).
                                        ;*
                                        ;*THE TRAP CATCHER IS SET UP FOR
                                        ;*      .WORD   .+2
                                        ;*      JSR PC,R0
                                        ;*
                                        ;*ILLEGAL INTERRUPTS OR INTERRUPTS TO THE WRONG VECTOR
                                        ;*GOTO THE VECTOR AND PICK UP THE ".+2" AS AN ADDRESS

                                        ;*AND "4700" AS NEW STATUS.
                                        ;*THE .+2 AS A PC WILL CAUSE EXECUTION OF THE "JSR PC,R0" (AN ILLEGAL INSTR.).
                                        ;*AND TRAP TO LOCATION "4". IN LOCATION 4 WE HAVE A
                                        ;*POINTER HERE. IF THIS CONDITION CAUSES A TRAP TO LOC. 4.
                                        ;*WE WILL REPORT IT IN THE SAME MANNER THAT WER WOULD
                                        ;*REPORT ANY OTHER ERROR.
                                        ;*IF A BUSS ERROR TRAP DID OCCUT AND CAUSE A TRAP TO 4.
                                        ;*WE WILL HALT.

021316  011637  021572          IOTRD:  MOV     (SP),TRTO       ;GET WHERE WE CAME TO.
021322  162737  000004  021572          SUB     #4,TRTO         ;FORM READ ADDR.

021330  023727  021572  001000          CMP     TRTO,#1000      ;DID TRAP FROM LESS THAN ADDR. 1000?
021336  003402                          BLE     2$              ;NO-CONTINUE.

021340  000000                  1$:     HALT                    ;A BUSS ERROR TIME OUT TRAP BROUGHT US HERE.
                                                                ;ADDRESS CONTAINED IN TRTO.

021342  000776                          BR      1$              ;DON'T ALLOW CONTINUE.

021344  016637  000004  021574  2$:     MOV     4(SP),TRFRO     ;GET TRAPPED FROM ADDR.
021352  062706  000004                  ADD     #4,SP                   ;/ADD #4 TO STACK POINTER.

021356  122737  000044  001102          CMPB    #44,$TSTNM      ;LESS THAN INTERRUPT TESTS?
021364  003402                          BLE     3$              ;NO MUST BE WRONG VECTOR.

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

021366  104004                          ERROR   4               ;ERROR! ILLEGAL INTERRUPT OR
                                                                ;INTERRUPT TO WRONG VECTOR.
                                                                ;IF TEST NO. IS LESS THAN 46,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.

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

021370  000002                        RTI
021372  022626                3$:     CMP     (SP)+,(SP)+     ;CLEAN THE STACK
021374  005737  001202                TST     $PASS           ;IS THIS THE FIRST PASS
021400  001026                        BNE     4$              ;NO DONT REPORT
021402  104401  024073                TYPE,   VTMSG           ;TELL THE OPER.
021406  013746  001206                MOV     $UNIT,-(SP)
021412  005216                        INC     (SP)
021414  104405                        TYPDS
021416  000240                        NOP
021420  000240                        NOP
021422  104401  024121                TYPE,   VTMSG3          ;TYPE EXPECT. INTR.
021426  013746  001424                MOV     VECT1,-(SP)     ;GET DEFAULT
021432  104403                        TYPOS
021434     003     001                .BYTE   3,1
021436  104401  024151                TYPE,   VTMSG1          ;TYPE RCVD TEXT
021442  013746  021572                MOV     TRTO,-(SP)      ;GET ACTUAL
021446  104403                        TYPOS
021450     003     001                .BYTE   3,1
021452  104401  024201                TYPE,   VTMSG2          ;ADD REMAINDER TEXT
021456  013777  001426  157740  4$:   MOV     VECTP,@VECT1
021464  013777  001432  157736        MOV     VECT2P,@VECT2
021472  012777  004700  157726        MOV     #4700,@VECTP
021500  012777  004700  157724        MOV     #4700,@VECT2P
021506  013737  021572  001424        MOV     TRTO,VECT1
021514  042737  000007  001424        BIC     #7,VECT1
021522  013737  001424  001426        MOV     VECT1,VECTP
021530  062737  000002  001426        ADD     #2,VECTP
021536  013737  001424  001430        MOV     VECT1,VECT2
021544  062737  000004  001430        ADD     #4,VECT2
021552  013737  001430  001432        MOV     VECT2,VECT2P
021560  062737  000002  001432        ADD     #2,VECT2P
021566  000177  157314                JMP     @$LPADR         ;START TEST OVER AGAIN.
021572  000000              TRTO:     .WORD   0               ;CONTAINS ADDR. WE TRAPPED OR INTERRUPTED TO.
021574  000000              TRFRO:    .WORD   0               ;CONTAINS ADDR. WE TRAPPED OR INTR. FROM.
```

```
 7444                                   .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)  021576  010046                   $TRAP:  MOV     R0,-(SP)        ;;SAVE R0
  (1)  021600  016600  000002                   MOV     2(SP),R0        ;;GET TRAP ADDRESS
  (1)  021604  005740                           TST     -(R0)           ;;BACKUP BY 2
  (1)  021606  111000                           MOVB    (R0),R0         ;;GET RIGHT BYTE OF TRAP
  (1)  021610  006300                           ASL     R0              ;;POSITION FOR INDEXING
  (1)  021612  016000  021632                   MOV     $TRPAD(R0),R0   ;;INDEX TO TABLE
  (1)  021616  000200                           RTS     R0              ;;GO TO ROUTINE
  (1)
  (1)
  (1)                                   ;;THIS IS USE TO HANDLE THE ''GETPRI'' MACRO
  (1)
  (1)  021620  011646                   $TRAP2: MOV     (SP),-(SP)      ;;MOVE THE PC DOWN
  (1)  021622  016666  000004  000002           MOV     4(SP),2(SP)     ;;MOVE THE PSW DOWN
  (1)  021630  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)  021632  021620                   $TRPAD: .WORD   $TRAP2
  (3)  021634  020410                           $TYPE   ;;CALL=TYPE     TRAP+1(104401)  TTY TYPEOUT ROUTINE
  (3)  021636  015364                           $TYPOC  ;;CALL=TYPOC    TRAP+2(104402)  TYPE OCTAL NUMBER (WITH LEADING ZEROS)
  (3)  021640  015340                           $TYPOS  ;;CALL=TYPOS    TRAP+3(104403)  TYPE OCTAL NUMBER (NO LEADING ZEROS)
  (3)  021642  015400                           $TYPON  ;;CALL=TYPON    TRAP+4(104404)  TYPE OCTAL NUMBER (AS PER LAST CALL)
  (3)  021644  015642                           $TYPDS  ;;CALL=TYPDS    TRAP+5(104405)  TYPE DECIMAL NUMBER (WITH SIGN)
  (3)  021646  015566                           $TYPBN  ;;CALL=TYPBN    TRAP+6(104406)  TYPE BINARY (ASCII) NUMBER
  (1)
  (3)  021650  017406                           $GTSWR  ;;CALL=GTSWR    TRAP+7(104407)  GET SOFT-SWR SETTING
  (1)
  (3)  021652  017316                           $CKSWR  ;;CALL=CKSWR    TRAP+10(104410) TEST FOR CHANGE IN SOFT-SWR
  (3)  021654  017660                           $RDCHR  ;;CALL=RDCHR    TRAP+11(104411) TTY TYPEIN CHARACTER ROUTINE
  (3)  021656  017750                           $RDLIN  ;;CALL=RDLIN    TRAP+12(104412) TTY TYPEIN STRING ROUTINE
  (3)  021660  020306                           $RDOCT  ;;CALL=RDOCT    TRAP+13(104413) READ AN OCTAL NUMBER FROM TTY
```

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                                                                N  8
 7446                                                  .SBTTL  ASCII MESSAGES
 7447
 7448  021662  005015  047115  045503  EM1:    .ASCIZ  <15><12>/MNCKW (CLOCK)  STATUS FUNCTION ERROR/
       021670  020127  041450  047514
       021676  045503  004451  052123
       021704  052101  051525  043040
       021712  047125  052103  047511
       021720  020116  051105  047522
       021726  000122
 7449  021730  005015  047115  045503  EM2:    .ASCIZ  <15><12>/MNCKW (CLOCK)  STATUS DATA ERROR/
       021736  020127  041450  047514
       021744  045503  004451  052123
       021752  052101  051525  042040
       021760  052101  020101  051105
       021766  047522  000122
 7450  021772  005015  047115  045503  EM3:    .ASCIZ  <15><12>/MNCKW (CLOCK)  BUFFER DATA ERROR/
       022000  020127  041450  047514
       022006  045503  004451  052502
       022014  043106  051105  042040
       022022  052101  020101  051105
       022030  047522  000122
 7451  022034  046600  041516  053513  EM4:    .ASCIZ  <200>/MNCKW (CLOCK)     INTERRUPT ERROR/
       022042  024040  046103  041517
       022050  024513  044411  052116
       022056  051105  052522  052120
       022064  042440  051122  051117
       022072     000
 7452  022073     015  046412  041516  EM5:    .ASCIZ  <15><12>/MNCKW (CLOCK)  COUNT REG. ERROR/
       022100  053513  024040  046103
       022106  041517  024513  041411
       022114  052517  052116  051040
       022122  043505  020056  051105
       022130  047522  000122
 7453  022134  046600  041516  053513  EM6:    .ASCIZ  <200>/MNCKW (CLOCK)     EXISTING UNIT FAILED TO RESPOND/
       022142  024040  046103  041517
       022150  024513  042411  044530
       022156  052123  047111  020107
       022164  047125  052111  043040
       022172  044501  042514  020104
       022200  047524  051040  051505
       022206  047520  042116     000
 7454  022213     015  046412  041516  EM11:   .ASCIZ  <15><12>#MNCKW (CLOCK)  COUNT ERROR #
       022220  053513  024040  046103
       022226  041517  024513  041411
       022234  052517  052116  042440
       022242  051122  051117  000040
 7455  022250  005015  047115  045503  EM12:   .ASCIZ  <15><12>#MNCKW (CLOCK)  COUNT FUNCTION ERROR#
       022256  020127  041450  047514
       022264  045503  004451  047503
       022272  047125  020124  052506
       022300  041516  044524  047117
       022306  042440  051122  051117
       022314     000
 7456  022315     200  047115  045503  EM13:   .ASCIZ  <200>#MNCKW (CLOCK)     INCORRECT I.D. VALUE#
       022322  020127  041450  047514
       022330  045503  004451  047111
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                022336  047503  051122  041505
                022344  020124  027111  027104
                022352  053040  046101  042525
                022360     000
 7457           022361     015  046412  041516  EM16:   .ASCIZ  <15><12>#MNCKW (CLOCK)  CLOCK INTERRUPT ERROR #
                022366  053513  024040  046103
                022374  041517  024513  041411
                022402  047514  045503  044440
                022410  052116  051105  052522
                022416  052120  042440  051122
                022424  051117  000040
 7458           022430  005015  047115  045503  EM20:   .ASCIZ  <15><12>#MNCKW (CLOCK)  REPEATABILITY ERROR #
                022436  020127  041450  047514
                022444  045503  004451  042522
                022452  042520  052101  041101
                022460  046111  052111  020131
                022466  051105  047522  020122
                022474     000
 7459           022475     015  046412  041516  EM26:   .ASCIZ  <15><12>#MNCKW (CLOCK)  DOES NOT EXIST <BUS ERROR> CHECK BASE ADDRESS SW
                022502  053513  024040  046103
                022510  041517  024513  042011
                022516  042517  020123  047516
                022524  020124  054105  051511
                022532  020124  041074  051525
                022540  042440  051122  051117
                022546  020076  044103  041505
                022554  020113  040502  042523
                022562  040440  042104  042522
                022570  051523  051440  044527
                022576  041524  042510  000123
 7460
 7461           022604  005015  047125  052111  DH1:    .ASCIZ  <15><12>#UNIT   ERRPC   ASR     WAS     S/B#
                022612  042411  051122  041520
                022620  040411  051123  053411
                022626  051501  051411  041057
                022634     000
 7462           022635     200  047125  052111  DH2:    .ASCIZ  <200>#UNIT       ERRPC#
                022642  042411  051122  041520
                022650     000
 7463           022651     015  052412  044516  DH3:    .ASCIZ  <15><12>#UNIT   ERRPC   ABR     WAS     S/B#
                022656  004524  051105  050122
                022664  004503  041101  004522
                022672  040527  004523  027523
                022700  000102
 7464           022702  052600  044516  004524  DH4A:   .ASCIZ  <200>#UNIT       ERRPC   TO      FROM ADDR.#
                022710  051105  050122  020103
                022716  020040  047524  020040
                022724  020040  020040  051106
                022732  046517  040440  042104
                022740  027122     000
 7465           022743     015  052412  044516  DH12:   .ASCIZ  <15><12>#UNIT   ERRPC   ASR     #
                022750  004524  051105  050122
                022756  004503  051501  004522
                022764     000
 7466           022765     015  052412  044516  DH20:   .ASCIZ  <15><12>#UNIT   ERRPC   ASR     2NDCNT  1STNCT  #
                022772  004524  051105  050122
```

```
        023000  004503  051501  004522
        023006  047062  041504  052116
        023014  030411  052123  041516
        023022  004524     000
 7467   023025     015  052412  044516  DH26:   .ASCIZ  <15><12>#UNIT   ERRPC   CLOCK ADDR.#
        023032  004524  051105  050122
        023040  004503  046103  041517
        023046  020113  042101  051104
        023054  000056
 7468   023056  050200  047101  046105  PRIME0: .ASCII  <200>'PANEL: PULL OUT BOTH ST POTS AND THEN TURN'
        023064  020072  052520  046114
        023072  047440  052125  041040
        023100  052117  020110  052123
        023106  050040  052117  020123
        023114  047101  020104  044124
        023122  047105  052040  051125
        023130     116
 7469   023131     200  020040  020040          .ASCII  <200>''       THEM COMPLETELY CW OR CCW''<200>
        023136  020040  052040  042510
        023144  020115  047503  050115
        023152  042514  042524  054514
        023160  041440  020127  051117
        023166  041440  053503     200
 7470   023173     104  040527  043122          .ASCIZ  'DWARF: S2  ALL SWITCHES OFF''<200><200>
        023200  020072  031123  020040
        023206  046101  020114  053523
        023214  052111  044103  051505
        023222  047440  043106  100200
        023230     000
 7471   023231     114  036440  046040  PRIME1: .ASCII  /L = LOGIC TEST WITH NO TEST MODULE CONNECTED/
        023236  043517  041511  052040
        023244  051505  020124  044527
        023252  044124  047040  020117
        023260  042524  052123  046440
        023266  042117  046125  020105
        023274  047503  047116  041505
        023302  042524     104
 7472   023305     015     012                  .BYTE   15,12
 7473   023307     104  036440  046040          .ASCII  /D = LOGIC TEST WITH A TEST MODULE CONNECTED TO ONE UNIT/
        023314  043517  041511  052040
        023322  051505  020124  044527
        023330  044124  040440  052040
        023336  051505  020124  047515
        023344  052504  042514  041440
        023352  047117  042516  052103
        023360  042105  052040  020117
        023366  047117  020105  047125
        023374  052111
 7474   023376     015     012                  .BYTE   15,12
 7475   023400  020107  020075  042507          .ASCII  /G = GET NEW SWITCH REGISTER VALUE/
        023406  020124  042516  020127
        023414  053523  052111  044103
        023422  051040  043505  051511
        023430  042524  020122  040526
        023436  052514     105
 7476   023441     015     012                  .BYTE   15,12
```

```
 7477  023443   102  036440  041040          .ASCII  /B = BASE OR VECTOR ADDRESS CHANGE/
       023450  051501  020105  051117
       023456  053040  041505  047524
       023464  020122  042101  051104
       023472  051505  020123  044103
       023500  047101  042507
 7478  023504   015   012                    .BYTE   15,12
 7479  023506  020110  020075  042510        .ASCIZ  /H = HELP THE OPERATOR AND RETYPE THIS LIST    /
       023514  050114  052040  042510
       023522  047440  042520  040522
       023530  047524  020122  047101
       023536  020104  042522  054524
       023544  042520  052040  044510
       023552  020123  044514  052123
       023560  020040  020040   000
 7480  023565   015   012              DOT:  .BYTE   15,12
 7481  023567   124  050131  020105          .ASCIZ  /TYPE THE ''TEST CHARACTER'' THEN DEPRESS ''RETURN KEY''  /
       023574  044124  020105  052042
       023602  051505  020124  044103
       023610  051101  041501  042524
       023616  021122  052040  042510
       023624  020116  042504  051120
       023632  051505  020123  051042
       023640  052105  051125  020116
       023646  042513  021131  020040
       023654   000
 7482  023655   200  047115  045503  ADROUT: .ASCIZ  <200>/MNCKW (CLOCK) BASE ADDRESS </
       023662  020127  041450  047514
       023670  045503  020051  040502
       023676  042523  040440  042104
       023704  042522  051523  036040
       023712   000
 7483  023713   200  047115  045503  VECOUT: .ASCIZ  <200>/MNCKW (CLOCK) VECTOR ADDRESS </
       023720  020127  041450  047514
       023726  045503  020051  042526
       023734  052103  051117  040440
       023742  042104  042522  051523
       023750  036040   000
 7484  023753   076  037440  000040  ENDOUT: .ASCIZ  /> ? /
 7485  023760  050200  047522  051107  FOUND1: .ASCIZ  <200>\PROGRAM DETECTED \
       023766  046501  042040  052105
       023774  041505  042524  020104
       024002   000
 7486  024003   040  047115  045503  FOUND2: .ASCIZ  \ MNCKW (CLOCK)'S    \
       024010  020127  041450  047514
       024016  045503  023451  020123
       024024  020040   000
 7487  024027   040  052073  052117  ERRTOT: .ASCIZ  \ ;TOTAL ERROR COUNT = \
       024034  046101  042440  051122
       024042  051117  041440  052517
       024050  052116  036440  000040
 7488  024056  035440  040502  020104  MESGD:  .ASCIZ  \ ;BAD UNITS \
       024064  047125  052111  020123
       024072   000
 7489  024073   200  047115  045503  VTMSG:  .ASCIZ  <200>/MNCKW (CLOCK) UNIT #/
       024100  020127  041450  047514
```

```
                024106  045503  020051  047125
                024114  052111  021440     000
7490            024121     200  054105  042520  VTMSG3: .ASCIZ  <200>/EXPECTED INTERRUPT AT /
                024126  052103  042105  044440
                024134  052116  051105  052522
                024142  052120  040440  020124
                024150     000
7491            024151     040  042522  042503  VTMSG1: .ASCIZ  / RECEIVED INTERRUPT AT /
                024156  053111  042105  044440
                024164  052116  051105  052522
                024172  052120  040440  020124
                024200     000
7492            024201     200  046120  040505  VTMSG2: .ASCII  <200>/PLEASE CHECK VECTOR SWITCHES/<200>
                024206  042523  041440  042510
                024214  045503  053040  041505
                024222  047524  020122  053523
                024230  052111  044103  051505
                024236     200
7493            024237     011  042522  052123          .ASCIZ  /       RESTARTING TEST/<200>
                024244  051101  044524  043516
                024252  052040  051505  100124
                024260     000
7494
7495                    024262                          .EVEN
7496
7497            024262  001504  001116  001420  DT1:    .WORD   UNITBD,$ERRPC,ASR,$BDDAT,$GDDAT,0
                024270  001126  001124  000000
7498            024276  001504  001116  000000  DT2:    .WORD   UNITBD,$ERRPC,0
7499            024304  001504  001116  001422  DT3:    .WORD   UNITBD,$ERRPC,ABR,$BDDAT,$GDDAT,0
                024312  001126  001124  000000
7500            024320  001504  001116  021572  DT4:    .WORD   UNITBD,$ERRPC,TRTO,TRFRO,0
                024326  021574  000000
7501            024332  001504  001116  001420  DT12:   .WORD   UNITBD,$ERRPC,ASR,0
                024340  000000
7502            024342  001504  001116  001420  DT20:   .WORD   UNITBD,$ERRPC,ASR,$BDDAT,$GDDAT,0
                024350  001126  001124  000000
7503            024356  001504  001116  001420  DT22:   .WORD   UNITBD,$ERRPC,ASR,$BDDAT,$TMP0,0
                024364  001126  001446  000000
7504            024372  001504  001116  001446  DT26:   .WORD   UNITBD,$ERRPC,$TMP0,0
                024400  000000
7505
7506            024402     000     000     000  DF0:    .BYTE   0,0,0,0,0,0,0
                024405     000     000     000
                024410     000
7507
7508                    000001                          .END
```

```
ABASE = 171020          5654# 5664  5731  5732
ABR     001422          5732# 5896* 5897* 5951  6040* 6042* 6115* 6123  6140* 6148  6210* 6215  6302*
                        6306  6326* 6345  6358* 6372* 6401* 6421* 6472* 6474* 6476* 6478* 6480* 6482*
                        6488* 6498  6513* 6546* 6731* 6767* 6775  6786* 6797  6937* 6939* 6941* 6943*
                        6945* 6969* 6981  6990  7002  7019* 7031  7040  7075* 7105* 7202  7499
ACDW1 = 000000          5664
ACDW2 = 000000          5664
ACPUOP= 000000          5664
ADDW0 = 000000          5664
ADDW1 = 000000          5664
ADDW10= 000000          5664
ADDW11= 000000          5664
ADDW12= 000000          5664
ADDW13= 000000          5664
ADDW14= 000000          5664
ADDW15= 000000          5664
ADDW2 = 000000          5664
ADDW3 = 000000          5664
ADDW4 = 000000          5664
ADDW5 = 000000          5664
ADDW6 = 000000          5664
ADDW7 = 000000          5664
ADDW8 = 000000          5664
ADDW9 = 000000          5664
ADEVCT= 000000          5664
ADEVM = 000000          5664
ADROUT  023655          7255  7482#
AENV  = 000000          5664
AENVM = 000000          5664
AFATAL= 000000          5664
AMADR1= 000000          5664
AMADR2= 000000          5664
AMADR3= 000000          5664
AMADR4= 000000          5664
AMAMS1= 000000          5664
AMAMS2= 000000          5664
AMAMS3= 000000          5664
AMAMS4= 000000          5664
AMSGAD= 000000          5664
AMSGLG= 000000          5664
AMSGTY= 000000          5664
AMTYP1= 000000          5664
AMTYP2= 000000          5664
AMTYP3= 000000          5664
AMTYP4= 000000          5664
ANYKEY  015120          7143  7159  7172  7280#
ANY2    015166          7073  7103  7141  7157  7170  7189  7225  7282#
APASS = 000000          5664
APRIOR= 000200          5656# 5664  5737
APTCSU= 000040          7336  7337#
APTENV= 000001          7327  7336  7337#
APTSIZ= 000200          5775  7337#
APTSPO= 000100          7336  7337#
ASK     001500          5757# 5877* 7126  7130* 7131* 7132  7134  7136*
ASR     001420          5731# 5887* 5896  5949  5998* 5999* 6000* 6001* 6002* 6003* 6004* 6005* 6006*
                        6007* 6059* 6060* 6065  6085* 6087* 6091* 6097* 6099  6114* 6119* 6123* 6139*
```

```
                        6144* 6148* 6172* 6177  6232* 6233* 6234* 6236  6256* 6257  6264* 6265* 6266
                        6271* 6272  6279* 6280* 6281  6288  6293* 6301* 6303* 6304* 6306* 6325* 6330*
                        6332* 6345* 6355* 6371* 6374* 6376* 6378  6399* 6403* 6405* 6409  6420* 6422*
                        6424* 6426  6433* 6472* 6474* 6476* 6478* 6480* 6482* 6487* 6490* 6492* 6498*
                        6500  6508* 6512* 6514* 6519  6545* 6548* 6549* 6556* 6562* 6569* 6571* 6572*
                        6578* 6584* 6590* 6592* 6597* 6602* 6698* 6699* 6700* 6701* 6703  6706  6714*
                        6715* 6716* 6717* 6719  6721  6730* 6732* 6737  6739  6747* 6748* 6749* 6751*
                        6752* 6754  6762* 6766* 6770* 6771* 6775* 6781* 6785* 6787* 6788* 6791* 6797*
                        6804* 6937* 6939* 6941* 6943* 6945* 6968* 6970* 6971* 6974* 6979* 6990* 6999*
                        7001* 7002* 7018* 7020* 7021* 7024* 7029* 7040* 7049* 7050  7074* 7076* 7082
                        7104* 7106* 7111  7140* 7142* 7144  7156* 7158* 7160  7169* 7171* 7173  7190*
                        7196* 7200* 7229* 7497  7501  7502  7503
ASWREG= 000000          5664
ATESTN= 000000          5664
AUNIT = 000000          5664
AUSWR = 000000          5664
AVECT1= 000440          5655# 5664  5733  5734  5735  5736
AVECT2= 000000          5664
BADUNT  001452          5745# 5876* 7247  7327*
BASEXC  015024          5811  7255#
BIT0  = 000001          5652# 5875  6007  6119  6144  6303  6330  6374  6403  6409  6426  6472  6474
                        6476  6478  6480  6482  6490  6571  6707  6722  6747  6751  6752  6771  6788
BIT00 = 000001          5652# 6281
BIT01 = 000002          5652#
BIT02 = 000004          5652#
BIT03 = 000010          5652#
BIT04 = 000020          5652#
BIT05 = 000040          5652#
BIT06 = 000100          5652#
BIT07 = 000200          5652#
BIT08 = 000400          5652# 6716  6717  7329
BIT09 = 001000          5652# 7327  7329
BIT1  = 000002          5652# 6006  6192  6337  6368
BIT10 = 002000          5652# 6192  6228  6266  6271  6272  6722  7146  7161  7174  7327
BIT11 = 004000          5652# 6000  6192  6228  6770  6787  6937  6939  6941  6943  6945  7329
BIT12 = 010000          5652# 6192  6228  6703  6707  6719  6722  6737  6756
BIT13 = 020000          5652# 5999  6279  6288  6368  7190  7327
BIT14 = 040000          5652# 5998  6571  6592  7329
BIT15 = 100000          5652# 5765  5867  6256  6257  6345  6707  6751  6990  7002  7040  7146  7161
                        7174  7196
BIT2  = 000004          5652# 6005  6248
BIT3  = 000010          5652# 6004  6388  6771  6788
BIT4  = 000020          5652# 6003  6303  6330  6374  6403
BIT5  = 000040          5652# 6002  6303  6330  6374  6403
BIT6  = 000100          5652# 5799  6001  6175  6213  6482  6483  7218  7238
BIT7  = 000200          5652#
BIT8  = 000400          5652# 6123  6148  6265  6304  6306  6332  6376  6405  6424  6472  6474  6476
                        6478  6480  6482  6492  6498  6549  6592  6775  6791  6797  6937  6939  6941
                        6943  6945  6974  7001  7024
BIT9  = 001000          5652# 6123  6148  6234  6280  6306  6345  6472  6474  6476  6478  6480  6482
                        6498  6572  6700  6701  6748  6749  6775  6797  6937  6939  6941  6943  6945
                        6979  6990  7002  7029  7040
BPTVEC= 000014          5652#
CKSWR = 104410          7327  7329  7444#
CR    = 000015          5652# 7336
CRLF  = 000200          5652# 5786  7336
```

```
CTRCHA  015336          7291* 7292* 7293  7297  7301#
CTRLCG  015260          7250  7288# 7327  7329
DDISP = 177570          5652# 5664  5775
DF0     024402          5674  5679  5684  5689  5694  5699  5705  5710  5715  5720  5725  5727  7506#
DH1     022604          5672  5677  5692  5713  5723  7461#
DH12    022743          5697  5703  7465#
DH2     022635          5727  7462#
DH20    022765          5708  7466#
DH26    023025          5718  7467#
DH3     022651          5682  7463#
DH4A    022702          5687  7464#
DISPLA  001142          5664# 5775* 7327* 7329*
DISPRE  000174          5640# 5775
DOT     023565          5805  7480#
DR      001436          5739# 5903  6193  6248  6337  6388
DR2     001440          5740# 5902* 6192* 6228* 6368*
DSWR  = 177570          5652# 5664  5775
DT1     024262          5673  5678  5693  5724  7497#
DT12    024332          5698  5704  7501#
DT2     024276          5727  7498#
DT20    024342          5709  7502#
DT22    024356          5714  7503#
DT26    024372          5719  7504#
DT3     024304          5683  7499#
DT4     024320          5688  7500#
DWARF   001476          5755# 5765* 5770* 5789* 5800* 5814* 5857  5900  6189  6225  6245  6334  6364
                        6385  7066  7097  7122  7181  7220
EMTVEC= 000030          5652# 5775*
EM1     021662          5671  7448#
EM11    022213          5712  7454#
EM12    022250          5696  7455#
EM13    022315          5722  7456#
EM16    022361          5702  7457#
EM2     021730          5676  7449#
EM20    022430          5707  7458#
EM26    022475          5717  7459#
EM3     021772          5681  7450#
EM4     022034          5686  7451#
EM5     022073          5691  7452#
EM6     022134          5727  7453#
ENDOUT  023753          7258  7266  7484#
ENDP    014512          7124  7183  7216#
ERCNT   001466          5751# 5879*
ERRTOT  024027          7241  7487#
ERRVEC= 000004          5652# 5775* 5784* 5785* 5835* 5853* 5854* 5949* 5951* 7329*
EVER    001460          5748# 5803* 5855  5866* 5867* 5869  5871  7227
EXTMSG  014740          7236  7238#
FIXADR  003016          5889# 7231
FOUND1  023760          5859  7485#
FOUND2  024003          5862  7486#
GNS   = ****** U        5786  7070  7071  7072  7101  7102  7128  7138  7139  7155  7168  7186  7187
                        7188  7281  7282  7285  7444
GTSWR = 104407          5786  5819  7299  7444#
HT    = 000011          5652# 7336
IOTRD   021316          5638  5784  5853  7361#
IOTVEC= 000020          5652# 5775*
```

```
KWL     001416          5729#   6482*   6483*
LCNT    001474          5754#
LF    = 000012          5652#   7336
LOGIC   002464          5791    5816    5826    5832#   7251
MASKNM  001450          5744#   5833*   5871*   5875*   7233*   7244    7327
MDEVCT  001470          5752#   5878*
MESGD   024056          7246    7488#
MTEST   002260          5796#   5822
MTEST1  002270          5793    5798#   5820    5828    7272    7296    7331
PIRQ  = 177772          5652#
PIRQVE= 000240          5652#
PRIADR  003002          5804    5874    5887#   7271
PRIME0  023056          5796    7224    7468#
PRIME1  023231          5797    7471#
PRIOR   001434          5737#
PR0   = 000000          5652#
PR1   = 000040          5652#
PR2   = 000100          5652#
PR3   = 000140          5652#
PR4   = 000200          5652#
PR5   = 000240          5652#
PR6   = 000300          5652#
PR7   = 000340          5652#
PS    = 177776          5652#
PSW   = 177776          5652#
PWRVEC= 000024          5652#   5775*   7339*
RDCHR = 104411          7129    7283    7331    7444#
RDLIN = 104412          5806    7332    7444#
RDOCT = 104413          7259    7267    7444#
RESTRT= 001550          5649    5772#
RESVEC= 000010          5652#
ROTATE  001462          5749#   5880*   5881
RUNIT   002462          5807*   5808*   5809    5812    5817    5821    5823    5829#
STACK = 001100          5652#   5775
START = 001530          5648    5767#
STKLMT= 177774          5652#
SWR     001140          5664#   5775*   5786    5841    6482    7327    7329    7331*   7339*
SWREG   000176          5641#   5775    5786    7331
SW0   = 000001          5652#
SW00  = 000001          5652#
SW01  = 000002          5652#
SW02  = 000004          5652#
SW03  = 000010          5652#
SW04  = 000020          5652#
SW05  = 000040          5652#
SW06  = 000100          5652#
SW07  = 000200          5652#
SW08  = 000400          5652#
SW09  = 001000          5652#
SW1   = 000002          5652#
SW10  = 002000          5652#   6482
SW11  = 004000          5652#
SW12  = 010000          5652#   5841
SW13  = 020000          5652#
SW14  = 040000          5652#
SW15  = 100000          5652#
```

```
SW2    = 000004            5652#
SW3    = 000010            5652#
SW4    = 000020            5652#
SW5    = 000040            5652#
SW6    = 000100            5652#
SW7    = 000200            5652#
SW8    = 000400            5652#
SW9    = 001000            5652#
TBITVE= 000014             5652#
TEMP1   001502             5758#  5763*  5769*  5773*  5792
TESTER= 001506             5650   5762#
TKVEC  = 000060            5652#  7331*
TPVEC  = 000064            5652#
TRAPVE= 000034             5652#  5775*
TRFRO   021574             7372*  7442#  7500
TRTO    021572             7361*  7362*  7364   7424   7432   7441#  7500
TRTVEC= 000014             5652#
TSCLC   001442             5741#  7191*  7193*  7194   7197*  7198   7201*
TSCLD   001444             5742#  7192*
TSTCNT  001472             5753#  5764*  5768*  5790*  5815*  5825*  5843
TST1    003106             5883   5899#  7234
TST10   003714             6002#
TST11   004012             6003#
TST12   004110             6004#
TST13   004206             6005#
TST14   004304             6006#
TST15   004402             6007#
TST16   004500             6040#
TST17   004570             6042#
TST2    003156             5901   5907   5949#
TST20   004660             6057#
TST21   004732             6083#
TST22   005014             6112#
TST23   005142             6137#
TST24   005270             6169#
TST25   005366             6187   6190   6191   6194   6207#
TST26   005450             6226   6227   6230#
TST27   005550             6244   6247   6254   6258   6263#
TST3    003252             5951#
TST30   005616             6273   6278#
TST31   005664             6299#
TST32   006002             6323#
TST33   006216             6336   6343   6357   6362#
TST34   006330             6366   6384   6386   6387   6389   6397#
TST35   006372             6418#
TST36   006440             6472#
TST37   006570             6474#
TST4    003324             5998#
TST40   006720             6476#
TST41   007050             6478#
TST42   007200             6480#
TST43   007330             6482#
TST44   007504             6482   6485#
TST45   007646             6510#
TST46   007714             6541#
TST47   010040             6565#
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TST50    010156            6587#
TST51    010300            6697#
TST52    010354            6713#
TST53    010430            6720    6728#
TST54    010514            6746#
TST55    010606            6764#
TST56    010742            6783#
TST57    011074            6937#
TST6     003520            6000#
TST60    011230            6937    6939#
TST61    011364            6939    6941#
TST62    011520            6941    6943#
TST63    011654            6943    6945#
TST64    012010            6945    6966#
TST65    012266            7003    7016#
TST66    012476            7038    7047    7051    7065#
TST67    013016            7067    7084    7096#
TST7     003616            6001#
TST70    013254            7098    7113    7118#
TST71    013626            7147    7151#
TST72    013744            7162    7165#
TST73    014120            7177    7180#
TST74    014502            7209    7213#
TYPBN  = 104406            7248    7444#
TYPDS  = 104405            5861    7236    7243    7328    7416    7444#
TYPE   = 104401            5786    5796    5797    5805    5827    5859    5862    7070    7071    7072    7101    7102    7128
                           7138    7139    7155    7168    7186    7187    7188    7224    7236    7241    7246    7249    7255
                           7258    7263    7266    7281    7282    7285    7309    7310    7312    7327    7328    7331    7336
                           7339    7413    7419    7423    7427    7444#
TYPOC  = 104402            7257    7265    7328    7331    7444#
TYPON  = 104404            7444#
TYPOS  = 104403            7421    7425    7444#
UNITBD   001504            5759#   7327*   7497    7498    7499    7500    7501    7502    7503    7504
UTEST    001464            5750#   5881*
VADDR    001454            5746#   5837    7229
VECOUT   023713            7263    7483#
VECTP    001426            5734#   5890*   5891*   6563    7428    7430*   7434*   7435*
VECT1    001424            5733#   5888*   5889*   5890    5892    6550*   6563*   7230*   7420    7428*   7432*   7433*   7434
                           7436
VECT2    001430            5735#   5892*   5893*   5894    6570*   6585*   6591*   6603*   7429*   7436*   7437*   7438
VECT2P   001432            5736#   5894*   5895*   6585    6603    7429    7431*   7438*   7439*
VTMSG    024073            7413    7489#
VTMSG1   024151            7423    7491#
VTMSG2   024201            7427    7492#
VTMSG3   024121            7419    7490#
VVECTR   001456            5747#   7230
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$ATYC    020716            7337#
$ATY1    020672            7337#
$ATY3    020700            7336    7337#
$ATY4    020710            7327    7337#
$AUTOB   001134            5664#   5786*   5787    7331
$BASE    001250            5664#   5832    5887    7256    7262*
$BDADR   001122            5664#
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                6125   6148*  6150   6177*  6215*  6306*  6345*  6348   6472*  6474*  6476*  6478*  6480*
                6482*  6498*  6706*  6721*  6739*  6754*  6756   6775*  6797*  6937*  6939*  6941*  6943*
                6945*  6981*  6982   6990*  6991   7002*  7031*  7032   7040*  7050*  7082*  7083   7111*
                7112   7144*  7146   7160*  7161   7173*  7175*  7176   7202*  7205   7497   7499   7502
                7503
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$BIN    015640  7310#*
$CDW1   001254  5664#
$CHARC  020666  7336#*
$CKSWR  017316  7331#  7444
$CMTAG  001100  5664#  5775
$CM3  = 000000  5664#
$CNTLC  020244  7331#
$CNTLG  020256  7331#
$CNTLU  020251  7331#
$CPUOP  001222  5664#
$CRLF   001171  5664#  7327   7328   7331   7336
$DBLK   016056  7312#
$DEVCT  001204  5664#  5783*
$DEVM   001252  5664#
$DOAGN  014714  7236#
$DTBL   016046  7312#
$ENDAD  014704  5661   7236#
$ENDCT  014652  7236#
$ENDMG  014723  7236#
$ENULL  014720  7236#  7249
$ENV    001214  5664#  5786   5839   7327   7336   7337
$ENVM   001215  5664#  5775   7336   7337
$EOP    014616  5852   5865   5949   5951   7228   7236#
$EOPCT  014644  7236#
$ERFLG  001103  5664#  7327*  7329*
$ERMAX  001115  5664#  5775*  7329*
$ERROR  016066  5775   7327#
$ERRPC  001116  5664#  7327*  7328   7497   7498   7499   7500   7501   7502   7503   7504
$ERRTB  001256  5664#  7328
$ERRTY  016322  7327   7328#
$ERTTL  001112  5664#  5802*  7239   7242   7327*
$ESCAP  001162  5664#  5775*  7327   7329*
$ETABL  001214  5664#
$ETEND  001256  5663   5664#
$FATAL  001176  5664#  7337*
$FFLG   021136  7337#*
$FILLC  001156  5664#  7336
$FILLS  001155  5664#  7336
$GDADR  001120  5664#
$GDDAT  001124  5664#  5905*  5906   5998*  5999*  6000*  6001*  6002*  6003*  6004*  6005*  6006*  6007*
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                6346*  6347   6348   6358   6359   6503*  6707*  6722*  6740*  6755*  6768*  6980*  6982
                6991   7000*  7030*  7032   7039*  7052*  7081*  7083   7110*  7112   7145*  7174*  7176
                7203*  7204   7497   7499   7502
$GET42  014674  7236#
$GTSWR  017406  7331#  7444
$HD   = 000001  5616
$HIBTS  001000  5663#
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$ICNT   001104          5664#   7329*
$ILLUP  021300          7339#
$INTAG  001135          5664#   7331*
$ITEMB  001114          5664#   7327*   7328
$LF     001172          5664#   7327    7331    7336
$LFLG   021135          7337#*
$LPADR  001106          5664#   5775*   5949*   7069*   7099*   7153*   7167*   7185*   7329*   7440
$LPERR  001110          5664#   5775*   5949*   6328*   7068*   7100*   7152*   7166*   7184*   7327    7329*
$MADR1  001226          5664#
$MADR2  001232          5664#
$MADR3  001236          5664#
$MADR4  001242          5664#
$MAIL   001174          5663    5664#   5775    5786    7327    7329    7336
$MAMS1  001224          5664#
$MAMS2  001230          5664#
$MAMS3  001234          5664#
$MAMS4  001240          5664#
$MBADR  001002          5663#
$MFLG   021134          7337#*
$MNEW   020274          7331#
$MSGAD  001210          5664#   7337*
$MSGLG  001212          5664#   7337*
$MSGTY  001174          5664#   7337*
$MSWR   020263          7331#
$MTYP1  001225          5664#
$MTYP2  001231          5664#
$MTYP3  001235          5664#
$MTYP4  001241          5664#
$MXCNT  016760          7329#
$NULL   001154          5664#   7336
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                        6362#   6397#   6418#   6472#   6474#   6476#   6478#   6480#   6482#   6485#   6510#   6541#   6565#
                        6587#   6697#   6713#   6728#   6746#   6764#   6783#   6937#   6939#   6941#   6943#   6945#   6966#
                        7016#   7065#   7096#   7118#   7151#   7165#   7180#   7213#
$OCNT   015562          7309#*
$OMODE  015564          7309#*
$OVER   016744          7329#
$PASS   001202          5664#   5775*   5801*   6356    7120    7222    7236*   7329    7411
$PASTM  001006          5663#
$POWER  021306          7339#
$PWRDN  021140          5775    7339#
$PWRMG  021274          7339#
$PWRUP  021212          7339#
$QUES   001170          5664#   5827    7327    7331    7336
$RDCHR  017660          7331#   7444
$RDDEC= ****** U        7444
$RDLIN  017750          7331#   7444
$RDOCT  020306          7332#   7444
$RDSZ = 000040          7331#
$RTNAD  014716          7236#
$R2A  = ****** U        7444
$SAVRE= ****** U        7444
$SAVR6  021304          7339#*
$SCOPE  016476          5775    7329#
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$STUP = 177777          5761#
$SVLAD  016710          7329#
$SVPC = 000214          5661#
$SWR  = 167400          5558# 5616  5618  5658# 5664  5775  5899  5949  5951  5998  5999  6000  6001
                        6002  6003  6004  6005  6006  6007  6040  6042  6057  6083  6112  6137  6169
                        6207  6230  6263  6278  6299  6323  6362  6397  6418  6472  6474  6476  6478
                        6480  6482  6485  6510  6541  6565  6587  6697  6713  6728  6746  6764  6783
                        6937  6939  6941  6943  6945  6966  7016  7065  7096  7118  7151  7165  7180
                        7213  7236  7327  7329  7339
$SWREG  001216          5664# 5775
$SWRMK= 000000          5618  7329
$TESTN  001200          5664# 7329*
$TIMES  001160          5664# 5775* 5949* 5998* 5999* 6000* 6001* 6002* 6003* 6004* 6005* 6006* 6007*
                        6057* 6083* 6112* 6137* 6169* 6207* 6299* 6323* 6472* 6474* 6476* 6478* 6480*
                        6482* 6485* 6510* 6541* 6565* 6587* 6728* 6764* 6937* 6939* 6941* 6943* 6945*
                        6966* 7016* 7065* 7096* 7180* 7213* 7236* 7329*
$TKB    001146          5664# 7280  7291  7331
$TKCNT  016762          7331#*
$TKINT  017030          5781  7331#
$TKQEN= 017030          7331#
$TKQIN  016764          7331#*
$TKQOU  016766          7331#*
$TKQSR  016770          7331#
$TKS    001144          5664# 5799* 6175* 6213* 7218* 7238* 7289  7331*
$TKSRV  017100          7331#
$TMPO   001446          5743# 5949* 5951* 6347* 6937* 6939* 6941* 6943* 6945* 7503  7504
$TN   = 000075          5616# 5659# 5899# 5901  5907  5949# 5951# 5998# 5999# 6000# 6001# 6002# 6003#
                        6004# 6005# 6006# 6007# 6040# 6042# 6057# 6083# 6112# 6137# 6169# 6187  6190
                        6191  6194  6207# 6226  6227  6230# 6244  6247  6254  6258  6263# 6273  6278#
                        6299# 6323# 6336  6343  6357  6362# 6366  6384  6386  6387  6389  6397# 6418#
                        6472# 6474# 6476# 6478# 6480# 6482# 6485# 6510# 6541# 6565# 6587# 6697# 6713#
                        6720  6728# 6746# 6764# 6783# 6937# 6939# 6941# 6943# 6945# 6966# 7003  7016#
                        7038  7047  7051  7065# 7067  7084  7096# 7098  7113  7118# 7147  7151# 7162
                        7165# 7177  7180# 7209  7213#
$TPB    001152          5664# 7336*
$TPFLG  001157          5664# 7336
$TPS    001150          5664# 7336
$TRAP   021576          5775  7444#
$TRAP2  021620          7444#
$TRP  = 000014          7444#
$TRPAD  021632          7444#
$TSTM   001004          5663#
$TSTNM  001102          5664# 7232* 7236* 7327  7329* 7375
$TTYIN  020204          7331#
$TYPBN  015566          7310# 7444
$TYPDS  015642          7312# 7444
$TYPE   020410          5777* 5778* 5779* 5780* 7336# 7337  7444
$TYPEC  020622          7331  7336#
$TYPEX  020670          7336#
$TYPOC  015364          7309# 7444
$TYPON  015400          7309# 7444
$TYPOS  015340          7309# 7444
$UNIT   001206          5664# 5834* 5838* 5843  5847  5860  5863  5866  5869  5873* 7226* 7227  7414
$UNITM  001010          5663#
$USWR   001220          5664#
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$XTSTR  016514          7329#
$$GET4= 000000          7236#
$OFILL  015563          7309#*
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.       = 024411        5622#   5633    5634#   5637#   5639#   5642#   5647#   5661#   5662#   5663#   5664#   5762    5767
                        5772    5775    5786#   7072#   7102#   7139#   7168#   7186#   7187#   7188#   7236    7281#   7282#
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.$ASTA= ****** U        7337
.$X     = 001000        5663#
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BUFLO   6009#  6040  6042
COMMEN  1526#  5652#
COUNTM  6435#  6472  6474  6476  6478  6480  6482
CSRDTA  5960#  5998  5999  6000  6001  6002  6003  6004  6005  6006  6007
DFC     5666#  5674  5679  5684  5689  5694  5699  5705  5710  5715  5720  5725
DIVCH   6806#  6937  6939  6941  6943  6945
ECB     5561#  5909  5912  5949  5951  5998  5999  6000  6001  6002  6003  6004  6005  6006  6007
        6040   6042  6074  6079  6105  6109  6129  6134  6154  6159  6181  6186  6195  6198  6219
        6223   6239  6243  6250  6253  6259  6261  6268  6270  6274  6276  6283  6287  6290  6292
        6308   6311  6339  6342  6350  6352  6381  6392  6395  6412  6428  6431  6472  6474  6476
        6478   6480  6482  6504  6507  6522  6525  6557  6559  6579  6581  6598  6708  6711  6723
        6726   6741  6744  6758  6761  6777  6780  6800  6803  6984  6987  6993  6997  7004  7006
        7034   7037  7042  7046  7053  7055  7085  7087  7114  7116  7377  7408
ENDCOM  1538#  5652#
ERROR   5652#  5851  5872  5910  5949  5951  5998  5999  6000  6001  6002  6003  6004  6005  6006
        6007   6040  6042  6075  6106  6130  6155  6183  6196  6220  6240  6251  6260  6269  6275
        6284   6291  6309  6340  6351  6382  6393  6413  6429  6472  6474  6476  6478  6480  6482
        6505   6523  6558  6580  6599  6709  6724  6742  6759  6778  6801  6937  6939  6941  6943
        6945   6985  6994  7005  7035  7043  7054  7086  7115  7148  7163  7178  7211  7378
ESCAPE  1654#  5652#
FFF     6937#  6939#  6941#  6943#  6945#
GETPRI  1278#  5652#
GETSWR  1725#  5652#  5786#
INSTR2  7314#  7327
LOCKM   6533#  6543  6551  6567  6573  6589  6593  6604
MULT    4393#  5652#
NEWTST  1585#  5652#  5899  5949  5951  5998  5999  6000  6001  6002  6003  6004  6005  6006  6007
        6040   6042  6057  6083  6112  6137  6169  6207  6230  6263  6278  6299  6323  6362  6397
        6418   6472  6474  6476  6478  6480  6482  6485  6510  6541  6565  6587  6697  6713  6728
        6746   6764  6783  6937  6939  6941  6943  6945  6966  7016  7065  7096  7118  7151  7165
        7180   7213
POP     2103#  5652#  7312  7332  7337  7339
POPSP2  5573#  5949  5951  6561  6583  6601  7373
PR      5577#  5782
PUSH    2095#  5652#  7312  7332  7337  7339
RDCLK   5586#  6123  6148  6306  6472  6474  6476  6478  6480  6482  6498  6775  6797
RDCLK1  5604#  6345  6990  7002  7040
REPORT  5352#  5652#
SCOPE   5652#  5899  5949  5951  5998  5999  6000  6001  6002  6003  6004  6005  6006  6007  6040
        6042   6057  6083  6112  6137  6169  6207  6230  6263  6278  6299  6323  6362  6397  6418
        6472   6474  6476  6478  6480  6482  6485  6510  6541  6565  6587  6697  6713  6728  6746
        6764   6783  6937  6939  6941  6943  6945  6966  7016  7065  7096  7118  7151  7165  7180
        7213
SETPRI  1246#  5652#  7331
SETTRA  7444#
SETUP   1302#  5652#  5775
SKIP    1688#  5652#  5901  5907  6187  6190  6191  6194  6226  6227  6244  6246  6247  6254  6258
        6273   6335  6336  6343  6357  6365  6366  6384  6386  6387  6389  6482  6720  6937  6939
        6941   6943  6945  7003  7038  7047  7051  7067  7084  7098  7113  7147  7162  7177  7209
        7228
SLASH   1478#  5652#
SPACE   5652#
STARS   1447#  5652#  5661  5663  5664  5899  5949  5951  5998  5999  6000  6001  6002  6003  6004
        6005   6006  6007  6040  6042  6057  6083  6112  6137  6169  6207  6230  6263  6278  6299
        6323   6362  6397  6418  6472  6474  6476  6478  6480  6482  6485  6510  6541  6565  6587
```

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                6697    6713    6728    6746    6764    6783    6937    6939    6941    6943    6945    6966    7016    7065    7096
                7118    7151    7165    7180    7213    7236    7309    7310    7312    7327    7328    7329    7331    7332    7336
                7337    7339    7444
SWRSU           1416#   5652#   5775#
TRMTRP          7444#
TYPBIN          2039#   5652#
TYPDEC          2009#   5652#   7236    7328
TYPNAM          1779#   5652#   5786
TYPNUM          1976#   5652#
TYPOCS          1929#   5555#   5652#
TYPOCT          1892#   5652#   7328    7331
TYPTXT          1846#   5652#   7070    7071    7072    7101    7102    7128    7138    7139    7155    7168    7186    7187    7188
                7281    7282    7285
ZP21            6048#   6057    6083
ZP25            6162#   6169
ZP25A           6199#   6207
ZZZ             7057#   7065    7089#   7096
ZZ1             5952#   5998    5999    6000    6001    6002    6003    6004    6005    6006    6007    6314#   6323    6472#   6474#
                6476#   6478#   6480#   6482#   6947#   6966    7008#   7016
$$CMRE          5664#
$$CMTM          5664#
$$ESCA          1667#   5652#
$$NEWT          1621#   5652#   5899    5949    5951    5998    5999    6000    6001    6002    6003    6004    6005    6006    6007
                6040    6042    6057    6083    6112    6137    6169    6207    6230    6263    6278    6299    6323    6362    6397
                6418    6472    6474    6476    6478    6480    6482    6485    6510    6541    6565    6587    6697    6713    6728
                6746    6764    6783    6937    6939    6941    6943    6945    6966    7016    7065    7096    7118    7151    7165
                7180    7213
$$SET           7444#
$$SETM          5775#
$$SKIP          1701#   5652#   5901    5907    6187    6190    6191    6194    6226    6227    6244    6247    6254    6258    6273
                6336    6343    6357    6366    6384    6386    6387    6389    6482    6720    6937    6939    6941    6943    6945
                7003    7038    7047    7051    7067    7084    7098    7113    7147    7162    7177    7209
.EQUAT           176#   5555#   5652
.HEADE            50#   5554#   5616
.KT11            319#
.SETTR          5554#
.SETUP          1180#   5554#   5761
.SWRHI            92#   5555#   5618
.SWRLO          5618#
.TRMTR          5554#
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.$APTB          5005#   5664#
.$APTH          5261#   5557#   5663
.$APTY          5436#   5557#   7337
.$ASTA          5307#
.$CATC           905#   5555#
.$CMTA          1016#   5555#   5664
.$DB2D          4591#
.$DB2O          4714#
.$DIV           4494#
.$EOP           2162#   5556#   7236
.$ERRO          2643#   5556#   7327
.$ERRT          2838#   5556#   7328
.$MULT          4431#
.$POWE          4143#   5555#   7339
.$RAND          4218#
```

```
.$RDDE   3814#
.$RDOC   3723#   5554#   7332
.$READ   3328#   5556#   7331
.$R2AZ   4858#
.$SAVE   3889#
.$SB2D   4675#
.$SB2O   4776#
.$SCOP   2397#   5556#   7329
.$SIZE   4271#
.$SUPR   4814#
.$TRAP   3991#   5554#   7444
.$TYPB   3221#   5554#   7310
.$TYPD   3144#   5556#   7312
.$TYPE   2925#   5556#   7336
.$TYPO   3048#   5555#   7309
.$40CA    944#
.1170     498#


. ABS.  024411     000


 ERRORS DETECTED:  0

 CVMNCB,CVMNCB/CRF=CVMNCB.SML,CVMNCB.P11
 RUN-TIME: 20 26 1 SECONDS
 RUN-TIME RATIO: 435/47=9.0
 CORE USED:  36K  (71 PAGES)
```