KWV11-A

DIAGNOSTIC

MD-11-DVKWA-B

EP DVKWA B DL B

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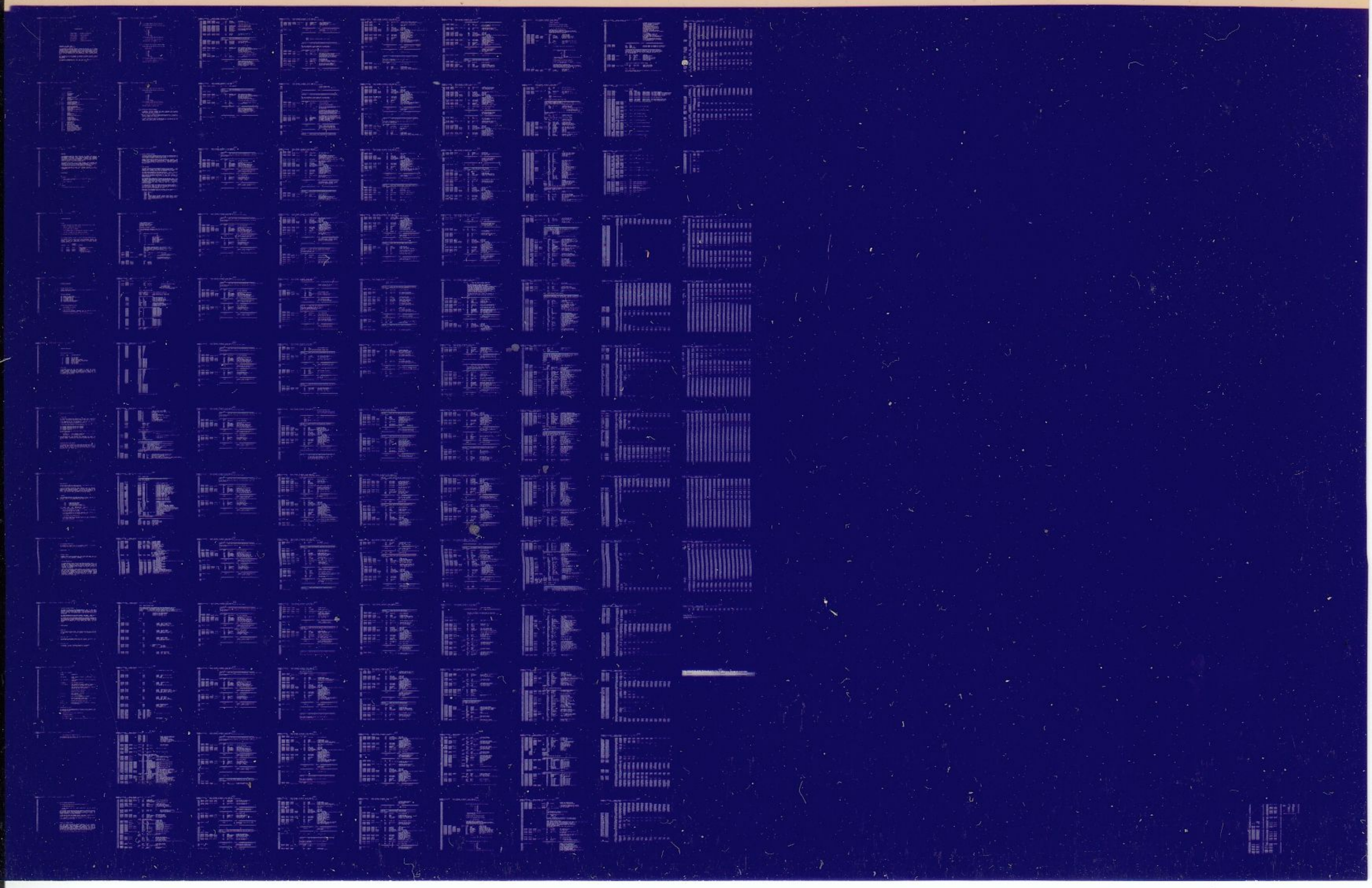
digital

MADE IN USA



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IDENTIFICATION

PRODUCT CODE:	MAINDEC-11-DVKWA-B-D
PRODUCT NAME:	KWV11A DIAGNOSTIC
DATE CREATED:	OCTOBER 1976
DATE REVISED:	JANUARY 1977
MAINTAINER:	DIAGNOSTIC ENGINEERING

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1.0 ABSTRACT

THIS PROGRAM ALLOWS THE USER CHECK-OUT OR DEBUG THE KWV11A, PROGRAMMABLE REAL-TIME CLOCK. THE LOGIC TEST IS SELF CONTAINED AND NEEDS NO EXTERNAL MAINTENANCE HARDWARE OR OPERATOR INTERVENTION WITH ONLY ONE EXCEPTION: IF THE CUSTOMER HARDWARE CONNECTED TO THE KWV11 COULD INJECT SIGNALS ON ST2, ST1, OR SLAVE IN INPUTS, IT MUST BE DISCONNECTED.

EVEN THOUGH THE KWV11 IS A Q BUS OPTION, THIS PROGRAM WAS DESIGNED TO RUN ON ANY PDP-11 FAMILY COMPUTER. IF THE USER IS UNFAMILAR WITH AN LSI-11 HE SHOULD REVIEW SECTIONS 8.4 AND 8.5. A SOFTWARE SWITCH REGISTER IS INCLUDED WITH THIS PROGRAM.

EVERY EFFORT WAS MADE TO MAKE THIS PROGRAM CONFORM TO LSI-11 PROGRAMMING RESTRICTIONS, HOWEVER; THE USER SHOULD READ SECTIONS 7.2 AND 7.3.

2.0 REQUIREMENTS

2.1 EQUIPMENT

1. PDP-11 FAMILY COMPUTER WITH 8K OF MEMORY (OR MORE) AND I/O FACILITIES (I.E., TTY).

2. KWV11 UNDER TEST.

2.2 STORAGE

THIS PROGRAM OCCUPIES AND USES 8K OF MEMORY.

3.0 LOADING PROCEDURE

3.1 METHOD

STANDARDS PROCEDURE FOR NORMAL BINARY TAPES SHOULD BE FOLLOWED.

1. ABSOLUTE LOADER MUST BE IN MEMORY.
2. PLACE BINARY TAPE IN READER.
3. TYPE ADDRESS *7500 (5* DETERMINE BY LOCATION OF LOADER).
4. TYPE "G" (PROGRAM WILL BE LOADED INTO MEMORY).

THE PROGRAM CAN ALSO BE LOADED BY XXDP, ACT, OR APT.

3.2 NON-STANDARD ADDRESS, VECTOR, OR USE OF SOFTWARE SWITCH REGISTER

THIS PROGRAM IS SET TO TEST A KWV11 WITH A STANDARD ADDRESS AND VECTOR. IF ANY OF THESE ARE DIFFERENT ON THE KW11K YOU ARE TESTING, CHANGE THE CORRESPONDING LOCATION IN MEMORY BEFORE STARTING THIS TEST.

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

4.0 STARTING PROCEDURE

4.1 CONTROL SWITCH SETTING

BEFORE STARTING THE DIAGNOSTIC, SET ALL SWITCH REGISTER BITS AS DESIRED, SEE SECTION 5.1.

4.2 STARTING ADDRESSES

200 START OF LOGIC TESTS
204 RESTART ADDRESS FOR LOGIC TEST
210 I/O SIGNAL TEST #1
214 I/O SIGNAL TEST #2
220 I/O SIGNAL TEST #3
230 PRODUCTION STARTING ADDRESS
240 TESTOR STARTING ADDRESS

4.3 PROGRAM AND/OR OPERATOR ACTION

1. LOAD PROGRAM INTO MEMORY.
2. ENTER KEYBOARD "ODT".
3. ALTER LOCATION "$SWREG" (ADDRESS 176) TO REFLECT DESIRED OPTIONS OF A SWITCH REGISTER - SEE SECTION 5.1.
4. TYPE STARTING ADDRESS, FOLLOWED BY "G" TO START PROGRAM.

5.0 OPERATING PROCEDURE

5.1 SWITCH REGISTER FUNCTION

SWR BIT	OCTAL	FUNCTION WHEN SET
15	100000	HALT ON ERROR
14	040000	LOOP ON TEST
13	020000	INHIBIT ERROR TYPEOUT
12	010000	ENABLE LINE FREQ. RATE TESTING
11	004000	INHIBIT ITERATIONS (SHORT PASS)
10	002000	BELL ON ERROR
09	001000	LOOP ON ERROR
08	000400	LOOP ON TEST IN SWR <7:0>

5.2 SCOPE LOOPS

IF AN ERROR OCCURS AND THE USER WISHES TO SCOPE THE ERROR, "$SWREG" SHOULD BE ALTERED TO "100000" AT THE START OF THE TEST TO HALT ON ERROR, THEN WHEN THE PROGRAM HALTS ON ERROR AND THE CPU ENTERS "ODT", "$SWREG" SHOULD BE ALTERED TO "060000" TO LOOP ON CURRENT TEST AND INHIBIT ERROR TYPEOUT, THEN TYPE "P" TO CONTINUE PROGRAM EXECUTION.

5.3 PROGRAM AND/OR OPERATOR ACTION

5.3.1 LOGIC TEST

THE FIRST PASS THROUGH THE PROGRAM WILL BE MADE WITH ITERATIONS INHIBITED. SUCCESSIVE PASSES WILL ENABLE ITERATIONS IF SWR11=0.

IF NOT INHIBITED BY APT, THE PROGRAM WILL LOOK FOR MORE KWV11'S TO EXERCISE, ONE PASS WILL EXERCISE ALL KWV11'S.

IF FOUR UNITS ARE DETECTED, THE FOLLOWING WILL BE TYPED:

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

AT END OF PASS WHEN ALL UNITS HAVE BEEN TESTED, THE FOLLOWING TYPEOUT WILL OCCUR:

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

THIS INDICATES THAT THE PROGRAM HAS COMPLETED 12 OCTAL (10 DECIMAL) PASSES. DURING THAT TIME 4(OCTAL) ERRORS WERE DETECTED. ALSO WE TESTED 4 UNITS AND THE THIRD UNIT WAS THE ONLY UNIT TO FAIL.

5.4 INHIBITING AUTO-SIZE FEATURE

THIS PROGRAM WILL AUTOMATICALLY AUTO-SIZE AND TEST EACH KWV11 IT DETECTS ON THE SYSTEM. TO INHIBIT THIS FEATURE, SET BIT 15 OF LOCATION "$ENVM". ALSO, TO TEST AN INDIVIDUAL KWV11 IN A GROUP, SET THIS BIT AND REFER TO SECTION 3.2 FOR CHANGING THE BASE ADDRESS OF THE KWV11 UNDER TEST.

6.0 ERRORS

6.1 ERROR PRINTOUT

PRINTOUT VARIES WITH THE ERROR DETECTED. THE ERROR PC TYPED OUT IS THE ACTUAL LOCATION OF THE ERROR CALL.

A HALT AT LOCATION "$TYPE"+10 WHEN RUNNING WITH NO TERMINAL INDICATES AN ERROR HAS OCCURRED. TO FIND OUT THE NUMBER OF THE ERROR, EXAMINE LOCATION "$TSTNM". THIS IS THE ITEM NUMBER OF THE ERROR. TO FIND OUT WHAT THE ERROR TYPEOUT WOULD HAVE BEEN GCTO TO THE ERROR POINTER TABLE BEGINNING AT LOCATION "ERRTB".

6.1.1 EXAMPLE

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

```
;ITEM 5

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

TO FIND OUT THE INFORMATION SPECIFIED BY DT5 ($ERRPC,BSR,$BDADR,$BDADR) FOLLOW THESE STEPS:

1. LOOK UP THE ADDRESS OF THE LABEL (I.E., $ERRPC) IN THE SYMBOL TABLE WHICH FOLLOWS THE LISTING.

2. * PUT THIS ADDRESS IN THE SWITCH REGISTER AND DEPRESS THE LOAD ADDRESS SWITCH ON THE PROCESSOR'S CONSOLE.

3. * NOW DEPRESS THE EXAMINE SWITCH.

4. * THE DATA DISPLAYED IN THE DATA LIGHTS IS THE INFORMATION THAT WOULD HAVE BEEN PRINTED FOR HIS LABEL IF YOU HAD A INPUT/OUTPUT TERMINAL.

* SEE SECTION 8.4 FOR LSI-11 ODT COMMANDS.

6.2 NON-STANDARD ERROR HALTS

BUS ERRORS WILL CAUSE A HALT TO THE ROUTINE "IOTRD". THE ADDRESS THAT CAUSED THIS TRAP WILL BE IN ADDRESS "TRTO".

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 SIGNAL WHILE THE DIAGNOSTIC IS RUNNING.

7.2 STARTING RESTRICTION

IF A FREE-RUNNING CLOCK, SUCH AS 60HZ FROM THE POWER SUPPLY, IS ATTACHED TO THE "BEVNT" BUS LINE ON BOTH REV LEVEL C/D AND E SYSTEMS, AN INTERRUPT TO LOCATION 100 WILL OCCUR WHEN USING THE "G" AND "L" COMMANDS PRIOR TO EXECUTING THE FIRST INSTRUCTION. THEREFORE THIS PROGRAM CAN NOT DISABLE THE BEVNT BUS LINE BY INHIBITING INTERRUPTS.

USER SYSTEMS REQUIRING A FREE-RUNNING CLOCK ATTACHED TO THE BEVNT BUS LINE CAN TEMPORARILY AVOID THIS SITUATION BY SETTING THE PSW(RS) TO 200, LOADING THE PC WITH THE STARTING ADDRESS INSTEAD OF USING THE "G" COMMAND, AND THEN USING THE "P" COMMAND. BEFORE USING THE "L" COMMAND, THE PSW(RS) CAN BE SET TO 200, THEREBY INHIBITING INTERRUPTS, TO AVOID RECEIVING THE EVENT INTERRUPT AFTER LOADING THE ABS LOADER.

7.3 POSSIBLE PROGRAM "BOMBS"

THE FIRST TWO TESTS OF THIS PROGRAM CHECK TO SEE IF THE KWV11 RESPONDS TO THE ADDRESS THE PROGRAM THINKS ITS AT. IF THE KWV11 DOES NOT RESPOND, A BUS ERROR OCCURS. ALSO BUS ERRORS CAN OCCUR DURING THE TIME THE PROGRAM SIZES TO SEE HOW MANY KWV11 ARE ON YOU SYSTEM.

FOR MORE INFORMATION ON THE NEXT SUBJECT, SEE JAN. 1976 LSI-11 ENGINEERING BULLETIN ISSUED BY THE DIGITAL COMPONENTS GROUP.

BUS ERRORS MAY ALTER THE PRESET CONTENTS OF LOCATION 4 BEFORE THE TRAP IS EXECUTED, THEREBY TRANSFERRING PROGRAM CONTROL TO AREA IN THE PROGRAM THAT WAS NOT SET UP TO HANDLE THE TRAP. IF THIS HAPPENS, THE PROGRAM WILL "BOMB" AND POSSIBLY REWITE PARTS OF ITSELF.

8.0 MISCELLANEOUS

8.1 POWER FAIL

AFTER A POWER FAILURE OCCURS, THE PROGRAM EXECUTION WILL CONTINUE AT THE POINT WHERE THE POWER OCCURRED. THE PROGRAM WILL TYPE "POWER".

8.2 XXDP, ACT, APT

THE PROGRAM IS CHAINABLE UNDER XXDP, ACT, OR APT. ALTHOUGH "APT HOOKS" HAVE BEEN INSTALLED, THEY HAVE NOT BEEN TESTED.

8.3 EXECUTION TIME

0.5 MINUTES (30 SEC) ITERATION INHIBITED - NO ERRORS
2.5 MINUTES (150 SEC) WITH ITERATIONS - NO ERRORS

8.4 LSI-11 "ODT" COMMANDS

FORMAT	DESCRIPTION
<CR> RETURN	CLOSE OPENED LOCATION AND ACCEPT NEXT COMMAND.
<LF> LINE FEED	CLOSE CURRENT LOCATION; OPEN NEXT SEQUENTIAL LOCATION.
↑(UPARROW)	OPEN PREVIOUS LOCATION.
← (LEFT ARROW)	TAKE CONTENTS OF OPENED LOCATION, INDEXED BY CONTENTS OF PC, AND OPEN THAT LOCATION.
@	TAKE CONTENTS OF OPENED LOCATION AS ABSOLUTE ADDRESS AND OPEN THAT LOCATION.
R/	OPEN THE WORD AT LOCATION R.
/	REOPEN THE LAST LOCATION.
$N/ OR RN/	OPEN GENERAL REGISTER N(0-7) OR S(PS REGISTER).
R;G OR RG	GOTO LOCATION R AND START PROGRAM.
NL	EXECUTE BOOTSTRAP LOADER USING N AS DEVICE CSR. CONSOLE DEVICE IS 177560.
;P OR P	PROCEED WITH PROGRAM EXECUTION.
RUBOUT	ERASES PREVIOUS NUMERIC CHARACTER. RESPONSE IS A BACKSLASH (\).

8.5 ENTERING LSI-11 "ODT"

THE HALT OR ODT MICROCODE STATE OF THE KD11F (LSI-11 MODULE) CAN BE ENTERED IN FIVE DIFFERENT WAYS (OTHERS ARE A SUBSET OF THESE) FROM THE RUN STATE:

1. EXECUTION OF A LSI-11 HALT INSTRUCTION,
2. A DOUBLE BUS ERROR,
3. AS A POWER UP OPTION,
4. ASCII BREAK WITH DLV11 FRAMING ERROR ASSERTING THE B HALT

LINE (ENABLED BY JUMPER OF DLV11).

UPON ENTERING THE HALT STATE, THE KD11F RESPONDS THROUGH THE SET OF COMMAND LISTED IN SECTION 8.4.

8.6 USE OF PROGRAM SOFTWARE SWR

THE PROGRAM SOFTWARE SWITCH REGISTER IS ENABLED IF

1. NO HARDWARE SWR EXISTS;

2. IF YOU START WITH ALL ONES (SWR=177777) IN THE SWITCH REGISTER.

THE SOFTWARE SWITCH REGISTER MAY BE CHANGED BY TYPING ↑G (CONTROL AND LETTER G KEYS TYPED SIMULTANEOUSLY). WHEN ↑G IS TYPED, THE PROGRAM RESPONDS BY TYPING "SWR=XXXXXX" WHERE XXXXXX EQUALS THE FORMER CONTENTS OF THE SWITCH REGISTER.

IF YOU WISH TO KEEP THE CURRENT VALUE, TYPE <CR>. IF YOU WISH TO CHANGE THE VALUE, TYPE THE NEW VALUE FOLLOWED BY A <CR>.

IT IS IMPORTANT TO NOTE THAT THE DIAGNOSTIC IS NOT RUNNING AFTER THE ↑G UNTIL A <CR> IS TYPED.

8.7 SPECIAL I/O SIGNAL TESTS

THREE TESTS WERE INCLUDED TO ENABLE CHECKOUT OF I/O SIGNALS: ST1, ST2, AND CLOCK OVERFLOW. THESE TESTS HAVE A SPECIAL STARTING ADDRESS. SINCE END-PASSES ARE IMMEDIATE, NO "END OF PASS" MESSAGE IS REPORTED. ERRORS ARE REPORTED BY TYPING OUT THE PC WHERE THE ERROR WAS DETECTED. WHEN STARTED, THE PROGRAM REMAINS IN A LOOP GENERATING AND DETECTING THE SPECIFIED SIGNALS. HALT ON ERROR AND INHIBIT ERROR TYPEOUT OPTIONS MAY BE USED.

LOGIC TEST MUST HAVE ALREADY BEEN RUN ON THE KWV11.

8.7.1 I/O SIGNAL TEST #1 ST1 IN, ST2 OUT

SWITCH PACK S2 MUST BE SET UP AS FOLLOWS:

SWITCH	STATE
1	OFF
2	ON
3	OFF
4	OFF
5	ON
6	ON
7	NOT USED

THE FOLLOWING JUMPER MUST BE INSTALLED.

J1-SS (ST2 OUT) TO J1-VV (ST1 IN)

LOAD AND START THE PROGRAM AT 210.

8.7.2 I/O SIGNAL TEST #2 CLOCK OVERFLOW TEST

SWITCH PACK S2 MUST BE SET UP AS FOLLOWS:

SWITCH	STATE
1	OFF
2	OFF
3	OFF
4	ON
5	ON
6	OFF
7	NOT USED

THE FOLLOWING JUMPER MUST BE INSTALLED.

J1-RR (CLOCK OVERFLOW) TO J1-TT (ST2 IN)

LOAD AND START AT LOCATION 214.

8.7.3 I/O SIGNAL TEST #3 ST1 OUT AND ST2 IN

SWITCH PACK S2 MUST BE SET UP AS FOLLOWS:

SWITCH	STATE
1	OFF
2	OFF
3	OFF
4	ON
5	ON
6	ON
7	NOT USED

THE FOLLOWING JUMPER MUST BE INSTALLED:

J1-UU (ST1 OUT) TO J1-TT (ST2 IN)

LOAD AND START AT LOCATION 220.

8.8 PRODUCTION STARTING ADDRESS

A SPECIAL STARTING ADDRESS HAS BEEN PROVIDED FOR IN-HOUSE PRODUCTION TO USE TO START THE LOGIC DIAGNOSTIC AND INFORM THE TEST THAT PRODUCTION IS USING IT.

IN THE FIELD ONLY ENOUGH ADDRESSES WERE ALLOTED FOR 4 SEQUENTIAL KWV11S. WHEN THE LOGIC TESTS ARE STARTED AT LOCATION 200, WE ONLY AUTO-SIZE UP TO 4 KWV11S.

IN HOUSE TESTING MAY WISH TO EXERCISE UP TO 16 KWV11S AT ONE TIME. THE LOGIC TESTS MAY BE STARTED AT LOCATION 230 AND THE PROGRAM WILL AUTO SIZE UP TO 16 KWV11S.

8.9 TESTOR STARTING ADDRESS

A SPECIAL STARTING ADDRESS HAS BEEN PROVIDED FOR MANUFACTURING TO USE TO START THE LOGIC DIAGNOSTIC AND INFORM THE PROGRAM THAT THE CLOCK MODULE IS CABLED TO AN IN-HOUSE TESTOR.

MANUAL INTERVENTION IS NEEDED IN THIS SEQUENCE OF TESTING. THE PROGRAM WILL TYPE OUT ALL INSTRUCTIONS. A CABLE SHOULD CONNECT J1 ON THE CLOCK MODULE TO J10 ON THE TESTOR. SWITCHES 1 AND 3 OF S2 (ON THE CLOCK MODULE) SHOULD BE ON, ALL OTHER SWITCHES ON S2 SHOULD BE OFF.

8.10 TRAP CATCHER

THE TRAP CATCHER IN THIS DIAGNOSTIC EMPLOYS A NEW CONCEPT. THIS CONCEPT WILL ENABLE THE USER OF THIS DIAGNOSTIC TO GAIN MORE KNOWLEDGE OF THE EVENTS THAT LEAD THE PROGRAM TO THIS AREA.

THE TRAP CATCH CONSISTS OF PC+2 AND JSR PC,R0. (I.E., LOCATION 300 WOULD CONTAIN 302 AND LOCATION 302 WOULD CONTAIN 4700.)

WHEN A DEVICE INTERRUPTS UNEXPECTEDLY TO THE TRAP CATCHER, IT WOULD PICK UP THE PC+2 OF THE TRAP AS AN ADDRESS OF THE INTERRUPT SERVICE ROUTINE.

THE PROGRAM WOULD THEN PICK UP "4700" AS THE NEW PSW. BIT 7 OF THE NEW PSW HAVING BEEN SET, WOULD CAUSE FURTHER INTERRUPTS FROM HAPPENING. WHEN THE CPU ATTEMPTS TO EXECUTE "4700" (JSR PC,R0), A BUSS-TIME-OUT TRAP WILL OCCUR TO LOCATION 4. LOCATION 4 CONTAINS A POINTER TO "IOTRD", A ROUTINE THAT WILL REPORT THE TRAP AS AN ERROR.

TO GUARD AGAINST "REAL" BUS ERRORS ROUTING US THROUGH LOCATION 4 TO "IOTRD", WE CHECK TO SEE IF THE TRAP THAT BROUGHT US TO LOCATION 4 REALLY CAME FROM THE TRAP CATCHER AREA. IF NOT WE'LL HALT AND LEAVE THE TRAP ADDRESS IN "TRTO".

MORE ABOUT THE INTERRUPT ERROR CAN BE FOUND IN THE DESCRIPTION OF THE ERROR IN THE PROGRAM LISTING IN THE ROUTINE "IOTRD".

```
                        %
                        .NLIST  MC,MD,CND
                        .LIST   ME
                        .ENABL  ABS
                        .ENABL  AMA
                        .MCALL  .HEADER,.SETUP,.SETTRAP,.TRMTRP,.$TRAP,.$RDOCT,.$TYPBIN
                        .MCALL  TYPOCS,.$POWER,.$CATCH,.$TYPOCT,.EQUAT,.$CMTAG,.SWRHI
                        .MCALL  .$EOP,.$ERROR,.$ERRTYP,.$TYPDEC,.$SCOPE,.$READ,.$TYPE
                        .MCALL  .$ACT11,.$APTVDR,.$APTYPE
167400                  $SWR=   167400
```

```
                                .TITLE  MAINDEC-11-DVKWA-B
                                ;*COPYRIGHT (C) 1976
                                ;*DIGITAL EQUIPMENT CORP.
                                ;*MAYNARD, MASS. 01754
                                ;*
                                ;*PROGRAM BY EDWARD C. BADGER
                                ;*
                                ;*THIS PROGRAM WAS ASSEMBLED USING THE PDP-11 MAINDEC SYSMAC
                                ;*PACKAGE (MAINDEC-11-DZQAC-C2), SEPT 14, 1976.
                                ;*
000001                          $TN=1

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

                                        .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  017004  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  001474          JMP     @#START
000204  000137  002104          JMP     @#RSTART
000210  000137  014006          JMP     @#IOTST1
000214  000137  014064          JMP     @#IOTST2
```

```
                                                JMP     @#IOTST3

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


                                        .SBTTL  BASIC DEFINITIONS

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

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

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

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

                                        ;*"SWITCH REGISTER" SWITCH DEFINITIONS
                        100000          SW15=   100000
                        040000          SW14=   40000
```

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

                                ;*DATA BIT DEFINITIONS (BIT00 TO BIT15)
                100000          BIT15=  100000
                040000          BIT14=  40000
                020000          BIT13=  20000
                010000          BIT12=  10000
                004000          BIT11=  4000
                002000          BIT10=  2000
                001000          BIT09=  1000
                000400          BIT08=  400
                000200          BIT07=  200
                000100          BIT06=  100
                000040          BIT05=  40
                000020          BIT04=  20
                000010          BIT03=  10
                000004          BIT02=  4
                000002          BIT01=  2
                000001          BIT00=  1
                                .EQUIV  BIT09,BIT9
                                .EQUIV  BIT08,BIT8
                                .EQUIV  BIT07,BIT7
                                .EQUIV  BIT06,BIT6
                                .EQUIV  BIT05,BIT5
                                .EQUIV  BIT04,BIT4
                                .EQUIV  BIT03,BIT3
                                .EQUIV  BIT02,BIT2
                                .EQUIV  BIT01,BIT1
                                .EQUIV  BIT00,BIT0

                                ;*BASIC "CPU" TRAP VECTOR ADDRESSES
```

```
                        ERRVEC= 4               ;;TIME OUT AND OTHER ERRORS
                        RESVEC= 10              ;;RESERVED AND ILLEGAL INSTRUCTIONS
                        TBITVEC=14              ;;"T" BIT
                        TRTVEC= 14              ;;TRACE TRAP
                        BPTVEC= 14              ;;BREAKPOINT TRAP (BPT)
                        IOTVEC= 20              ;;INPUT/OUTPUT TRAP (IOT) **SCOPE**
                        PWRVEC= 24              ;;POWER FAIL
                        EMTVEC= 30              ;;EMULATOR TRAP (EMT) **ERROR**
                        TRAPVEC=34              ;;"TRAP" TRAP
                        TKVEC=  60              ;;TTY KEYBOARD VECTOR
                        TPVEC=  64              ;;TTY PRINTER VECTOR
                        PIRQVEC=240             ;;PROGRAM INTERRUPT REQUEST VECTOR

                                ABASE=  170420
                                AVECT1= 440
                                APRIOR= 200

                                $SWR=   167400
                                $TN=    1

                        .SBTTL  ACT11 HOOKS

                        ;;**************************************************************
                        ;HOOKS REQUIRED BY ACT11
                                $SVPC=.                 ;SAVE PC
                                .=46
                                $ENDAD                  ;;1)SET LOC.46 TO ADDRESS OF $ENDAD IN .$EOP
                                .=52
                                .WORD   0               ;;2)SET LOC.52 TO ZERO
                                .=$SVPC                 ;; RESTORE PC
                                .=1000
                        .SBTTL  APT PARAMETER BLOCK

                        ;;**************************************************************
                        ;SET LOCATIONS 24 AND 44 AS REQUIRED FOR APT
                        ;;**************************************************************
                                .$X=.   ;;SAVE CURRENT LOCATION
                                .=24    ;;SET POWER FAIL TO POINT TO START OF PROGRAM
                                200     ;;FOR APT START UP
                                .=44    ;;POINT TO APT INDIRECT ADDRESS PNTR.
                                $APTHDR ;;POINT TO APT HEADER BLOCK
                                .=.$X   ;;RESET LOCATION COUNTER
                        ;;**************************************************************
                        ;SETUP APT PARAMETER BLOCK AS DEFINED IN THE APT-PDP11 DIAGNOSTIC
                        ;INTERFACE SPEC.

                        $APTHD:
                        $HIBTS: .WORD   0       ;;TWO HIGH BITS OF 18 BIT MAILBOX ADDR.
                        $MBADR: .WORD   $MAIL   ;;ADDRESS OF APT MAILBOX (BITS 0-15)
                        $TSTM:  .WORD   2       ;;RUN TIM OF LONGEST TEST
                        $PASTM: .WORD   120.    ;;RUN TIME IN SECS. OF 1ST PASS ON 1 UNIT (QUICK VERIFY)
                        $UNITM: .WORD   120.    ;;ADDITIONAL RUN TIME (SECS) OF A PASS FOR EACH ADDITIONAL UNIT
                                .WORD   $ETEND-$MAIL/2 ;;LENGTH MAILBOX-ETABLE(WORDS)
```

```
                                .SBTTL  COMMON TAGS

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

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

                                ;;**********************************************************************
                                .EVEN
001174                          $MAIL:                          ;;APT MAILBOX
001174  000000                  $MSGTY: .WORD   AMSGTY          ;;MESSAGE TYPE CODE
001176  000000                  $FATAL: .WORD   AFATAL          ;;FATAL ERROR NUMBER
001200  000000                  $TESTN: .WORD   ATESTN          ;;TEST NUMBER
001202  000000                  $PASS:  .WORD   APASS           ;;PASS COUNT
001204  000000                  $DEVCT: .WORD   ADEVCT          ;;DEVICE COUNT
```

```
                                $UNIT:  .WORD   AUNIT   ;;I/O UNIT NUMBER
                                $MSGAD: .WORD   AMSGAD  ;;MESSAGE ADDRESS
                                $MSGLG: .WORD   AMSGLG  ;;MESSAGE LENGTH
                                $ETABLE:                ;;APT ENVIRONMENT TABLE
                                $ENV:   .BYTE   AENV    ;;ENVIRONMENT BYTE
                                $ENVM:  .BYTE   AENVM   ;;ENVIRONMENT MODE BITS
                                $SWREG: .WORD   ASWREG  ;;APT SWITCH REGISTER
                                $USWR:  .WORD   AUSWR   ;;USER SWITCHES
                                $CPUOP: .WORD   ACPUOP  ;;CPU TYPE,OPTIONS
                                ;*                      BITS 15-11=CPU TYPE
                                ;*                              11/04=01,11/05=02,11/20=03,11/40=04,11/45=05
                                ;*                              11/70=06,PDQ=07,Q=10
                                ;*                      BIT 10=REAL TIME CLOCK
                                ;*                      BIT  9=FLOATING POINT PROCESSOR
                                ;*                      BIT  8=MEMORY MANAGEMENT
                                $MAMS1: .BYTE   AMAMS1  ;;HIGH ADDRESS,M.S. BYTE
                                $MTYP1: .BYTE   AMTYP1  ;;MEM. TYPE,BLK#1
                                ;*                      MEM.TYPE BYTE   --  (HIGH BYTE)
                                ;*                              900 NSEC CORE=001
                                ;*                              300 NSEC BIPOLAR=002
                                ;*                              500 NSEC MOS=003
                                $MADR1: .WORD   AMADR1  ;;HIGH ADDRESS,BLK#1
                                ;*                        MEM.LAST ADDR.=3 BYTES,THIS WORD AND LOW OF "TYPE" ABOVE
                                $MAMS2: .BYTE   AMAMS2  ;;HIGH ADDRESS,M.S. BYTE
                                $MTYP2: .BYTE   AMTYP2  ;;MEM.TYPE,BLK#2
                                $MADR2: .WORD   AMADR2  ;;MEM.LAST ADDRESS,BLK#2
                                $MAMS3: .BYTE   AMAMS3  ;;HIGH ADDRESS,M.S.BYTE
                                $MTYP3: .BYTE   AMTYP3  ;;MEM.TYPE,BLK#3
                                $MADR3: .WORD   AMADR3  ;;MEM.LAST ADDRESS,BLK#3
                                $MAMS4: .BYTE   AMAMS4  ;;HIGH ADDRESS,M.S.BYTE
                                $MTYP4: .BYTE   AMTYP4  ;;MEM.TYPE,BLK#4
                                $MADR4: .WORD   AMADR4  ;;MEM.LAST ADDRESS,BLK#4
                                $VECT1: .WORD   AVECT1  ;;INTERRUPT VECTOR#1,BUS PRIORITY#1
                                $VECT2: .WORD   AVECT2  ;;INTERRUPT VECTOR#2BUS PRIORITY#2
                                $BASE:  .WORD   ABASE   ;;BASE ADDRESS OF EQUIPMENT UNDER TEST
                                $DEVM:  .WORD   ADEVM   ;;DEVICE MAP
                                $CDW1:  .WORD   ACDW1   ;;CONTROLLER DESCRIPTION WORD#1
                                $ETEND:
                                .MEXIT
```

```
                                .SBTTL  ERROR POINTER TABLE

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

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

001256                          $ERRTB:

                                ;ITEM   1

001256  017134                          EM1                     ;CLOCK   SR FUNCTION ERROR
001260  017457                          DH1                     ;ERRPC   ASR     WAS     S/B
001262  017666                          DT1                     ;$ERRPC,ASR,$BDDAT,$GDDAT
001264  017764                          DF0                     ;ALL NUMBERS ARE IN OCTAL FORM

                                ;ITEM   2

001266  017166                          EM2                     ;CLOCK   SR DATA ERROR
001270  017457                          DH1                     ;ERRPC   ASR     WAS     S/B
001272  017666                          DT1                     ;$ERRPC,ASR,$BDDAT,$GDDAT
001274  017764                          DF0                     ;ALL NUMBERS ARE IN OCTAL FORM

                                ;ITEM   3

001276  017214                          EM3                     ;CLOCK  BR DATA ERROR
001300  017503                          DH3                     ;ERRPC   ABR     WAS
001302  017700                          DT3                     ;$ERRPC,ABR,$BDDAT,$GDDAT
001304  017764                          DF0                     ;ALL NUMBERS ARE IN OCTAL FORM

                                ;ITEM   4

001306  017242                          EM4             ;INTERRUPT ERROR.
001310  017527                          DH4A            ;ERRPC   TO      ROM ADDR.
001312  017712                          DT4             ;$ERRPC,        TRTO,TRFRO
001314  017764                          DF0                     ;ALL NUMBERS ARE IN OCTAL FORM

                                ;ITEM   5

001316  017263                          EM5                     ;CLOCK   COUNT REG ERROR
001320  017457                          DH1                     ;ERRPC   ASR   WAS   S/B
001322  017666                          DT1                     ;$ERRPC, ACR, $BDDAT, $GDDAT
```

```
1020  001324  017764                          DF0                     ;ALL NUMBERS ARE IN OCTAL FORM
1021
1022
1023                                  ;ITEM   6
1024
1025  001326  017325                          EM12                    ;CLOCK   COUNT FUNCTION ERROR
1026  001330  017563                          DH12                    ;ERRPC   ASR
1027  001332  017722                          DT12                    ;ERRPC, ASR
1028  001334  017764                          DF0                     ;ALL NUMBERS ARE IN OCTAL FORM
1029
1030
1031                                  ;ITEM   7
1032
1033  001336  017354                          EM16                    ;CLOCK   INTERRUPT ERROR
1034  001340  017563                          DH12                    ;ERRPC   ASR
1035  001342  017722                          DT12                    ;$ERRPC, ASR
1036  001344  017764                          DF0                     ;ALL NUMBERS ARE IN OCTAL FORM
1037
1038
1039                                  ;ITEM   10
1040
1041  001346  017405                          EM20                    ;CLOCK   REPEATABILITY ERROR
1042  001350  017600                          DH20                    ;ERROR   ASR   2ND CNT 1ST CNT  3RD CNT
1043  001352  017730                          DT20                    ;$ERRPC, ASR, $BDDAT, $GDDAT, $TMP0
1044  001354  017764                          DF0                     ;ALL NUMBERS ARE IN OCTAL FORM
1045
1046
1047                                  ;ITEM   11
1048
1049  001356  017306                          EM11                    ;CLOCK   COUNT ERROR
1050  001360  017457                          DH1                     ;ERRPC   ASR   WAS   S/B
1051  001362  017744                          DT22                    ;$ERRPC, ASR, $BDDAT, $TMP0
1052  001364  017764                          DF0                     ;ALL NUMBERS ARE IN OCTAL FORM
1053
1054
1055                                  ;ITEM   12
1056
1057  001366  017434                          EM26                    ;CLOCK ADDRESSING ERROR
1058  001370  017641                          DH26                    ;ERRPC   CLOCK ADDR.
1059  001372  017756                          DT26                    ;$ERRPC,$TMP0
1060  001374  017764                          DF0                     ;ALL NUMBERS ARE IN OCTAL FORM
1061
1062
1063  001376  170420          ASR:    .WORD   ABASE
1064  001400  170422          ABR:    .WORD   ABASE+2
1065  001402  000440          VECT1:  .WORD   AVECT1
1066  001404  000442          VECTP:  .WORD   AVECT1+2
1067  001406  000444          VECT2:  .WORD   AVECT1+4        ;VECTOR ADDR. OF ST2 INTRS.
1068  001410  000446          VECT2P: .WORD   AVECT1+6
1069  001412  000200          PRIOR:  .WORD   APRIOR
1070  001414  167774          DR:     .WORD   167774
1071  001416  167772          DR2:    .WORD   167772
1072  001420  000000          $TMP0:  .WORD   0               ;TEMP STORAGE.
1073  001422  000000          $TMP1:  .WORD   0               ;TMP STORAGE.
```

```
1074  001424  000000                    $TMP3:  .WORD   0
1075  001426  000000                    ROTATE: .WORD   0                       ;POINT TO DEVICE UNDER TEST.
1076  001430  000000                    UTEST:  .WORD   0                       ;KEEPS TRACK OF GOOD UNITS.
1077  001432  000000                    ERCNT:  .WORD   0                       ;COUNTS ERRORS.
1078  001434  000000                    MDEVCT: .WORD   0                       ;COUNTS DEVICES TESTED.
1079  001436  000000                    TSTCNT: .WORD   0                       ;MAX DEVICES TO BE TESTED.
1080  001440  000000                    EXS:    .WORD   0                       ;=0, NORMAL: =1 SPECIAL TESTOR START, BY L+S @ 2
1081  001442  000000                    LCNT:   .WORD   0                       ;TOTAL UNITS TESTED.
1082
1083
1084  001444  005237  001440            TSTSTR: INC     EXS                     ;SET FOR TESTOR.
1085  001450  012737  000020  001436            MOV     #16.,TSTCNT             ;ALLOW 16 UNITS
1086  001456  000413                            BR      1$
1087          001460                    WSTART=.
1088  001460  012737  000020  001436            MOV     #16.,TSTCNT     ;TEST UP TO 16 UNITS.
1089  001466  005037  001440                    CLR     EXS
1090  001472  000405                            BR      1$
1091          001474                    START=.
1092  001474  012737  000004  001436            MOV     #4,TSTCNT       ;TEST UP TO FOUR UNITS.
1093  001502  005037  001440                    CLR     EXS
1094  001506                            1$:
1095                                    .SBTTL  INITIALIZE THE COMMON TAGS
1096                                    ;;CLEAR THE COMMON TAGS ($CMTAG) AREA
1097  001506  012706  001100                    MOV     #$CMTAG,R6      ;;FIRST LOCATION TO BE CLEARED
1098  001512  005026                            CLR     (R6)+           ;;CLEAR MEMORY LOCATION
1099  001514  022706  001140                    CMP     #SWR,R6 ;;DONE?
1100  001520  001374                            BNE     .-6             ;;LOOP BACK IF NO
1101  001522  012706  001100                    MOV     #STACK,SP       ;;SETUP THE STACK POINTER
1102                                    ;;INITIALIZE A FEW VECTORS
1103  001526  012737  015040  000020            MOV     #$SCOPE,@#IOTVEC ;;IOT VECTOR FOR SCOPE ROUTINE
1104  001534  012737  000340  000022            MOV     #340,@#IOTVEC+2 ;;LEVEL 7
1105  001542  012737  014476  000030            MOV     #$ERROR,@#EMTVEC ;;EMT VECTOR FOR ERROR ROUTINE
1106  001550  012737  000340  000032            MOV     #340,@#EMTVEC+2 ;;LEVEL 7
1107  001556  012737  017054  000034            MOV     #$TRAP,@#TRAPVEC ;;TRAP VECTOR FOR TRAP CALLS
1108  001564  012737  000340  000036            MOV     #340,@#TRAPVEC+2;LEVEL 7
1109  001572  012737  016626  000024            MOV     #$PWRDN,@#PWRVEC ;;POWER FAILURE VECTOR
1110  001600  012737  000340  000026            MOV     #340,@#PWRVEC+2 ;;LEVEL 7
1111  001606  005037  001160                    CLR     $TIMES          ;;INITIALIZE NUMBER OF ITERATIONS
1112  001612  005037  001162                    CLR     $ESCAPE         ;;CLEAR THE ESCAPE ON ERROR ADDRESS
1113  001616  112737  000001  001115            MOVB    #1,$ERMAX       ;;ALLOW ONE ERROR PER TEST
1114  001624  012737  001624  001106            MOV     #.,$LPADR       ;;INITIALIZE THE LOOP ADDRESS FOR SCOPE
1115  001632  012737  001632  001110            MOV     #.,$LPERR       ;;SETUP THE ERROR LOOP ADDRESS
1116                                    ;;SIZE FOR A HARDWARE SWITCH REGISTER. IF NOT FOUND OR IT IS
1117                                    ;;EQUAL TO A "-1"  SETUP FOR A SOFTWARE SWITCH REGISTER.
1118  001640  013746  000004                    MOV     @#ERRVEC,-(SP)  ;;SAVE ERROR VECTOR
1119  001644  012737  001700  000004            MOV     #64$,@#ERRVEC   ;;SET UP ERROR VECTOR
1120  001652  012737  177570  001140            MOV     #DSWR,SWR       ;;SETUP FOR A HARDWARE SWICH REGISTER
1121  001660  012737  177570  001142            MOV     #DDISP,DISPLAY  ;;AND A HARDWARE DISPLAY REGISTER
1122  001666  022777  177777  177244            CMP     #-1,@SWR        ;;TRY TO REFERENCE HARDWARE SWR
1123  001674  001012                            BNE     66$             ;;BRANCH IF NO TIMEOUT TRAP OCCURRED
1124                                                                    ;;AND  THE HARDWARE SWR IS NOT = -1
1125  001676  000403                            BR      65$             ;;BRANCH IF NO TIMEOUT
1126  001700  012716  001706          64$:      MOV     #65$,(SP)       ;;SET UP FOR TRAP RETURN
1127  001704  000002                            RTI
```

```
1128  001706  012737  000176  001140  65$:    MOV     #SWREG,SWR      ;;POINT TO SOFTWARE SWR
1129  001714  012737  000174  001142          MOV     #DISPREG,DISPLAY
1130  001722  012637  000004          66$:    MOV     (SP)+,@#ERRVEC  ;;RESTORE ERROR VECTOR
1131
1132  001726  005037  001202                  CLR     $PASS           ;;CLEAR PASS COUNT
1133  001732  132737  000200  001215          BITB    #APTSIZE,$ENVM  ;;TEST USER SIZE UNDER APT
1134  001740  001403                          BEQ     67$             ;;YES,USE NON-APT SWITCH
1135  001742  012737  001216  001140          MOV     #$SWREG,SWR     ;;NO,USE APT SWITCH REGISTER
1136  001750                          67$:
1137
1138
1139  001750  012746  000340                  MOV     #340,-(SP)              ;SET CPU PRIORITY ON RETERN.
1140  001754  012746  001762                  MOV     #68$,-(SP)              ;SHOW RETURN ADDRESS.
1141  001760  000002                          RTI                             ;CAUSE A RETURN(PUTS STATUS IN STATUS REG.).
1142  001762                          68$:
1143
1144  001762  005037  001204                  CLR     $DEVCT          ;ZERO DEVICE COUNT.
1145  001766  012737  017004  000004          MOV     #IOTRD,@#ERRVEC ;FIX TRAP CATCHER.
1146  001774  013737  001244  001402          MOV     $VECT1,VECT1    ;NOW FIX VECTOR ADDR.
1147  002002  013737  001250  001376          MOV     $BASE,ASR       ;FIX ADDRESS OF CSR.
1148
1149                          .SBTTL  TYPE PROGRAM NAME
1150                          ;;TYPE THE NAME OF THE PROGRAM IF FIRST PASS
1151  002010  005227  177777                  INC     #-1             ;;FIRST TIME?
1152  002014  001033                          BNE     69$             ;;BRANCH IF NO
1153  002016  104401  002064                  TYPE    ,70$            ;;TYPE ASCIZ STRING
1154
1155  002022  005737  000042          .SBTTL  GET VALUE FOR SOFTWARE SWITCH REGISTER
1156  002026  001012                          TST     @#42            ;;ARE WE RUNNING UNDER XXDP/ACT?
1157  002030  123727  001214  000001          BNE     71$             ;;BRANCH IF YES
1158  002036  001406                          CMPB    $ENV,#1         ;;ARE WE RUNNING UNDER APT?
1159  002040  023727  001140  000176          BEQ     71$             ;;BRANCH IF YES
1160  002046  001005                          CMP     SWR,#SWREG      ;;SOFTWARE SWITCH REG SELECTED?
1161  002050  104406                          BNE     72$             ;;BRANCH IF NO
1162  002052  000403                          GTSWR                   ;;GET SOFT-SWR SETTINGS
1163  002054  112737  000001  001134          BR      72$
1164  002062                          71$:    MOVB    #1,$AUTOB       ;;SET AUTO-MODE INDICATOR
1165  002062  000410                  72$:    BR      69$             ;;GET OVER THE ASCIZ
1166                          ;;70$:  .ASCIZ  <CRLF>#MD11-DVKWA-B#<CRLF>
1167  002104                  69$:
1168  002104                  RSTART:
1169  002104  005737  001440                  TST     $XS             ;TESTOR MODE ENABLED??
1170  002110  001441                          BEQ     1$              ;NO DON'T TYPE NEXT MESSAGE.
1171  002112  104401  002120                  TYPE    ,65$            ;;TYPE ASCIZ STRING
1172  002116  000436                          BR      64$             ;;GET OVER THE ASCIZ
1173                          ;;65$:  .ASCIZ  <15><12>#TESTOR MODE ENABLED--SEE DOCUMENTATION FOR INSTRUCTIONS.#
1174  002214                  64$:
1175  002214                  1$:
1176  002214  104401  002222                  TYPE    ,67$            ;;TYPE ASCIZ STRING
1177  002220  000411                          BR      66$             ;;GET OVER THE ASCIZ
1178                          ;;67$:  .ASCIZ  <15><12>#TEST RUNNING...#
1179  002244                  66$:
1180  002244  005037  001434                  CLR     MDEVCT          ;TESTING FIRST UNIT.
1181  002250  005037  001432                  CLR     ERCNT           ;NO ERRORS.
```

```
1182  002254  005037  001202                  CLR     $PASS           ;NO PASSES.
1183  002260  012737  000001  001426          MOV     #1,ROTATE       ;POINT TO FIRST UNIT.
1184  002266  013737  001426  001430          MOV     ROTATE,UTEST
1185  002274                          LOOP:                           ;COME HERE FOR NEXT UNIT,OR END PASS.
1186
1187  002274  042737  170000  001402          BIC     #170000,VECT1   ;CLEAR OUT PRIORITY BITS.
1188  002302  013737  001402  001404          MOV     VECT1,VECTP     ;NOW FIX VECTOR +2 ADDR.
1189  002310  062737  000002  001404          ADD     #2,VECTP
1190  002316  013737  001402  001406          MOV     VECT1,VECT2     ;LETS FIX ST2 VECTOR ADDR.
1191  002324  062737  000004  001406          ADD     #4,VECT2        ;ITS 4 GREATER THEN THE 1ST.
1192  002332  013737  001406  001410          MOV     VECT2,VECT2P    ;VECTOR +2 ADDR.
1193  002340  062737  000002  001410          ADD     #2,VECT2P
1194
1195
1196  002346  013737  001376  001400          MOV     ASR,ABR         ;FIX ADDR OF PRESET REG=
1197  002354  062737  000002  001400          ADD     #2,ABR          ;CSR + 2
1198
1199
1200                                  ;;**************************************************************
1201                                  ;*TEST 1         *TEST THE ADDRESSABILITY OF CLOCK CSR
1202                                  ;;**************************************************************
1203  002362  000240                  TST1:   NOP
1204  002364  012737  000050  001160          MOV     #50,$TIMES      ;;DO 50 ITERATIONS
1205  002372  012737  002414  001106          MOV     #1$,$LPADR      ;;SET SCOPE LOOP ADDRESS
1206  002400  112737  000001  001102          MOVB    #1,$TSTNM       ;SET TEST #1.
1207  002406  012737  002414  001110          MOV     #1$,$LPERR
1208
1209
1210
1211  002414  013746  000004          1$:     MOV     @#ERRVEC,-(SP)  ;SAVE CONTENTS OF ADDRS 6.
1212  002420  012737  002434  000004          MOV     #2$,@#ERRVEC    ;SET TIME-OUT TRAP VECTOR TO HANDLER IN CASE.
1213                                                                  ;WE TIME-OUT WHEN ADDRESSING THE KW11.
1214  002426  005777  176744                  TST     @ASR            ;ADDRESS THE CLOCK!
1215                                                                  ;IF CLOCK DOES NOT RETURN
1216                                                                  ;"BUS SSYN" THEN WE'LL TIME-OUT
1217
1218  002432  000406                  BR      3$              ;THE CLOCK WAS THERE! EXIT SUB-TEST.
1219  002434                          2$:
1220  002434  062706  000004                  ADD     #4,SP                   ;/ADD #4 TO STACK POINTER.
1221  002440  013737  001376  001420          MOV     ASR,$TMPO       ;FOR ERROR TYPEOUT.
1222
1223

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

1226  002446  104012                  ERROR   12              ;REPORT ERROR=CLOCK CSR FAILED TO RETURN
1227                                                          ;"BUS SSYN" WHEN ADDRESSED.
1228                                                          ;NOTE: IF PROGRAM HAS INCORRECT
1229                                                          ;ADDRESS THEN WE MIG NOT BE
1230                                                          ;TALKING TO THE CLOCK. MAKE SURE
1231                                                          ;OF CLOCK ADDRESS.
1232
1233

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

```
1236  002450  012637  000004          3$:     MOV     (SP)+,@#ERRVEC
1237
1238
1239                                  ;;*********************************************************************
1240                                  ;*TEST 2        *TEST THE ADDRESSABILITY OF CLOCK BUFFER REG.
1241                                  ;;*********************************************************************
1242  002454  000004                  TST2:   SCOPE
1243
1244
1245  002456  013746  000004          1$:     MOV     @#ERRVEC,-(SP)  ;SAVE CONTENTS OF ADDRS 6.
1246  002462  012737  002476  000004          MOV     #2$,@#ERRVEC    ;SET TIME-OUT TRAP VECTOR TO HANDLER IN CASE.
1247                                                                  ;WE TIME-OUT WHEN ADDRESSING THE KW11.
1248  002470  005777  176704                TST     @ABR            ;ADDRESS THE CLOCK!
1249                                                                  ;IF CLOCK DOES NOT RETURN
1250                                                                  ;"BUS SSYN" THEN WE'LL TIME-OUT
1251
1252  002474  000406                  BR      3$                      ;THE CLOCK WAS THERE! EXIT SUB-TEST.
1253  002476                          2$:
1254  002476  062706  000004                ADD     #4,SP                   ;/ADD #4 TO STACK POINTER.
1255  002502  013737  001400  001420        MOV     ABR,$TMP0       ;FOR ERROR TYPEOUT.
1256
1257
                                      ;;$$$$$$$$$$$$$$$$$$$$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$

1260  002510  104012                          ERROR   12              ;REPORT ERROR=CLOCK BUFFER REG. FAILED TO RETURN
1261                                                                  ;"BUS SSYN" WHEN ADDRESSED.
1262                                                                  ;NOTE: IF PROGRAM HAS INCORRECT
1263                                                                  ;ADDRESS THEN WE MIG NOT BE
1264                                                                  ;TALKING TO THE CLOCK. MAKE SURE
1265                                                                  ;OF CLOCK ADDRESS.
1266
1267
                                      ;;$$$$$$$$$$$$$$$$$$$$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$

1270  002512  012637  000004          3$:     MOV     (SP)+,@#ERRVEC
1271
1272
1273
1274
```

```
                                         ;/#
                                 ;;***************************************************************
                                 ;*TEST 3        *TEST THAT CLOCK A STATUS REGISTER BIT 14 CAN BE SET AND CLEARED
                                 ;*
                                 ;*CLOCK STATUS REGISTER BIT EXERCISE. ON FAILURE-SUSPECT INDIVIDUAL
                                 ;*F/FS OR GATES
                                 ;*

                                 ;;***************************************************************
002516  000004                   TST3:   SCOPE
002520  012737  000100  001160           MOV     #100,$TIMES      ;;DO 100 ITERATIONS

002526  005077  176644                   CLR     @ASR             ;/CLEAR THE STATUS REGISTER.
002532  052777  040000  176636           BIS     #BIT14,@ASR      ;/SET BIT 14.
002540  012737  040000  001124           MOV     #BIT14,$GDDAT    ;/SET FOR ERROR TYPEOUT S/B.
002546  017737  176624  001126           MOV     @ASR,$BDDAT      ;/READ THE STATUS REGISTEP.
002554  023737  001124  001126           CMP     $GDDAT,$BDDAT    ;/DID BIT 14 AND ONLY BIT 14 SET?
002562  001402                           BEQ     1$               ;/IF SO-LETS TRY CLEARING IT.

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

002564  104002                           ERROR   2                ;/ERROR CLOCK AS STATUS REGISTER
                                                                  ;/BIT 14 FAILED TO BIT SET.

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

002566  000412                           BR      2$               ;/BR TO END SUBTEST.

002570  042777  040000  176600   1$:     BIC     #BIT14,@ASR      ;/TRY CLEARING BIT 14.
002576  005037  001124                   CLR     $GDDAT           ;/CLEAR S/B FOR TYPEOUT IF ANY.
002602  017737  176570  001126           MOV     @ASR,$BDDAT      ;/NOW READ IT BACK.
002610  001401                           BEQ     2$               ;/IF ZERO - NO ERROR!


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

002612  104002                           ERROR   2                ;/ERROR - CLOCK A STATUS REGISTER.
                                                                  ;/BIT 14 FAILED TO CLEAR.


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

002614                           2$:


```

```
                                                   ;/*
                                        ;;*************************************************************
                                        ;*TEST 4        *TEST THAT CLOCK A STATUS REGISTER BIT 13 CAN BE SET AND CLEARED
                                        ;*
                                        ;*CLOCK STATUS REGISTER BIT EXERCISE. ON FAILURE-SUSPECT INDIVIDUAL
                                        ;*F/FS OR GATES
                                        ;*

                                        ;;*************************************************************
 002614  000004                         TST4:   SCOPE
 002616  012737  000100  001160                 MOV     #100,$TIMES       ;;DO 100 ITERATIONS

 002624  005077  176546                         CLR     @ASR              ;/CLEAR THE STATUS REGISTER.
 002630  052777  020000  176540                 BIS     #BIT13,@ASR       ;/SET BIT 13.
 002636  012737  020000  001124                 MOV     #BIT13,$GDDAT     ;/SET FOR ERROR TYPEOUT S/B.
 002644  017737  176526  001126                 MOV     @ASR,$BDDAT       ;/READ THE STATUS REGISTER.
 002652  023737  001124  001126                 CMP     $GDDAT,$BDDAT     ;/DID BIT 13 AND ONLY BIT 13 SET?
 002660  001402                                 BEQ     1$                ;/IF SO-LETS TRY CLEARING IT.

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

 002662  104002                                 ERROR   2                 ;/ERROR CLOCK AS STATUS REGISTER
                                                                          ;/BIT 13 FAILED TO BIT SET.

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

 002664  000412                                 BR      2$                ;/BR TO END SUBTEST.

 002666  042777  020000  176502         1$:     BIC     #BIT13,@ASR       ;/TRY CLEARING BIT 13.
 002674  005037  001124                         CLR     $GDDAT            ;/CLEAR S/B FOR TYPEOUT IF ANY.
 002700  017737  176472  001126                 MOV     @ASR,$BDDAT       ;/NOW READ IT BACK.
 002706  001401                                 BEQ     2$                ;/IF ZERO - NO ERROR!


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

 002710  104002                                 ERROR   2                 ;/ERROR - CLOCK A STATUS REGISTER.
                                                                          ;/BIT 13 FAILED TO CLEAR.


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

 002712                                 2$:


```

```
                                                ;/*
                                        ;;*************************************************************
                                        ;*TEST 5        *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
                                        ;*

                                        ;;*************************************************************
002712  000004                          TST5:   SCOPE
002714  012737  000100  001160                  MOV     #100,$TIMES             ;;DO 100 ITERATIONS

002722  005077  176450                          CLR     @ASR                    ;/CLEAR THE STATUS REGISTER.
002726  052777  004000  176442                  BIS     #BIT11,@ASR             ;/SET BIT 11.
002734  012737  004000  001124                  MOV     #BIT11,$GDDAT           ;/SET FOR ERROR TYPEOUT S/B.
002742  017737  176430  001126                  MOV     @ASR,$BDDAT             ;/READ THE STATUS REGISTER.
002750  023737  001124  001126                  CMP     $GDDAT,$BDDAT           ;/DID BIT 11 AND ONLY BIT 11 SET?
002756  001402                                  BEQ     1$                      ;/IF SO-LETS TRY CLEARING IT.

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

002760  104002                                  ERROR   2                       ;/ERROR CLOCK AS STATUS REGISTER
                                                                                ;/BIT 11 FAILED TO BIT SET.

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

002762  000412                                  BR      2$                      ;/BR TO END SUBTEST.

002764  042777  004000  176404  1$:             BIC     #BIT11,@ASR             ;/TRY CLEARING BIT 11.
002772  005037  001124                          CLR     $GDDAT                  ;/CLEAR S/B FOR TYPEOUT IF ANY.
002776  017737  176374  001126                  MOV     @ASR,$BDDAT             ;/NOW READ IT BACK.
003004  001401                                  BEQ     2$                      ;/IF ZERO - NO ERROR!


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

003006  104002                                  ERROR   2                       ;/ERROR - CLOCK A STATUS REGISTER.
                                                                                ;/BIT 11 FAILED TO CLEAR.


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

003010                                  2$:


```

```
                                        ;/*
                                ;;**********************************************************************
                                ;*TEST 6         *TEST THAT CLOCK A STATUS REGISTER BIT 6 CAN BE SET AND CLEARED
                                ;*
                                ;*CLOCK STATUS REGISTER BIT EXERCISE. ON FAILURE-SUSPECT INDIVIDUAL
                                ;*F/FS OR GATES
                                ;*

                                ;;**********************************************************************
003010  000004                  TST6:   SCOPE
003012  012737  000100  001160          MOV     #100,$TIMES     ;;DO 100 ITERATIONS

003020  005077  176352          CLR     @ASR            ;/CLEAR THE STATUS REGISTER.
003024  052777  000100  176344  BIS     #BIT6,@ASR      ;/SET BIT 6.
003032  012737  000100  001124  MOV     #BIT6,$GDDAT    ;/SET FOR ERROR TYPEOUT S/B.
003040  017737  176332  001126  MOV     @ASR,$BDDAT     ;/READ THE STATUS REGISTER.
003046  023737  001124  001126  CMP     $GDDAT,$BDDAT   ;/DID BIT 6 AND ONLY BIT 6 SET?
003054  001402                  BEQ     1$              ;/IF SO-LETS TRY CLEARING IT.

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

003056  104002                  ERROR   2               ;/ERROR CLOCK AS STATUS REGISTER
                                                        ;/BIT 6 FAILED TO BIT SET.

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

003060  000412                  BR      2$              ;/BR TO END SUBTEST.
003062  042777  000100  176306  1$:     BIC     #BIT6,@ASR      ;/TRY CLEARING BIT 6.
003070  005037  001124          CLR     $GDDAT          ;/CLEAR S/B FOR TYPEOUT IF ANY.
003074  017737  176276  001126  MOV     @ASR,$BDDAT     ;/NOW READ IT BACK.
003102  001401                  BEQ     2$              ;/IF ZERO - NO ERROR!

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

003104  104002                  ERROR   2               ;/ERROR - CLOCK A STATUS REGISTER.
                                                        ;/BIT 6 FAILED TO CLEAR.

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

003106                          2$:
```

```
                                        ;/*
                                ;;**********************************************************************
                                ;*TEST 7         *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
                                ;*
                                ;;**********************************************************************
003106  000004                  TST7:   SCOPE
003110  012737  000100  001160          MOV     #100,$TIMES     ;;DO 100 ITERATIONS

003116  005077  176254                  CLR     @ASR            ;/CLEAR THE STATUS REGISTER.
003122  052777  000040  176246          BIS     #BIT5,@ASR      ;/SET BIT 5.
003130  012737  000040  001124          MOV     #BIT5,$GDDAT    ;/SET FOR ERROR TYPEOUT S/B.
003136  017737  176234  001126          MOV     @ASR,$BDDAT     ;/READ THE STATUS REGISTER.
003144  023737  001124  001126          CMP     $GDDAT,$BDDAT   ;/DID BIT 5 AND ONLY BIT 5 SET?
003152  001402                          BEQ     1$              ;/IF SO-LETS TRY CLEARING IT.

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

003154  104002                          ERROR   2               ;/ERROR CLOCK AS STATUS REGISTER
                                                                ;/BIT 5 FAILED TO BIT SET.

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

003156  000412                          BR      2$              ;/BR TO END SUBTEST.

003160  042777  000040  176210  1$:     BIC     #BIT5,@ASR      ;/TRY CLEARING BIT 5.
003166  005037  001124                  CLR     $GDDAT          ;/CLEAR S/B FOR TYPEOUT IF ANY.
003172  017737  176200  001126          MOV     @ASR,$BDDAT     ;/NOW READ IT BACK.
003200  001401                          BEQ     2$              ;/IF ZERO - NO ERROR!

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

003202  104002                          ERROR   2               ;/ERROR - CLOCK A STATUS REGISTER.
                                                                ;/BIT 5 FAILED TO CLEAR.

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

003204                          2$:
```

```
                                        ;/#
                                ;;**********************************************************************
                                ;*TEST 10        *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
                                ;*

                                ;;**********************************************************************
003204  000004                  TST10:  SCOPE
003206  012737  000100  001160          MOV     #100,$TIMES     ;;DO 100 ITERATIONS

003214  005077  176156          1$:     CLR     @ASR            ;/CLEAR THE STATUS REGISTER.
003220  052777  000020  176150          BIS     #BIT4,@ASR      ;/SET BIT 4.
003226  012737  000020  001124          MOV     #BIT4,$GDDAT    ;/SET FOR ERROR TYPEOUT S/B.
003234  017737  176136  001126          MOV     @ASR,$BDDAT     ;/READ THE STATUS REGISTER.
003242  023737  001124  001126          CMP     $GDDAT,$BDDAT   ;/DID BIT 4 AND ONLY BIT 4 SET?
003250  001402                        BEQ     1$              ;/IF SO-LETS TRY CLEARING IT.

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

003252  104002                          ERROR   2               ;/ERROR CLOCK AS STATUS REGISTER
                                                                ;/BIT 4 FAILED TO BIT SET.

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

003254  000412                          BR      2$              ;/BR TO END SUBTEST.

003256  042777  000020  176112  1$:     BIC     #BIT4,@ASR      ;/TRY CLEARING BIT 4.
003264  005037  001124                  CLR     $GDDAT          ;/CLEAR S/B FOR TYPEOUT IF ANY.
003270  017737  176102  001126          MOV     @ASR,$BDDAT     ;/NOW READ IT BACK.
003276  001401                        BEQ     2$              ;/IF ZERO - NO ERROR!

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

003300  104002                          ERROR   2               ;/ERROR - CLOCK A STATUS REGISTER.
                                                                ;/BIT 4 FAILED TO CLEAR.

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

003302                          2$:
```

```
                                        ;/*
                                        ;;**********************************************************************
                                        ;*TEST 11        *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
                                        ;*
                                        ;;**********************************************************************
003302  000004                        TST11:  SCOPE
003304  012737  000100  001160                MOV     #100,$TIMES     ;;DO 100 ITERATIONS
003312  005077  176060                        CLR     @ASR            ;/CLEAR THE STATUS REGISTER.
003316  052777  000010  176052                BIS     #BIT3,@ASR      ;/SET BIT 3.
003324  012737  000010  001124                MOV     #BIT3,$GDDAT    ;/SET FOR ERROR TYPEOUT S/B.
003332  017737  176040  001126                MOV     @ASR,$BDDAT     ;/READ THE STATUS REGISTER.
003340  023737  001124  001126                CMP     $GDDAT,$BDDAT   ;/DID BIT 3 AND ONLY BIT 3 SET?
003346  001402                                BEQ     1$              ;/IF SO-LETS TRY CLEARING IT.

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

003350  104002                                ERROR   2               ;/ERROR CLOCK AS STATUS REGISTER
                                                                        ;/BIT 3 FAILED TO BIT SET.

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

003352  000412                                BR      2$              ;/BR TO END SUBTEST.

003354  042777  000010  176014  1$:           BIC     #BIT3,@ASR      ;/TRY CLEARING BIT 3.
003362  005037  001124                        CLR     $GDDAT          ;/CLEAR S/B FOR TYPEOUT IF ANY.
003366  017737  176004  001126                MOV     @ASR,$BDDAT     ;/NOW READ IT BACK.
003374  001401                                BEQ     2$              ;/IF ZERO - NO ERROR!

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

003376  104002                                ERROR   2               ;/ERROR - CLOCK A STATUS REGISTER.
                                                                        ;/BIT 3 FAILED TO CLEAR.

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

003400                                  2$:
```

```
                                        ;/*
                                        ;;**********************************************************************
                                        ;*TEST 12        *TEST THAT CLOCK A STATUS REGISTER BIT 2 CAN BE SET AND CLEARED
                                        ;*
                                        ;*CLOCK STATUS REGISTER BIT EXERCISE. ON FAILURE-SUSPECT INDIVIDUAL
                                        ;*F/FS OR GATES
                                        ;*

                                        ;;**********************************************************************
003400  000004                          TST12:  SCOPE
003402  012737  000100  001160                  MOV     #100,$TIMES     ;;DO 100 ITERATIONS

003410  005077  175762                          CLR     @ASR            ;/CLEAR THE STATUS REGISTER.
003414  052777  000004  175754                  BIS     #BIT2,@ASR      ;/SET BIT 2.
003422  012737  000004  001124                  MOV     #BIT2,$GDDAT    ;/SET FOR ERROR TYPEOUT S/B.
003430  017737  175742  001126                  MOV     @ASR,$BDDAT     ;/READ THE STATUS REGISTER.
003436  023737  001124  001126                  CMP     $GDDAT,$BDDAT   ;/DID BIT 2 AND ONLY BIT 2 SET?
003444  001402                                  BEQ     1$              ;/IF SO-LETS TRY CLEARING IT.

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

003446  104002                                  ERROR   2               ;/ERROR CLOCK AS STATUS REGISTER
                                                                        ;/BIT 2 FAILED TO BIT SET.

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

003450  000412                                  BR      2$              ;/BR TO END SUBTEST.

003452  042777  000004  175716  1$:     BIC     #BIT2,@ASR      ;/TRY CLEARING BIT 2.
003460  005037  001124                  CLR     $GDDAT          ;/CLEAR S/B FOR TYPEOUT IF ANY.
003464  017737  175706  001126          MOV     @ASR,$BDDAT     ;/NOW READ IT BACK.
003472  001401                          BEQ     2$              ;/IF ZERO - NO ERROR!

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

003474  104002                                  ERROR   2               ;/ERROR - CLOCK A STATUS REGISTER.
                                                                        ;/BIT 2 FAILED TO CLEAR.

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

003476                                  2$:
```

```
                                        ;/*
                                        ;;**********************************************************************
                                        ;*TEST 13        *TEST THAT CLOCK A STATUS REGISTER BIT 1 CAN BE SET AND CLEARED
                                        ;*
                                        ;*CLOCK STATUS REGISTER BIT EXERCISE. ON FAILURE-SUSPECT INDIVIDUAL
                                        ;*F/FS OR GATES
                                        ;*

                                        ;;**********************************************************************
003476  000004                          TST13:  SCOPE
003500  012737  000100  001160                  MOV     #100,$TIMES     ;;DO 100 ITERATIONS

003506  005077  175664                          CLR     @ASR            ;/CLEAR THE STATUS REGISTER.
003512  052777  000002  175656                  BIS     #BIT1,@ASR      ;/SET BIT 1.
003520  012737  000002  001124                  MOV     #BIT1,$GDDAT    ;/SET FOR ERROR TYPEOUT S/B.
003526  017737  175644  001126                  MOV     @ASR,$BDDAT     ;/READ THE STATUS REGISTER.
003534  023737  001124  001126                  CMP     $GDDAT,$BDDAT   ;/DID BIT 1 AND ONLY BIT 1 SET?
003542  001402                                  BEQ     1$              ;/IF SO-LETS TRY CLEARING IT.

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

003544  104002                                  ERROR   2               ;/ERROR CLOCK AS STATUS REGISTER
                                                                        ;/BIT 1 FAILED TO BIT SET.

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

003546  000412                                  BR      2$              ;/BR TO END SUBTEST.

003550  042777  000002  175620  1$:     BIC     #BIT1,@ASR      ;/TRY CLEARING BIT 1.
003556  005037  001124                  CLR     $GDDAT          ;/CLEAR S/B FOR TYPEOUT IF ANY.
003562  017737  175610  001126          MOV     @ASR,$BDDAT     ;/NOW READ IT BACK.
003570  001401                          BEQ     2$              ;/IF ZERO - NO ERROR!

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

003572  104002                                  ERROR   2               ;/ERROR - CLOCK A STATUS REGISTER.
                                                                        ;/BIT 1 FAILED TO CLEAR.

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

003574                                  2$:
```

```
                                        ;/*
                                ;;**********************************************************************
                                ;*TEST 14        *TEST THAT CLOCK A STATUS REGISTER BIT 0 CAN BE SET AND CLEARED
                                ;*
                                ;*CLOCK STATUS REGISTER BIT EXERCISE. ON FAILURE-SUSPECT INDIVIDUAL
                                ;*F/FS OR GATES
                                ;*

                                ;;**********************************************************************
003574  000004                  TST14:  SCOPE
003576  012737  000100  001160          MOV     #100,$TIMES     ;;DO 100 ITERATIONS

003604  005077  175566          CLR     @ASR            ;/CLEAR THE STATUS REGISTER.
003610  052777  000001  175560  BIS     #BIT0,@ASR      ;/SET BIT 0.
003616  012737  000001  001124  MOV     #BIT0,$GDDAT    ;/SET FOR ERROR TYPEOUT S/B.
003624  017737  175546  001126  MOV     @ASR,$BDDAT     ;/READ THE STATUS REGISTER.
003632  023737  001124  001126  CMP     $GDDAT,$BDDAT   ;/DID BIT 0 AND ONLY BIT 0 SET?
003640  001402                  BEQ     1$              ;/IF SO-LETS TRY CLEARING IT.

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

003642  104002                          ERROR   2               ;/ERROR CLOCK AS STATUS REGISTER
                                                                ;/BIT 0 FAILED TO BIT SET.

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

003644  000412                          BR      2$              ;/BR TO END SUBTEST.

003646  042777  000001  175522  1$:     BIC     #BIT0,@ASR      ;/TRY CLEARING BIT 0.
003654  005037  001124                  CLR     $GDDAT          ;/CLEAR S/B FOR TYPEOUT IF ANY.
003660  017737  175512  001126          MOV     @ASR,$BDDAT     ;/NOW READ IT BACK.
003666  001401                  BEQ     2$              ;/IF ZERO - NO ERROR!

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

003670  104002                          ERROR   2               ;/ERROR - CLOCK A STATUS REGISTER.
                                                                ;/BIT 0 FAILED TO CLEAR.

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

003672                          2$:

                                        .RADIX  8


                                ;;**********************************************************************
                                ;*TEST 15        *TEST THAT PATERN 125252 WILL SET AND CLEAR IN BUFFER REG.
                                ;;**********************************************************************
003672  000004                  TST15:  SCOPE

003674  005077  175500          CLR     @ABR            ;/CLEAR THE BUFFER REG.
003700  012737  125252  001124  MOV     #125252,$GDDAT  ;/RECORD PATTERN: 125252
```

```
1734  003706  013777  001124  175464          MOV     $GDDAT,@ABR     ;/SET PATTERN IN BUFFER REG.
1735  003714  017737  175460  001126          MOV     @ABR,$BDDAT     ;/READ THE BUFFER REG.
1736
1737  003722  023737  001124  001126          CMP     $GDDAT,$BDDAT   ;/DID THE PATTERN SET OK?
1738  003730  001402                          BEQ     1$              ;/YES-TRY CLEARING IT.
1739
1740

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

1743  003732  104003                          ERROR   3               ;/ERROR PATTERN 125252 FAILED TO
1744                                                                  ;/SET PROPERLY IN BUFFER REG.
1745

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

1748  003734  000412                          BR      2$              ;/GOTO SCOPE LOOP.
1749
1750  003736  042777  125252  175434  1$:     BIC     #125252,@ABR    ;/TRY CLEARING PATTERN.
1751  003744  005037  001124                  CLR     $GDDAT          ;/EXPECT ZERO BACK.
1752  003750  017737  175424  001126          MOV     @ABR,$BDDAT     ;/READ BUFFER REG.,WAS IT ZERO?
1753  003756  001401                          BEQ     2$              ;/YES-NEXT TEST.
1754
1755

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

1758  003760  104003                          ERROR   3               ;/BUFFER REG. COULD NOT BE LOADED
1759                                                                  ;/TO A ZERO.
1760

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

1763  003762                           2$:
1764
1765
1766                                    ;;=====================================================================
1767                                    ;*TEST 16       *TEST THAT PATERN 052525 WILL SET AND CLEAR IN BUFFER REG.
1768                                    ;;=====================================================================
1769  003762  000004                    TST16:  SCOPE
1770
1771  003764  005077  175410                  CLR     @ABR            ;/CLEAR THE BUFFER REG.
1772  003770  012737  052525  001124          MOV     #052525,$GDDAT  ;/RECORD PATTERN: 052525
1773  003776  013777  001124  175374          MOV     $GDDAT,@ABR     ;/SET PATTERN IN BUFFER REG.
1774  004004  017737  175370  001126          MOV     @ABR,$BDDAT     ;/READ THE BUFFER REG.
1775
1776  004012  023737  001124  001126          CMP     $GDDAT,$BDDAT   ;/DID THE PATTERN SET OK?
1777  004020  001402                          BEQ     1$              ;/YES-TRY CLEARING IT.
1778
1779

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

1782  004022  104003                          ERROR   3               ;/ERROR PATTERN 052525 FAILED TO
1783                                                                  ;/SET PROPERLY IN BUFFER REG.
1784

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

1787  004024  000412                          BR      2$              ;/GOTO SCOPE LOOP.
```

```
1788
1789  004026  042777  052525  175344  1$:     BIC     #052525,@ABR    ;/TRY CLEARING PATTERN.
1790  004034  005037  001124                  CLR     $GDDAT          ;/EXPECT ZERO BACK.
1791  004040  017737  175334  001126          MOV     @ABR,$BDDAT     ;/READ BUFFER REG.,WAS IT ZERO?
1792  004046  001401                          BEQ     2$              ;/YES-NEXT TEST.
1793
1794
                                        ;;$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$

1797  004050  104003                          ERROR   3               ;/BUFFER REG. COULD NOT BE LOADED
1798                                                                  ;/TO A ZERO.
1799
                                        ;;$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$

1802  004052                           2$:
1803
1804
1805
1806                                            .SBTTL  *
1807                                            .SBTTL  * PHASE 2 ADVANCED BASIC LOGIC TESTS
1808                                            .SBTTL  *
1809
1810
1811                                    ;;**************************************************************
1812                                    ;*TEST 17        *TEST THE LOW BYTE OPERATION OF CLOCK'S STATUS REGISTER
1813
1814                                    ;*
1815                                    ;*WE CAN SUCCESSFULLY WRITE EVERY BIT IN STATUS REG A
1816                                    ;*NOW LETS CHECK THE BYTE OPERATION OF THIS REGISTER.
1817                                    ;*
1818
1819                                    ;;**************************************************************
1820  004052  000004                   TST17:  SCOPE
1821  004054  012737  000050  001160            MOV     #50,$TIMES      ;;DO 50 ITERATIONS
1822
1823  004062  005077  175310                    CLR     @ASR            ;MAKE SURE THE STATUS REGISTER IS CLEAR.
1824  004066  112777  127677  175302            MOVB    #127677,@ASR    ;TRY WRITING ALL BITS IN THE
1825                                                                    ;STATUS REGISTER. LOGIC SHOULD PREVENT IT
1826                                                                    ;FROM BEING WRITTEN INTO BECAUSE
1827                                                                    ;WE ARE USING A DATOB INSTRUCTION.
1828
1829  004074  017777  175276  175024            MOV     @ASR,@$BDDAT    ;NOW EXAMINE THE
1830                                                                    ;STATUS REGISTER.
1831  004102  013737  001126  001124            MOV     $BDDAT,$GDDAT   ;FIX $GDDAT FOR ERROR TYPEOUT IF
1832  004110  105037  001125                    CLRB    $GDDAT+1        ;ANY RROR HAS OCCURRED, UPPER BYTE CLEARED.
1833
1834  004114  105737  001127                    TSTB    $BDDAT+1        ;ARE ANY BITS IN THE UPPER BYTE
1835                                                                    ;OF THE STATUS REGISTER SET?
1836  004120  001401                          BEQ     1$              ;BRANCH NEXT TEST IF UPPER BYTE=0.
1837
1838
                                        ;;$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$

1841  004122  104001                          ERROR   1               ;ERROR - WROTE INTO UPPER BYTE OF
```

```
                                                        ;CLOCK'S STATUS WHEN
                                                        ;DOING A DATOB TO THE LOW BYTE.


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

004124                          1$:

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

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

                                ;;*********************************************************************
004124  000004                  TST20:  SCOPE
004126  012737  000050  001160          MOV     #50,$TIMES      ;;DO 50 ITERATIONS

004134  005077  175236                  CLR     @ASR            ;CLEAR THE STATUS REGISTER.

004140  005237  001376                  INC     ASR             ;ADD #1 TO THE STATUS REGISTER'S ADDRESS
                                                                ;SO THAT WE WILL BE WRITING INTO
                                                                ;THE HIGH BYTE.

004144  112777  177313  175224          MOVB    #177313,@ASR    ;TRY WRITING ALL BITS IN THE STATUS
                                                                ;REGISTER. LOGIC SHOULD PREVENT THE LOW
                                                                ;BYTE OF THE STATUS REGISTER FROM
                                                                ;BEING WRITTEN INTO BECAUSE WE ARE USING
                                                                ;A DATOB INSTRUCTION WITH ADD SET.

004152  005337  001376                  DEC     ASR             ;FIX ADDRESS OF THE STATUS REGISTER ADDR.
                                                                ;SO WE CAN LOOK AT THE WHOLE WORD.
004156  017737  175214  001126          MOV     @ASR,$BDDAT     ;READ BACK WHAT THE STATUS REG. CONTAINS
004164  013737  001126  001124          MOV     $BDDAT,$GDDAT   ;FIX $GDDAT FOR ERROR TYPEOUT IF AN ERROR
004172  105037  001124                  CLRB    $GDDAT          ;OCCURRED, LOWER BYTE CLEARED.
004176  105737  001126                  TSTB    $BDDAT          ;IS LOWER BYTE CLEAR?
004202  001401                          BEQ     1$              ;BR IF YES TO NEXT SUBTEST.


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

004204  104001                          ERROR   1               ;ERROR - WROTE INTO LOWER BYTE
                                                                ;OF CLOCKS STATUS REGISTER WHEN
                                                                ;DOING A DATOB TO THE HIGH BYTE.


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

004206                          1$:

                                ;;*********************************************************************
                                ;*TEST 21        *TEST CLOCK'S COUNT REGISTER WITH 125252 PATTERN
                                ;;*********************************************************************
```

```
1896  004206  000004                    TST21:  SCOPE
1897  004210  012737  000100  001160            MOV     #100,$TIMES     ;;DO 100 ITERATIONS
1898
1899  004216  005077  175154                    CLR     @ASR            ;SELECT MODE 0.
1900  004222  012777  125252  175150            MOV     #125252,@ABR    ;LOAD THE BUFFER REGISTER WITH
1901                                                                    ;PATTERN 125252. IT WILL BE
1902                                                                    ;TRANSFERRED TO THE COUNT REGISTER
1903                                                                    ;SINCE THIS IS MODE 0.
1904  004230  052777  000001  175140            BIS     #BIT0,@ASR      ;SET GO BIT(ALLOWS BUFFER-COUNT REG XFER).
1905
1906  004236  012737  125252  001124            MOV     #125252,$GDDAT  ;SET EXPECTED TO PATTERN IN CASE OF
1907                                                                    ;NEED OF ERROR TYPEOUT.
1908  004244  017746  175126                    MOV     @ASR,-(6)       ;/SAVE CSR
1909  004250  011637  001424                    MOV     (6),$TMP3       ;/GET CSR.
1910  004254  042737  177707  001424            BIC     #177707,$TMP3   ;/SAVE RATE BITS.
1911  004262  052737  004005  001424            BIS     #BIT11!BIT2!BIT0,$TMP3  ;/SET MODE 2, NO RATE,DISABLE INTERNAL OSC
1912  004270  013777  001424  175100            MOV     $TMP3,@ASR              ;/LOAD CSR.
1913                                                                    ;/THIS MUST BE DONE IN
1914                                                                    ;/ORDER TO XFERR COUNTER
1915                                                                    ;/TO BUFFER ON ST2.
1916  004276  052777  001000  175072            BIS     #BIT9,@ASR      ;/GENERATE ON ST2 PULSE
1917  004304  017737  175070  001126            MOV     @ABR,$BDDAT     ;/READ THE PRESET BUFFER,
1918                                                                    ;/PREVIOUS COUNTER
1919  004312  012677  175060                    MOV     (6)+,@ASR       ;/CONTENTS ARE IN $BDDAT.
1920  004316  005737  001126                    TST     $BDDAT          ;/RESTORE CSR
1921
1922  004322  023737  001124  001126            CMP     $GDDAT,$BDDAT   ;DID ALL THE BITS AND NO OTHER BITS
1923                                                                    ;COME THROUGH?
1924  004330  001401                            BEQ     1$              ;BR IF YES TO NEXT TEST.
1925
1926
                                              ;;$$$$$$$$$$$$$$$$$$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$

1929  004332  104005                                ERROR   5               ;DATA ERROR CLOCK - PATTERN "125252"
1930                                                                    ;FAILED TO TRANSFER PROPERLY BETWEEN
1931                                                                    ;BUFFER AND COUNT REGISTERS.
1932
1933
                                              ;;$$$$$$$$$$$$$$$$$$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$

1936  004334                                  1$:
1937
1938                                          ;;**********************************************************************
1939                                          ;*TEST 22       *TEST CLOCKS COUNTER REGISTER WITH 052525 PATTERN
1940                                          ;;**********************************************************************
1941  004334  000004                    ;ST22:  SCOPE
1942  004336  012737  000050  001160            MOV     #50,$TIMES      ;;DO 50 ITERATIONS
1943
1944  004344  005077  175026                    CLR     @ASR            ;SELECT MODE 0.
1945  004350  012777  052525  175022            MOV     #052525,@ABR    ;LOAD THE BUFFER REGISTER WITH
1946                                                                    ;PATTERN 052525. IT WILL BE
1947                                                                    ;TRANSFERRED TO THE COUNT REGISTER
1948                                                                    ;SINCE THIS IS MODE 0.
1949  004356  052777  000001  175012            BIS     #BIT0,@ASR      ;SET BO BIT(ALLOWS BUFFER-COUNT REG XFER).
```

```

004364  012737  052525  001124          MOV     #052525,$GDDAT  ;SET EXPECTED TO PATTERN IN CASE OF
                                                                ;NEED OF ERROR TYPEOUT.
004372  017746  175000                  MOV     @ASR,-(6)       ;/SAVE CSR
004376  011637  001424                  MOV     (6),$TMP3       ;/GET CSR.
004402  042737  177707  001424          BIC     #177707,$TMP3   ;/SAVE RATE BITS.
004410  052737  004005  001424          BIS     #BIT11!BIT2!BIT0,$TMP3  ;/SET MODE 2, NO RATE,DISABLE INTERNAL OSC
004416  013777  001424  174752          MOV     $TMP3,@ASR              ;/LOAD CSR.
                                                                ;/THIS MUST BE DONE IN
                                                                ;/ORDER TO XFERR COUNTER
                                                                ;/TO BUFFER ON ST2.
004424  052777  001000  174744          BIS     #BIT9,@ASR      ;/GENERATE ON ST2 PULSE
004432  017737  174742  001126          MOV     @ABR,$BDDAT     ;/READ THE PRESET BUFFER,
                                                                ;/PREVIOUS COUNTER
004440  012677  174732                  MOV     (6)+,@ASR       ;/CONTENTS ARE IN $BDDAT.
004444  005737  001126                  TST     $BDDAT          ;/RESTORE CSR

004450  023737  001124  001126          CMP     $GDDAT,$BDDAT   ;DID ALL THE BITS AND NO OTHER BITS
                                                                ;COME THROUGH?
004456  001401                          BEQ     1$              ;BR IF YES TO NEXT TEST.


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

004460  104005                          ERROR   5               ;DATA ERROR CLOCK - PATTERN "052525"
                                                                ;FAILED TO TRANSFER PROPERLY BETWEEN
                                                                ;BUFFER AND COUNT REGISTERS.



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

004462                          1$:



                                ;;*************************************************************
                                ;*TEST 23        *TEST THAT INIT CLEARS STATUS REGISTER
                                ;*
                                ;*TESTING OF THE INIT LOGIC AS RECEIVED FROM THE QBUS AND BUFFERED
                                ;*TO STATUS REGISTER F/FS.
                                ;*
                                ;;*************************************************************
004462  000004                  TST23:  SCOPE
004464  012737  000005  001160          MOV     #5,$TIMES       ;;DO 5 ITERATIONS

004472  005037  001124                  CLR     $GDDAT          ;EXPECTED DATA IS ZERO.
004476  012777  177777  174672          MOV     #177777,@ASR    ;SET ALL BITS IN THE STATUS REG.

004504  000005                          RESET                   ;SYSTEM INITIALIZE.

004506  017737  174664  001126          MOV     @ASR,$BDDAT     ;READ THE STATUS REG., ALL BITS SHOULD
                                                                ;HAVE BEEN CLEARED BY INIT.
004514  001402                          BEQ     1$              ;BR IF YES TO NEXT TEST.


```

```
                                        ;;SSSSSSSSSSSSSSSSSSSSSSS>>> ERROR <<<SSSSSSSSSSSSSSSSSSSSSSSSSSSSSSS

2006
2007  004516  104002                            ERROR   2               ;ERROR - SYSTEM INIT FAILED TO CLEAR
2008                                                                      ;STATUS REGISTER CLOCK A.
2009
2010
                                        ;;SSSSSSSSSSSSSSSSSSSSSSS>>> ERROR <<<SSSSSSSSSSSSSSSSSSSSSSSSSSSSSSS

2013  004520  000413                            BR      TST24           ;;
2014  004522                                1$:
2015  004522  005737  001440                    TST     EXS             ;TEST EXTERNAL SIGS?
2016  004526  001410                            BEQ     TST24           ;;
2017  004530  052777  016000  174660            BIS     #BIT11!BIT12!BIT10,@DR2 ;ENABLE ST1,ST2 TO LATCH.
2018  004536  032777  000006  174650            BIT     #6,@DR          ;ST1,ST2, OVERFLOW SET?
2019  004544  001401                            BEQ     TST24           ;;
2020
                                        ;;SSSSSSSSSSSSSSSSSSSSSSS>>> ERROR <<<SSSSSSSSSSSSSSSSSSSSSSSSSSSSSSS

2023  004546  104006                            ERROR   6               ;INIT FAILED TO CLEAR
2024                                                                    ;ST1,ST2, AND/OR OVERFLOW
2025
                                        ;;SSSSSSSSSSSSSSSSSSSSSSS>>> ERROR <<<SSSSSSSSSSSSSSSSSSSSSSSSSSSSSSS

2028
2029                                    ;;**************************************************************
2030                                    ;*TEST 24       *TEST THAT INIT CLEARS BUFFER REGISTER
2031                                    ;*
2032                                    ;*THIS TEST IS DESIGNED TO SEE IF "INIT H"
2033                                    ;*CLEARS THE BUFFER REGISTER. WE ALREADY
2034                                    ;*KNOW IT CLEARS THE STATUS REG.
2035                                    ;*
2036                                    ;;**************************************************************
2037  004550  000004                    TST24:  SCOPE
2038  004552  012737  000005  001160            MOV     #5,$TIMES       ;;DO 5 ITERATIONS
2039
2040  004560  005037  001124                    CLR     $GDDAT          ;CLEAR EXPECTED DATA.
2041  004564  012777  177777  174606            MOV     #177777,@ABR    ;SET ALL BITS IN THE BUFFER REGISTER.
2042
2043  004572  000005                            RESET                   ;ISSUE SYSTEM INITIALIZE.
2044
2045  004574  017737  174600  001126            MOV     @ABR,$BDDAT     ;READ THE BUFFER REGISTER, ALL BITS
2046                                                                    ;SHOULD HAVE BEEN CLEARED BY INIT.
2047  004602  001401                            BEQ     1$              ;BR IF YES TO NEXT SUBTEST.
2048
2049
                                        ;;SSSSSSSSSSSSSSSSSSSSSSS>>> ERROR <<<SSSSSSSSSSSSSSSSSSSSSSSSSSSSSSS

2052  004604  104003                            ERROR   3               ;ERROR - SYSTEM INIT FAILED
2053                                                                    ;TO CLEAR BUFFER REGISTER A.
2054
2055
                                        ;;SSSSSSSSSSSSSSSSSSSSSSS>>> ERROR <<<SSSSSSSSSSSSSSSSSSSSSSSSSSSSSSS
```

```
2058  004606                          1$:
2059  004606  005737  001440                  TST     EXS             ;TEST EXTERNAL SIGS?
2060  004612  001403                          BEQ     TST25           ;;
2061  004614  052777  016000  174574          BIS     #BIT11!BIT12!BIT10,@DR2 ;ENABLE THEM
2062
2063                                  ;;*****************************************************************
2064                                  ;*TEST 25       *TEST THE SETTING OF MAINTENANCE ST2 IN CLOCK BIT 15 TO SET
2065                                  ;;*****************************************************************
2066  004622  000004                  TST25:  SCOPE
2067
2068  004624  012777  000001  174544          MOV     #1,@ASR         ;SET THE GO BIT(ENABLES ST2 TO SET FLG).
2069  004632  052777  001000  174536          BIS     #BIT9,@ASR      ;SET MAINTENANCE ST2.
2070
2071  004640  005777  174532                  TST     @ASR            ;DID BIT15 (ST2 FLAG) SET?
2072  004644  100402                          BMI     1$              ;BR IF YES - NEXT TEST
2073
2074
                                    ;;$$$$$$$$$$$$$$$$$$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$

2077  004646  104001                          ERROR   1               ;ERROR - MAINTENANCE ST2 (BIT9)
2078                                                                  ;DID NOT SET BIT15 (ST2 FLAG).
2079
2080
                                    ;;$$$$$$$$$$$$$$$$$$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$

2083  004650  000410                          BR      TST26           ;;
2084  004652  005737  001440          1$:     TST     EXS             ;TEST EXTERNAL SIGNALS?
2085  004656  001405                          BEQ     TST26           ;;
2086  004660  032777  000004  174526          BIT     #BIT2,@DR       ;DID EXTERNAL ST2 GET SET?
2087  004666  001001                          BNE     TST26           ;;
2088
                                    ;;$$$$$$$$$$$$$$$$$$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$

2091  004670  104006                          ERROR   6               ;ST2 OUT NOT DETECTED
2092                                                                  ;BY TESTOR
2093
                                    ;;$$$$$$$$$$$$$$$$$$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$

2096
2097
2098                                ;;*****************************************************************
2099                                ;*TEST 26       *TEST THAT BIT00 IN CLOCK STATUS REG. WILL SET WHEN BIT13 AND MAIN. ST2
2100                                ;;*****************************************************************
2101  004672  000004                  TST26:  SCOPE
2102
2103  004674  012777  020000  174474          MOV     #BIT13,@ASR     ;SET "ST2 ENB COUNTER" IN CLK  STATUS REG.
2104  004702  052777  001000  174466          BIS     #BIT9,@ASR      ;GENERATE A MAINTENANCE ST2.
2105  004710  032777  000001  174460          BIT     #BIT00,@ASR     ;DID BIT00 (GO) SET?
2106  004716  001001                          BNE     1$              ;BR IF YES - NEXT TEST.
2107
2108
                                    ;;$$$$$$$$$$$$$$$$$$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$

2111  004720  104001                          ERROR   1               ;ERROR - BIT00 OF CLOCK'S STATUS REGISTER
```

```
                                                                 ;FAILED TO SET WHEN BIT13 WAS SET
                                                                 ;AND A MAINTENANCE ST2 GENERATED.


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

004722  005077  174450            1$:     CLR     @ASR           ;LEAVE SUBTEST WITH CLOCK CLEAR.

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

                                  ;;*************************************************************
                                  ;*TEST 27        *TEST TO SEE IF THE COUNTER WILL INCREMENT
                                  ;;*************************************************************
004726  000004                    TST27:  SCOPE

004730  005077  174442                    CLR     @ASR           ;CLEAR THE CSR.
004734  005077  174440                    CLR     @ABR           ;CLEAR THE BUFFER
004740  052777  000061  174430            BIS     #BIT5!BIT4!BIT0,@ASR ;SET RATE:ST1, GO.
004746  052777  000400  174422            BIS     #BIT8,@ASR     ;GENERATE A MAINTENANCE ST1.
                                                                 ;DID THE CLOCK COUNT?
004754  017746  174416                    MOV     @ASR,-(6)      ;/SAVE CSR
004760  011637  001424                    MOV     (6),$TMP3      ;/GET CSR.
004764  042737  177707  001424            BIC     #177707,$TMP3  ;/SAVE RATE BITS.
004772  052737  004005  001424            BIS     #BIT11!BIT2!BIT0,$TMP3  ;/SET MODE 2, NO RATE,DISABLE INTERNAL OSC
005000  013777  001424  174370            MOV     $TMP3,@ASR              ;/LOAD CSR.
                                                                 ;/THIS MUST BE DONE IN
                                                                 ;/ORDER TO XFERR COUNTER
                                                                 ;/TO BUFFER ON ST2.
005006  052777  001000  174362            BIS     #BIT9,@ASR     ;/GENERATE ON ST2 PULSE
005014  017737  174360  001126            MOV     @ABR,$BDDAT    ;/READ THE PRESET BUFFER,
                                                                 ;/PREVIOUS COUNTER
005022  012677  174350                    MOV     (6)+,@ASR      ;/CONTENTS ARE IN $BDDAT.
005026  005737  001126                    TST     $BDDAT         ;/RESTORE CSR
005032  001001                            BNE     1$             ;YES, NEXT TEST.

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

005034  104006                            ERROR   6              ;CLOCK FAILED TO INCREMENT.


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

005036                            1$:

                                  ;;*************************************************************
                                  ;*TEST 30       *SEE IF CLOCK WILL COUNT UP FROM A ZERO BASE, RATE:ST1
                                  ;*
                                  ;*      NOTE:   IN THIS TEST, LOOP ON ERROR WILL CAUSE A LOOP
                                  ;*              ON THE FAILING COUT PATTERN;
                                  ;*              WHILE LOOP ON TEST WILL START THE TEST
                                  ;*              AND THE CLOCK FROM ZERO TO THE FAILING COUNT.
                                  ;*
```

```
2166                                    ;;*****************************************************************
2167  005036  000004                    TST30:  SCOPE
2168  005040  012737  000010  001160            MOV     #10,$TIMES      ;;DO 10 ITERATIONS
2169
2170  005046  005077  174324            CLR     @ASR            ;CLEAR THE CSR.
2171  005052  005077  174322            CLR     @ABR            ;CLEAR THE BUFFER REG
2172  005056  012737  000000  001124    MOV     #0,$GDDAT       ;CLEAR EXPECTED.
2173  005064  012737  005226  001110    MOV     #2$,$LPERR
2174
2175  005072  052777  000061  174276  1$:     BIS     #BIT5!BIT4!BIT0,@ASR ;START CLOCK, RATE:ST1.
2176
2177  005100  052777  000400  174270    BIS     #BIT8,@ASR      ;GENERATE A MAINTENANCE ST1
2178                                                            ;CLOCK SHOULD COUNT ONCE.
2179  005106  005737  001440            TST     EXS             ;TEST EXTERNAL SIGNALS?
2180  005112  001406                    BEQ     10$             ;NO
2181  005114  032777  000002  174272    BIT     #BIT1,@DR       ;YES - DID ST1 GET SET?
2182  005122  001002                    BNE     10$             ;YES
2183
                                        ;;$$$$$$$$$$$$$$$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$
2186  005124  104006                            ERROR   6               ;ST1 OUT NOT DETECTED
2187                                                                    ;BY TESTOR
2188
                                        ;;$$$$$$$$$$$$$$$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$
2191  005126  000447                    BR      TST31           ;;
2192  005130                          10$:
2193  005130  017746  174242            MOV     @ASR,-(6)       ;/SAVE CSR
2194  005134  011637  001424            MOV     (6),$TMP3       ;/GET CSR.
2195  005140  042737  177707  001424    BIC     #177707,$TMP3   ;/SAVE RATE BITS.
2196  005146  052737  004005  001424    BIS     #BIT11!BIT2!BIT0,$TMP3  ;/SET MODE 2, NO RATE,DISABLE INTERNAL OSC
2197  005154  013777  001424  174214    MOV     $TMP3,@ASR              ;/LOAD CSR.
2198                                                            ;/THIS MUST BE DONE IN
2199                                                            ;/ORDER TO XFERR COUNTER
2200                                                            ;/TO BUFFER ON ST2.
2201  005162  052777  001000  174206    BIS     #BIT9,@ASR      ;/GENERATE ON ST2 PULSE
2202  005170  017737  174204  001126    MOV     @ABR,$BDDAT     ;/READ THE PRESET BUFFER,
2203                                                            ;/PREVIOUS COUNTER
2204  005176  012677  174174            MOV     (6)+,@ASR       ;/CONTENTS ARE IN $BDDAT.
2205  005202  005737  001126            TST     $BDDAT          ;/RESTORE CSR
2206  005206  005237  001124            INC     $GDDAT          ;COUNT=OLD COUNT+1
2207  005212  023737  001124  001126    CMP     $GDDAT,$BDDAT   ;COUNT READ=COUNT EXP'ED?
2208  005220  001402                    BEQ     2$              ;YES - SEE IF WE'RE THROUGH.
2209
                                        ;;$$$$$$$$$$$$$$$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$
2212  005222  104011                            ERROR   11              ;CLOCK FAILED TO COUNT UP PROPERLY.
2213
                                        ;;$$$$$$$$$$$$$$$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$
2216  005224  000410                    BR      3$              ;GOTO SCOPE LOOP.
2217
2218  005226  005077  174144          2$:     CLR     @ASR
2219  005232  013777  001124  174140        MOV     $GDDAT,@ABR
```

```
2220  005240  005737  001124              TST     $GDDAT          ;ALL DONE?
2221  005244  001312                      BNE     1$              ;NO DO NEXT INCREMENT.
2222  005246                      3$:
2223
2224                              ;;**********************************************************************
2225                              ;*TEST 31       *TEST THAT OVERFLOW (CSR BIT07) WILL SET ON OVERFLOW
2226                              ;;**********************************************************************
2227  005246  000004              TST31:  SCOPE
2228
2229  005250  005737  001440              TST     EXS             ;TESTOR MODE ENABLED??
2230  005254  001411                      BEQ     2$              ;NO-THEN SKIP NEXT SECTION OF CODE.
2231
2232  005256  005037  170500              CLR     @#170500        ;CLEAR TESTOR A/D
2233  005262  005737  170502              TST     @#170502        ;DUMB READ OF A/D BUFFER.
2234  005266  052737  000040  170500      BIS     #BIT5,@#170500  ;ENABLE EXTRENAL START OF A/D.
2235  005274  012700  000010              MOV     #8.,R0          ;SET TIME OUT NUMBER.
2236  005300                      2$:
2237  005300  005077  174072              CLR     @ASR            ;CLEAR THE CSR
2238  005304  012777  177777  174066      MOV     #-1,@ABR        ;SET PRESET BUFFER TO ALL ONES.
2239
2240  005312  052777  000061  174056      BIS     #BIT5!BIT4!BIT0,@ASR ;START CLOCK, RATE ST1.
2241
2242  005320  052777  000400  174050      BIS     #BIT8,@ASR      ;COUNT CLOCK ONCE, OVERFLOW
2243                                                              ;SHOULD OCCUR.
2244  005326  105777  174044              TSTB    @ASR            ;DID OVERFLOW SET?
2245  005332  100402                      BMI     1$              ;YES - THEN NEXT TEST
2246
2247
                                ;;$$$$$$$$$$$$$$$$$$$$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$

2250  005334  104006                      ERROR   6               ;ERROR - OVERFLOW, CSR BIT0?
2251                                                              ;FAILED TO SET ON OVERFLOW
2252  005336  000411                      BR      TST32           ;;
2253  005340  005737  001440      1$:     TST     EXS             ;TEST EXTERNAL SIGNALS?
2254  005344  001406                      BEQ     TST32           ;;
2255  005346  105737  170500              TSTB    @#170500        ;IF  OVERFLOW GOT OUT,IT GAVE A/D START,
2256                                                              ;WE'RE LOOKING FOR A/D DONE-DID IT GET SET?
2257  005352  100403                      BMI     TST32           ;;
2258  005354  005300                      DEC     R0              ;DID WE ALLOW ENOUGH TIME??
2259  005356  001370                      BNE     1$              ;NO-THEN WAIT.
2260
                                ;;$$$$$$$$$$$$$$$$$$$$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$

2263  005360  104006                      ERROR   6               ;OVERFLOW OUT NOT DETECTED
2264                                                              ;BY TESTOR
2265
                                ;;$$$$$$$$$$$$$$$$$$$$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$

2268
2269
2270                            ;;**********************************************************************
2271                            ;*TEST 32       *TEST THAT OVERFLOW WILL CLEAR THE GO BIT
2272                            ;;**********************************************************************
2273  005362  000004            TST32:  SCOPE
```

```
2274
2275  005364  005077  174006              CLR     @ASR            ;CLEAR THE CSR.
2276
2277  005370  012777  177777  174002      MOV     #-1,@ABR        ;PRESET CLOCK TO -1.
2278
2279  005376  052777  000061  173772      BIS     #BIT5!BIT4!BIT0,@ASR ;START CLOCK, RATE:ST1
2280
2281  005404  052777  000400  173764      BIS     #BIT8,@ASR      ;COUNT ONCE, OVERFLOW
2282                                                              ;SHOULD OCCUR CLEARING
2283                                                              ;ENABLE (CSR BIT00)
2284
2285  005412  032777  000001  173756      BIT     #BIT0,@ASR      ;DID THE ENABLE CLEAR?
2286  005420  001401                      BEQ     1$              ;YES - NEXT TEST.
2287
2288

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

2291  005422  104006                      ERROR   6               ;ERROR - OVERFLOW FAILED
2292                                                              ;TO CLEAR ENABLE (CSR BIT00)
2293
2294  005424                          1$:
2295
2296                                  ;;*****************************************************************
2297                                  ;*TEST 33       *TEST THAT GO BIT DOES NOT CLEAR ON OVERFLOW, IF MODE 1
2298                                  ;;*****************************************************************
2299  005424  000004                  TST33:  SCOPE
2300
2301  005426  005077  173744              CLR     @ASR            ;CLEAR THE CSR.
2302  005432  012777  177777  173740      MOV     #-1,@ABR        ;PRESET BUFFER=ONE COUNT FROM OVERFLOW.
2303  005440  052777  000063  173730      BIS     #63,@ASR        ;MODE 1, RATE:ST1, GO.
2304
2305  005446  052777  000400  173722      BIS     #BIT8,@ASR      ;GENERATE MAINTENANCE ST1.
2306
2307  005454  032777  000001  173714      BIT     #BIT0,@ASR      ;DID ENABLE (GO BIT) CLEAR?
2308  005462  001001                      BNE     1$              ;NO (GOOD) NEXT TEST.
2309

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

2312  005464  104006                      ERROR   6               ;GO BIT CLEARED ON OVERFLOW
2313                                                              ;WHEN MODE 1 WAS SELECTED
2314

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

2317
2318  005466  005077  173704          1$:     CLR     @ASR            ;CLEAR THE CLOCK.
2319
2320
2321
2322
2323                                  ;;*****************************************************************
2324                                  ;*TEST 34       *TEST THE ABILITY OF CLOCK TO COUNT AT 1MHZ RATE
2325
2326                                  ;*
2327                                  ;*THIS TEST IS DESIGNED TO TEST THE CLOCK'S ABILITY
```

```
                                        ;*TO COUNT AT 1MHZ RATE.
                                        ;*
                                        ;;*****************************************************************
005472  000004                  TST34:  SCOPE
005474  012737  000005  001160          MOV     #5,$TIMES       ;;DO 5 ITERATIONS

005502  005077  173670          CLR     @ASR            ;/CLEAR CLOCK
005506  005077  173666          CLR     @ABR            ;/CLEAR PRESET BUFFER
005512  012777  000011  173656  MOV     #BIT0!10,@ASR   ;/START CLOCK, MODE0, RATE:1MHZ
005520  005000                  CLR     R0              ;/NOW WE'LL DO A LITTLE DELAY. THIS DELAY

005522  005200          1$:     INC     R0              ;/WILL AMOUNT TO APPROXIMATELY
005524  001376                  BNE     1$              ;/369 MS.

005526  017746  173644          MOV     @ASR,-(6)       ;/SAVE CSR
005532  011637  001424          MOV     (6),$TMP3       ;/GET CSR.
005536  042737  177707  001424  BIC     #177707,$TMP3   ;/SAVE RATE BITS.
005544  052737  004005  001424  BIS     #BIT11!BIT2!BIT0,$TMP3  ;/SET MODE 2, NO RATE,DISABLE INTERNAL OSC
005552  013777  001424  173616  MOV     $TMP3,@ASR              ;/LOAD CSR.
                                                        ;/THIS MUST BE DONE IN
                                                        ;/ORDER TO XFERR COUNTER
                                                        ;/TO BUFFER ON ST2.
005560  052777  001000  173610  BIS     #BIT9,@ASR      ;/GENERATE ON ST2 PULSE
005566  017737  173606  001126  MOV     @ABR,$BDDAT     ;/READ THE PRESET BUFFER,
                                                        ;/PREVIOUS COUNTER
005574  012677  173576          MOV     (6)+,@ASR       ;/CONTENTS ARE IN $BDDAT.
005600  005737  001126          TST     $BDDAT          ;/RESTORE CSR
005604  001004                  BNE     2$              ;/YES - NEXT TEST.
005606  105766  177776          TSTB    -2(6)           ;/AT HIGH RATE MAY HAVE HAD OVERFLOW
                                                        ;/NOTE: CSR HAD BEEN PUT ON STACK.
005612  100401                  BMI     2$              ;/NEXT TEST IF OVERFLOW.

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

005614  104006                  ERROR   6               ;/CLOCK FAILED TO COUNT AT
                                                        ;/RATE:1MHZ

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


005616  005077  173554  2$:     CLR     @ASR            ;/CLEAR THE CLOCK.


                                        ;;*****************************************************************
                                        ;*TEST 35        *TEST THE ABILITY OF CLOCK TO COUNT AT 100KHZ RATE

                                        ;*
                                        ;*THIS TEST IS DESIGNED TO TEST THE CLOCK'S ABILITY
                                        ;*TO COUNT AT 100KHZ RATE.
                                        ;*
                                        ;;*****************************************************************
```

```
2382  005622  000004                    TST35:  SCOPE
2383  005624  012737  000005  001160            MOV     #5,$TIMES       ;;DO 5 ITERATIONS
2384
2385
2386  005632  005077  173540            CLR     @ASR            ;/CLEAR CLOCK
2387  005636  005077  173536            CLR     @ABR            ;/CLEAR PRESET BUFFER
2388  005642  012777  000021  173526    MOV     #BIT0!20,@ASR   ;/START CLOCK, MODE0, RATE:100KHZ
2389  005650  005000                    CLR     R0              ;/NOW WE'LL DO A LITTLE DELAY. THIS DELAY
2390
2391  005652  005200                1$: INC     R0              ;/WILL AMOUNT TO APPROXIMATELY
2392  005654  001376                    BNE     1$              ;/369 MS.
2393
2394  005656  017746  173514            MOV     @ASR,-(6)       ;/SAVE CSR
2395  005662  011637  001424            MOV     (6),$TMP3       ;/GET CSR.
2396  005666  042737  177707  001424    BIC     #177707,$TMP3   ;/SAVE RATE BITS.
2397  005674  052737  004005  001424    BIS     #BIT11!BIT2!BIT0,$TMP3  ;/SET MODE 2, NO RATE,DISABLE INTERNAL OSC
2398  005702  013777  001424  173466    MOV     $TMP3,@ASR              ;/LOAD CSR.
2399                                                    ;/THIS MUST BE DONE IN
2400                                                    ;/ORDER TO XFERR COUNTER
2401                                                    ;/TO BUFFER ON ST2.
2402  005710  052777  001000  173460    BIS     #BIT9,@ASR      ;/GENERATE ON ST2 PULSE
2403  005716  017737  173456  001126    MOV     @ABR,$BDDAT     ;/READ THE PRESET BUFFER,
2404                                                    ;/PREVIOUS COUNTER
2405  005724  012677  173446            MOV     (6)+,@ASR       ;/CONTENTS ARE IN $BDDAT.
2406  005730  005737  001126            TST     $BDDAT          ;/RESTORE CSR
2407  005734  001004                    BNE     2$              ;/YES - NEXT TEST.
2408  005736  105766  177776            TSTB    -2(6)           ;/AT HIGH RATE MAY HAVE HAD OVERFLOW
2409                                                    ;/NOTE: CSR HAD BEEN PUT ON STACK.
2410  005742  100401                    BMI     2$              ;/NEXT TEST IF OVERFLOW.
2411
2412

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

2415  005744  104006                            ERROR   6               ;/CLOCK FAILED TO COUNT AT
2416                                                    ;/RATE:100KHZ
2417

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

2420
2421  005746  005077  173424        2$: CLR     @ASR            ;/CLEAR THE CLOCK.
2422
2423
2424
2425                                    ;;*****************************************************************
2426                                    ;*TEST 36       *TEST THE ABILITY OF CLOCK TO COUNT AT 10KHZ RATE
2427
2428                                    ;*
2429                                    ;*THIS TEST IS DESIGNED TO TEST THE CLOCK'S ABILITY
2430                                    ;*TO COUNT AT 10KHZ RATE.
2431                                    ;*
2432                                    ;*****************************************************************
2433  005752  000004                    TST36:  SCOPE
2434  005754  012737  000005  001160            MOV     #5,$TIMES       ;;DO 5 ITERATIONS
2435
```

```

005762  005077  173410                    CLR     @ASR              ;/CLEAR CLOCK
005766  005077  173406                    CLR     @ABR              ;/CLEAR PRESET BUFFER
005772  012777  000031  173376            MOV     #BIT0!30,@ASR     ;/START CLOCK, MODE0, RATE:10KHZ
006000  005000                            CLR     R0                ;/NOW WE'LL DO A LITTLE DELAY. THIS DELAY

006002  005200                    1$:     INC     R0                ;/WILL AMOUNT TO APPROXIMATELY
006004  001376                            BNE     1$                ;/369 MS.

006006  017746  173364                    MOV     @ASR,-(6)         ;/SAVE CSR
006012  011637  001424                    MOV     (6),$TMP3         ;/GET CSR.
006016  042737  177707  001424            BIC     #177707,$TMP3     ;/SAVE RATE BITS.
006024  052737  004005  001424            BIS     #BIT11!BIT2!BIT0,$TMP3   ;/SET MODE 2, NO RATE,DISABLE INTERNAL OSC
006032  013777  001424  173336            MOV     $TMP3,@ASR               ;/LOAD CSR.
                                                                    ;/THIS MUST BE DONE IN
                                                                    ;/ORDER TO XFERR COUNTER
                                                                    ;/TO BUFFER ON ST2.
006040  052777  001000  173330            BIS     #BIT9,@ASR        ;/GENERATE ON ST2 PULSE
006046  017737  173326  001126            MOV     @ABR,$BDDAT       ;/READ THE PRESET BUFFER,
                                                                    ;/PREVIOUS COUNTER
006054  012677  173316                    MOV     (6)+,@ASR         ;/CONTENTS ARE IN $BDDAT.
006060  005737  001126                    TST     $BDDAT            ;/RESTORE CSR
006064  001004                            BNE     2$                ;/YES - NEXT TEST.
006066  105766  177776                    TSTB    -2(6)             ;/AT HIGH RATE MAY HAVE HAD OVERFLOW
                                                                    ;/NOTE: CSR HAD BEEN PUT ON STACK.
006072  100401                            BMI     2$                ;/NEXT TEST IF OVERFLOW.


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

006074  104006                            ERROR   6                 ;/CLOCK FAILED TO COUNT AT
                                                                    ;/RATE:10KHZ

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

006076  005077  173274            2$:     CLR     @ASR              ;/CLEAR THE CLOCK.




                                  ;;**************************************************************
                                  ;*TEST 37       *TEST THE ABILITY OF CLOCK TO COUNT AT 1KHZ RATE

                                  ;*
                                  ;*THIS TEST IS DESIGNED TO TEST THE CLOCK'S ABILITY
                                  ;*TO COUNT AT 1KHZ RATE.
                                  ;*
                                  ;;**************************************************************
006102  000004                    TST37:  SCOPE
006104  012737  000005  001160            MOV     #5,$TIMES         ;;DO 5 ITERATIONS

006112  005077  173260                    CLR     @ASR              ;/CLEAR CLOCK
006116  005077  173256                    CLR     @ABR              ;/CLEAR PRESET BUFFER
```

```
2490  006122  012777  000041  173246          MOV     #BIT0!40,@ASR   ;/START CLOCK, MODE0, RATE:1KHZ
2491  006130  005000                          CLR     R0              ;/NOW WE'LL DO A LITTLE DELAY. THIS DELAY
2492
2493  006132  005200                  1$:     INC     R0              ;/WILL AMOUNT TO APPROXIMATELY
2494  006134  001376                          BNE     1$              ;/369 MS.
2495
2496  006136  017746  173234                  MOV     @ASR,-(6)       ;/SAVE CSR
2497  006142  011637  001424                  MOV     (6),$TMP3       ;/GET CSR.
2498  006146  042737  177707  001424          BIC     #177707,$TMP3   ;/SAVE RATE BITS.
2499  006154  052737  004005  001424          BIS     #BIT11!BIT2!BIT0,$TMP3  ;/SET MODE 2, NO RATE,DISABLE INTERNAL OSC
2500  006162  013777  001424  173206          MOV     $TMP3,@ASR              ;/LOAD CSR.
2501                                                                  ;/THIS MUST BE DONE IN
2502                                                                  ;/ORDER TO XFERR COUNTER
2503                                                                  ;/TO BUFFER ON ST2.
2504  006170  052777  001000  173200          BIS     #BIT9,@ASR      ;/GENERATE ON ST2 PULSE
2505  006176  017737  173176  001126          MOV     @ABR,$BDDAT     ;/READ THE PRESET BUFFER,
2506                                                                  ;/PREVIOUS COUNTER
2507  006204  012677  173166                  MOV     (6)+,@ASR       ;/CONTENTS ARE IN $BDDAT.
2508  006210  005737  001126                  TST     $BDDAT          ;/RESTORE CSR
2509  006214  001004                          BNE     2$              ;/YES - NEXT TEST.
2510  006216  105766  177776                  TSTB    -2(6)           ;/AT HIGH RATE MAY HAVE HAD OVERFLOW
2511                                                                  ;/NOTE: CSR HAD BEEN PUT ON STACK.
2512  006222  100401                          BMI     2$              ;/NEXT TEST IF OVERFLOW.
2513
2514

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

2517  006224  104006                          ERROR   6               ;/CLOCK FAILED TO COUNT AT
2518                                                                  ;/RATE:1KHZ
2519

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

2522
2523  006226  005077  173144          2$:     CLR     @ASR            ;/CLEAR THE CLOCK.
2524
2525
2526
2527                                ;;**********************************************************************
2528                                ;*TEST 40        *TEST THE ABILITY OF CLOCK TO COUNT AT 100HZ RATE
2529
2530                                ;*
2531                                ;*THIS TEST IS DESIGNED TO TEST THE CLOCK'S ABILITY
2532                                ;*TO COUNT AT 100HZ RATE.
2533                                ;*
2534                                ;;**********************************************************************
2535  006232  000004                TST40:  SCOPE
2536  006234  012737  000005  001160          MOV     #5,$TIMES       ;;DO 5 ITERATIONS
2537
2538
2539  006242  005077  173130                  CLR     @ASR            ;/CLEAR CLOCK
2540  006246  005077  173126                  CLR     @ABR            ;/CLEAR PRESET BUFFER
2541  006252  012777  000051  173116          MOV     #BIT0!50,@ASR   ;/START CLOCK, MODE0, RATE:100HZ
2542  006260  005000                          CLR     R0              ;/NOW WE'LL DO A LITTLE DELAY. THIS DELAY
2543
```

```
2544  006262  005200                  1$:     INC     R0              ;/WILL AMOUNT TO APPROXIMATELY
2545  006264  001376                          BNE     1$              ;/369 MS.
2546
2547  006266  017746  173104                  MOV     @ASR,-(6)       ;/SAVE CSR
2548  006272  011637  001424                  MOV     (6),$TMP3       ;/GET CSR.
2549  006276  042737  177707  001424          BIC     #177707,$TMP3   ;/SAVE RATE BITS.
2550  006304  052737  004005  001424          BIS     #BIT11!BIT2!BIT0,$TMP3  ;/SET MODE 2, NO RATE,DISABLE INTERNAL OSC
2551  006312  013777  001424  173056          MOV     $TMP3,@ASR              ;/LOAD CSR.
2552                                                                  ;/THIS MUST BE DONE IN
2553                                                                  ;/ORDER TO XFERR COUNTER
2554                                                                  ;/TO BUFFER ON ST2.
2555  006320  052777  001000  173050          BIS     #BIT9,@ASR      ;/GENERATE ON ST2 PULSE
2556  006326  017737  173046  001126          MOV     @ABR,$BDDAT     ;/READ THE PRESET BUFFER,
2557                                                                  ;/PREVIOUS COUNTER
2558  006334  012677  173036                  MOV     (6)+,@ASR       ;/CONTENTS ARE IN $BDDAT.
2559  006340  005737  001126                  TST     $BDDAT          ;/RESTORE CSR
2560  006344  001004                          BNE     2$              ;/YES - NEXT TEST.
2561  006346  105766  177776                  TSTB    -2(6)           ;/AT HIGH RATE MAY HAVE HAD OVERFLOW
2562                                                                  ;/NOTE: CSR HAD BEEN PUT ON STACK.
2563  006352  100401                          BMI     2$              ;/NEXT TEST IF OVERFLOW.
2564
2565

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

2568  006354  104006                          ERROR   6               ;/CLOCK FAILED TO COUNT AT
2569                                                                  ;/RATE:100HZ
2570

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

2573
2574  006356  005077  173014          2$:     CLR     @ASR            ;/CLEAR THE CLOCK.
2575
2576
2577
2578                                  ;;**********************************************************************
2579                                  ;*TEST 41        *TEST THE ABILITY OF CLOCK TO COUNT AT LINEFREQ RATE
2580
2581                                  ;*
2582                                  ;*THIS TEST IS DESIGNED TO TEST THE CLOCK'S ABILITY
2583                                  ;*TO COUNT AT LINEFREQ RATE.
2584                                  ;*
2585                                  ;**********************************************************************
2586  006362  000004                  TST41:  SCOPE
2587  006364  012737  000005  001160          MOV     #5,$TIMES       ;;DO 5 ITERATIONS
2588
2589  006372  032777  010000  172540          BIT     #BIT12,@SWR     ;SHALL WE TEST
2590                                                                  ;LINE FREQ?
2591                                                                  ;SW12=1
2592  006400  001450                          BEQ     TST42           ;;
2593
2594  006402  005077  172770                  CLR     @ASR            ;/CLEAR CLOCK
2595  006406  005077  172766                  CLR     @ABR            ;/CLEAR PRESET BUFFER
2596  006412  012777  000071  172756          MOV     #BIT0!70,@ASR   ;/START CLOCK, MODE0, RATE:LINEFREQ
2597  006420  005000                          CLR     R0              ;/NOW WE'LL DO A LITTLE DELAY. THIS DELAY
```

```
2598
2599  006422  005200                    1$:     INC     R0              ;/WILL AMOUNT TO APPROXIMATELY
2600  006424  001376                            BNE     1$              ;/369 MS.
2601
2602  006426  017746  172744                     MOV     @ASR,-(6)       ;/SAVE CSR
2603  006432  011637  001424                     MOV     (6),$TMP3       ;/GET CSR.
2604  006436  042737  177707  001424            BIC     #177707,$TMP3   ;/SAVE RATE BITS.
2605  006444  052737  004005  001424            BIS     #BIT11!BIT2!BIT0,$TMP3  ;/SET MODE 2, NO RATE,DISABLE INTERNAL OSC
2606  006452  013777  001424  172716            MOV     $TMP3,@ASR              ;/LOAD CSR.
2607                                                                    ;/THIS MUST BE DONE IN
2608                                                                    ;/ORDER TO XFERR COUNTER
2609                                                                    ;/TO BUFFER ON ST2.
2610  006460  052777  001000  172710            BIS     #BIT9,@ASR      ;/GENERATE ON ST2 PULSE
2611  006466  017737  172706  001126            MOV     @ABR,$BDDAT     ;/READ THE PRESET BUFFER,
2612                                                                    ;/PREVIOUS COUNTER
2613  006474  012677  172676                     MOV     (6)+,@ASR       ;/CONTENTS ARE IN $BDDAT.
2614  006500  005737  001126                     TST     $BDDAT          ;/RESTORE CSR
2615  006504  001004                            BNE     2$              ;/YES - NEXT TEST.
2616  006506  105766  177776                     TSTB    -2(6)           ;/AT HIGH RATE MAY HAVE HAD OVERFLOW
2617                                                                    ;/NOTE: CSR HAD BEEN PUT ON STACK.
2618  006512  100401                            BMI     2$              ;/NEXT TEST IF OVERFLOW.
2619
2620

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

2623  006514  104006                            ERROR   6               ;/CLOCK FAILED TO COUNT AT
2624                                                                    ;/RATE:LINEFREQ
2625

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

2628
2629  006516  005077  172654            2$:     CLR     @ASR            ;/CLEAR THE CLOCK.
2630
2631
2632
2633                                      ;;**************************************************************
2634                                      ;*TEST 42        *TEST THAT COUNTER DOESN'T COUNT WHEN "SLAVE IN" RATE IS SELECTED
2635                                      ;;**************************************************************
2636  006522  000004                      TST42:  SCOPE
2637  006524  012737  000020  001160             MOV     #20,$TIMES      ;;DO 20 ITERATIONS
2638
2639  006532  005077  172640                     CLR     @ASR            ;CLEAR CSR.
2640  006536  005077  172636                     CLR     @ABR            ;CLEAR PRESET BUFFER.
2641
2642  006542  052777  000001  172626             BIS     #BIT0,@ASR      ;SET GO BIT, RATE:"SLAVE IN"
2643
2644  006550  052777  000400  172620             BIS     #BIT8,@ASR      ;GENERATE A MAINTENANCE ST1.
2645  006556  005000                            CLR     R0
2646
2647  006560  005200                    1$:     INC     R0              ;NOW DO A SHORT DELAY.
2648  006562  001376                            BNE     1$
2649
2650  006564  017746  172606                     MOV     @ASR,-(6)       ;/SAVE CSR
2651  006570  011637  001424                     MOV     (6),$TMP3       ;/GET CSR.
```

```
2652  006574  042737  177707  001424          BIC     #177707,$TMP3   ;/SAVE RATE BITS.
2653  006602  052737  004005  001424          BIS     #BIT11!BIT2!BIT0,$TMP3  ;/SET MODE 2, NO RATE,DISABLE INTERNAL OSC
2654  006610  013777  001424  172560          MOV     $TMP3,@ASR              ;/LOAD CSR.
2655                                                                          ;/THIS MUST BE DONE IN
2656                                                                          ;/ORDER TO XFERR COUNTER
2657                                                                          ;/TO BUFFER ON ST2.
2658  006616  052777  001000  172552          BIS     #BIT9,@ASR      ;/GENERATE ON ST2 PULSE
2659  006624  017737  172550  001126          MOV     @ABR,$BDDAT     ;/READ THE PRESET BUFFER,
2660                                                                  ;/PREVIOUS COUNTER
2661  006632  012677  172540                  MOV     (6)+,@ASR       ;/CONTENTS ARE IN $BDDAT.
2662  006636  005737  001126                  TST     $BDDAT          ;/RESTORE CSR
2663  006642  001003                          BNE     2$              ;IF ANY COUNT, ERROR.
2664  006644  105777  172526                  TSTB    @ASR            ;CHECK FOR OVERFLOW.
2665  006650  100003                          BPL     3$              ;IF NO OVERFLOW, NEXT TEST
2666
2667  006652  005037  001124          2$:     CLR     $GDDAT          ;CLEAR FOR TYPEOUT, EXP'D ZERO.
2668

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

2671  006656  104011                  ERROR   11                      ;CLOCK COUNTED WHEN RATE:"SLAVE IN"
2672                                                                  ;WAS SELECTED.
2673

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

2676  006660  005077  172512          3$:     CLR     @ASR            ;CLEAR CLOCK'S CSR.
2677
2678
2679                                ;;**************************************************************
2680                                ;*TEST 43       *TEST THAT THE CLOCK WILL COUNT IN MODE 1
2681                                ;;**************************************************************
2682  006664  000004                TST43:  SCOPE
2683
2684  006666  005077  172504                  CLR     @ASR            ;CLEAR THE CSR.
2685  006672  012777  177777  172500          MOV     #-1,@ABR        ;PRESET BUFFER REG.
2686  006700  052777  000013  172470          BIS     #13,@ASR        ;START CLOCK,RATE:1 MHZ,MODE 1.
2687  006706  005000                          CLR     R0
2688  006710  105200                  1$:     INCB    R0              ;NOW DO A SHORT DELAY SO THAT THE
2689  006712  001376                          BNE     1$              ;CLOCK CAN COUNT TO OVERFLOW.
2690
2691  006714  105777  172456                  TSTB    @ASR            ;OVERFLOW SHOULD HAVE SET.
2692  006720  100401                          BMI     2$              ;GOTO NEXT TEST IF SO.
2693
2694

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

2697  006722  104006                  ERROR   6                       ;CLOCK FAILED TO COUNT UP AND SET
2698                                                                  ;OVERFLOW IN MODE 1.
2699

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

2702  006724                        2$:

2703
2704
2705                                    .SBTTL  *
```

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


                                ;;**********************************************************************
                                ;*TEST 44        *TEST THAT THE CLOCK WILL INTERRUPT ON OVERFLOW
                                ;;**********************************************************************
006724  000004                  TST44:  SCOPE
006726  012737  000020  001160          MOV     #20,$TIMES      ;;DO 20 ITERATIONS

006734  012746  000340          .MOV    #340,-(SP)      ;PUT PRIORITY ON STACK.
006740  012746  006746          MOV     #64$,-(SP)      ;PUT RETURN ADDRESS ON STACK
006744  000002                  RTI                     ;DO AN RTI, PUTS PRIORITY IN CPU.
006746                  64$:

006746  005077  172424          CLR     @ASR            ;CLEAR CLOCK'S CSR.
006752  012777  177777  172420  MOV     #-1,@ABR        ;SET PRESET BUFFER TO ALL ONES.

006760  012777  000161  172410  MOV     #161,@ASR       ;START CLOCK, RATE:ST1.
006766  052777  000400  172402  BIS     #BIT8,@ASR      ;GENERATE A MAINTENANCE ST1.
006774  012777  007034  172400  MOV     #1$,@VECT1      ;SET INTERRUPT ADDR.

007002  012746  000000          MOV     #0,-(SP)        ;PUT PRIORITY ON STACK.
007006  012746  007014          MOV     #65$,-(SP)      ;PUT RETURN ADDRESS ON STACK
007012  000002                  RTI                     ;DO AN RTI, PUTS PRIORITY IN CPU.
007014                  65$:

007014  000240                  NOP                     ;STALL TIME

007016  012746  000340          MOV     #340,-(SP)      ;PUT PRIORITY ON STACK.
007022  012746  007030          MOV     #66$,-(SP)      ;PUT RETURN ADDRESS ON STACK
007026  000002                  RTI                     ;DO AN RTI, PUTS PRIORITY IN CPU.
007030                  66$:

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

007030  104007                  ERROR   7               ;CLOCK FAILED TO INTERRUPT.

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

007032  000402                  BR      2$
007034                  1$:
007034  062706  000004          ADD     #4,SP                   ;/ADD #4 TO STACK POINTER.
007040  005077  172332  2$:     CLR     @ASR            ;CLEAR THE CLOCK.


                                ;;**********************************************************************
                                ;*TEST 45        *TEST THAT ST2 WILL CAUSE AN INTERRUPT
                                ;;**********************************************************************
007044  000004                  TST45:  SCOPE


007046  012746  000340          MOV     #340,-(SP)      ;PUT PRIORITY ON STACK.
007052  012746  007060          MOV     #64$,-(SP)      ;PUT RETURN ADDRESS ON STACK
```

```
2760  007056  000002                        RTI                     ;DO AN RTI, PUTS PRIORITY IN CPU.
2761  007060                          64$:
2762
2763  007060  005077  172312                CLR     @ASR            ;CLEAR CLOCKS CSR.
2764  007064  012777  007140  172314        MOV     #1$,@VECT2      ;SET UP INTERRUPT VECTOR.
2765  007072  012777  040001  172276        MOV     #BIT14!BIT0,@ASR;SET "INT2",AND GO BIT.
2766  007100  052777  001000  172270        BIS     #BIT9,@ASR      ;GENERATE A MAINTENANCE ST2.
2767
2768  007106  012746  000000                MOV     #0,-(SP)        ;PUT PRIORITY ON STACK.
2769  007112  012746  007120                MOV     #65$,-(SP)      ;PUT RETURN ADDRESS ON STACK
2770  007116  000002                        RTI                     ;DO AN RTI, PUTS PRIORITY IN CPU.
2771  007120                          65$:
2772
2773  007120  000240                        NOP                     ;STALL TIME
2774
2775  007122  012746  000340                MOV     #340,-(SP)      ;PUT PRIORITY ON STACK.
2776  007126  012746  007134                MOV     #66$,-(SP)      ;PUT RETURN ADDRESS ON STACK
2777  007132  000002                        RTI                     ;DO AN RTI, PUTS PRIORITY IN CPU.
2778  007134                          66$:
2779

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

2782  007134  104007                        ERROR   7               ;CLOCK FAILED TO INTERRUPT ON ST2.
2783

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

2786  007136  000402                        BR      2$
2787  007140                          1$:
2788  007140  062706  000004                ADD     #4,SP                   ;/ADD #4 TO STACK POINTER.
2789  007144  005077  172226          2$:   CLR     @ASR            ;CLEAR CLOCK'S CSR.
2790
2791                                        .SBTTL  *
2792                                        .SBTTL  *PHASE 5 ADVANCED TESTING
2793                                        .SBTTL  *
2794
```

```
                                ;;*****************************************************************
                                ;*TEST 46       *TEST THAT THE "FOR" BIT WILL SET ON 2 ST2'S
                                ;;*****************************************************************
007150  000004                  TST46:  SCOPE

007152  005077  172220                  CLR     @ASR            ;START WITH CSR CLEAR.
007156  005277  172214                  INC     @ASR            ;SET GO BIT.
007162  052777  001000  172206          BIS #BIT9,@ASR          ; GENERATE THE 1ST ST2 PULSE.
007170  052777  001000  172200          BIS     #BIT9,@ASR      ;GENERATE 2ND ST2 PULSE.
                                                                ;THIS SHOULD CAUSE FOR BIT TO SET.
007176  032777  010000  172172          BIT     #BIT12,@ASR     ;DID FOR BIT SET?
007204  001007                          BNE     1$              ;YES-THEN NEXT TEST.

007206  017737  172164  001126          MOV     @ASR,$BDDAT     ;RECORD CSR.
007214  012737  110001  001124          MOV     #BIT15!BIT12!BIT0,$GDDAT        ;RECORD S/B.

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

007222  104001                          ERROR   1               ;ERROR-"FOR" BIT FAILED TO SET ON
                                                                ;ON TWO SUCCESIVE ST2 PULSES.

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

007224                          1$:

                                ;;*****************************************************************
                                ;*TEST 47       *TEST THAT FOR BIT WILL SET ON TWO OVERFLOWS
                                ;;*****************************************************************
007224  000004                  TST47:  SCOPE
007226  012737  000002  001160          MOV     #2,$TIMES       ;;DO 2 ITERATIONS

007234  005077  172136                  CLR     @ASR            ;START WITH CSR CLEAR.
007240  012777  177777  172132          MOV     #-1,@ABR        ;PRELOAD BUFFER REG.
007246  052777  000013  172122          BIS     #13,@ASR        ;START CLOCK,MODE 1,1MHZ.
007254  005000                          CLR     R0              ;NOW DO A SHORT DELAY.
007256  105200                  1$:     INCB    R0              ;DURING THIS DELAY, THE CLOCK WILL
007260  001376                          BNE     1$              ;HAVE OVERFLOWED TWICE-
                                                                ;THIS SHOULD CAUSE THE FOR BIT TO SET.

007262  032777  010000  172106          BIT     #BIT12,@ASR     ;DID FOR SET?
007270  001007                          BNE     2$              ;YES-NEXT TEST.

007272  017737  172100  001126          MOV     @ASR,$BDDAT     ;NO-RECORD THE CSR.
007300  012737  010213  001124          MOV     #010213,$GDDAT  ;RECORD S/B.

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

007306  104001                          ERROR   1               ;ERROR FOR BIT FAILED TO SET ON
                                                                ; TWO SUCCESSIVE OVERFLOWS.

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

007310                          2$:
                                ;;*****************************************************************
```

```
                                        ;*TEST 50       *TEST THAT FOR BIT WILL CLEAR IF GO BIT IS SET
                                        ;;*****************************************************************
007310  000004                          TST50:  SCOPE

007312  012777  000001  172056                MOV     #BIT0,@ASR      ;CLEAR CSR,SET GO BIT.
007320  052777  001000  172050                BIS     #BIT9,@ASR      ;SET 1ST ST2 PULSE.
007326  052777  001000  172042                BIS     #BIT9,@ASR      ;GENERATE 2ND ST2 PULSE.
                                                                      ;FOR BIT SETS HERE.
007334  042777  000001  172034                BIC     #BIT0,@ASR      ;CLEAR GO BIT.

007342  052777  000001  172026                BIS     #BIT0,@ASR      ;SET THE "GO" BIT AGAIN -
                                                                      ;SHOULD CLEAR FOR BIT.
007350  017737  172022  001126                MOV     @ASR,$BDDAT     ;READ THE CSR.

007356  012737  100001  001124                MOV     #100001,$GDDAT  ;RECORD WHAT CSR S/B.
007364  032737  010000  001126                BIT     #BIT12,$BDDAT   ;DID FOR BIT CLEAR?
007372  001401                                BEQ     1$              ;YES NEXT TEST.

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

007374  104001                                ERROR   1               ;FOR BIT FALED TO CLEAR
                                                                      ;WHEN "GO" BIT WAS SET.

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

007376  005077  171774                1$:     CLR     @ASR            ;CLEAR THE CSR.

                                        ;;*****************************************************************
                                        ;*TEST 51       *TEST THAT WE CAN DISABLE THE INTERNAL OSC
                                        ;;*****************************************************************
007402  000004                          TST51:  SCOPE
007404  012737  000005  001160                MOV     #5,$TIMES       ;;DO 5 ITERATIONS

007412  005077  171760                        CLR     @ASR            ;CLEAR THE CSR
007416  005077  171756                        CLR     @ABR            ;CLEAR THE PRESET BUFFER
007422  005037  001124                        CLR     $GDDAT          ;CLEAR EXPED.

007426  012777  004000  171742                MOV     #BIT11,@ASR     ;DISABLE THE INTERNAL OSC.
007434  052777  000011  171734                BIS     #BIT3!BIT0,@ASR ;START CLOCK:RATE 1MHZ.
007442  005000                                CLR     R0
007444  105200                          1$:     INCB    R0              ;DELAY A SHORT TIME.
007446  001376                                BNE     1$
007450  017746  171722                        MOV     @ASR,-(6)       ;/SAVE CSR
007454  011637  001424                        MOV     (6),$TMP3       ;/GET CSR.
007460  042737  177707  001424                BIC     #177707,$TMP3   ;/SAVE RATE BITS.
007466  052737  004005  001424                BIS     #BIT11!BIT2!BIT0,$TMP3  ;/SET MODE 2, NO RATE,DISABLE INTERNAL OSC
007474  013777  001424  171674                MOV     $TMP3,@ASR              ;/LOAD CSR.
                                                                      ;/THIS MUST BE DONE IN
                                                                      ;/ORDER TO XFERR COUNTER
                                                                      ;/TO BUFFER ON ST2.
007502  052777  001000  171666                BIS     #BIT9,@ASR      ;/GENERATE ON ST2 PULSE
007510  017737  171664  001126                MOV     @ABR,$BDDAT     ;/READ THE PRESET BUFFER,
                                                                      ;/PREVIOUS COUNTER
```

```
007516  012677  171654                  MOV     (6)+,@ASR          ;/CONTENTS ARE IN $BDDAT.
007522  005737  001126                  TST     $BDDAT             ;/RESTORE CSR
007526  001401                          BEQ     2$                 ;NO - GOOD - NEXT TEST.

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

007530  104011                          ERROR   11                 ;CLOCK DISABLE INTERNAL
                                                                   ;OSC. DID NOT WORK.

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

007532  005077  171640          2$:     CLR     @ASR               ;CLEAR THE CSR.

                                ;;*************************************************************
                                ;*TEST 52       *TEST THAT CLOCK CAN BE COUNTED USING MAINTENANCE OSC
                                ;;*************************************************************
007536  000004                  TST52:  SCOPE

007540  005077  171632                  CLR     @ASR               ;CLEAR THE CSR.
007544  005077  171630                  CLR     @ABR               ;CLEAR THE PRESET BUFFER.
007550  052777  004000  171620          BIS     #BIT11,@ASR        ;DISABLE THE INTERNAL OSC.
007556  052777  000011  171612          BIS     #BIT3!BIT0,@ASR    ;START CLOCK, 1MHZ, GO.
007564  012700  177754                  MOV     #-20.,R0           ;SET TO COUNT 20 TIMES

007570  052777  002000  171600  1$:     BIS     #BIT10,@ASR        ;GENERATE 1 MAINTENANCE OSC.
                                                                   ;NOTE: AT 1MHZ, IT TAKES 10
                                                                   ;MAINT. OSC TO EQUAL 1 COUNT
007576  005200                          INC     R0                 ;DO 20 MAINTENANCE OSC.
007600  001373                          BNE     1$

007602  017746  171570                  MOV     @ASR,-(6)          ;/SAVE CSR
007606  011637  001424                  MOV     (6),$TMP3          ;/GET CSR.
007612  042737  177707  001424          BIC     #177707,$TMP3      ;/SAVE RATE BITS.
007620  052737  004005  001424          BIS     #BIT11!BIT2!BIT0,$TMP3   ;/SET MODE 2, NO RATE,DISABLE INTERNAL OSC
007626  013777  001424  171542          MOV     $TMP3,@ASR               ;/LOAD CSR.
                                                                   ;/THIS MUST BE DONE IN
                                                                   ;/ORDER TO XFERR COUNTER
                                                                   ;/TO BUFFER ON ST2.
007634  052777  001000  171534          BIS     #BIT9,@ASR         ;/GENERATE ON ST2 PULSE
007642  017737  171532  001126          MOV     @ABR,$BDDAT        ;/READ THE PRESET BUFFER,
                                                                   ;/PREVIOUS COUNTER
007650  012677  171522                  MOV     (6)+,@ASR          ;/CONTENTS ARE IN $BDDAT.
007654  005737  001126                  TST     $BDDAT             ;/RESTORE CSR
007660  001001                          BNE     2$                 ;YES - NEXT TEST.


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

007662  104011                          ERROR   11                 ;ERROR COULD NOT COUNT USING
                                                                   ;MAINTENANCE OSC.

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

007664  005077  171506          2$:     CLR     @ASR               ;CLEAR THE CSR.
```

```
                                        ;;**********************************************************************
                                        ;*TEST 53        *TEST THE CLOCK'S 1MHZ DIVIDER
                                        ;;**********************************************************************
007670  000004                  TST53:  SCOPE
007672  012737  000005  001160          MOV     #5,$TIMES       ;;DO 5 ITERATIONS

007700  005077  171472                  CLR     @ASR            ;/CLEAR THE CSR.
007704  005077  171470                  CLR     @ABR            ;/CLEAR THE PRESET BUFFER.
007710  052777  004000  171460          BIS     #BIT11,@ASR     ;/DISABLE THE INTERNAL OSC.
007716  052777  000011  171452          BIS     #1!10,@ASR      ;/ENABLE CLOCK, RATE:1MHZ

007724  012700  177766          10$:    MOV     #-10.,R0        ;/SET TO GENERATE 10 OSC PULSES.

007730  052777  002000  171440  1$:     BIS     #BIT10,@ASR     ;/GENERATE ONE OSC PULSE.
007736  005200                          INC     R0              ;/DONE 10 OSC PULSES?
007740  001373                          BNE     1$              ;/NO - DO ANOTHER ONE.

007742  012737  000001  001124  2$:     MOV     #1,$GDDAT       ;/SET FOR ERROR TYPEOUT - IF ANY.
007750  017746  171422                  MOV     @ASR,-(6)       ;/SAVE CSR
007754  011637  001424                  MOV     (6),$TMP3       ;/GET CSR.
007760  042737  177707  001424          BIC     #177707,$TMP3   ;/SAVE RATE BITS.
007766  052737  004005  001424          BIS     #BIT11!BIT2!BIT0,$TMP3  ;/SET MODE 2, NO RATE,DISABLE INTERNAL OSC
007774  013777  001424  171374          MOV     $TMP3,@ASR              ;/LOAD CSR.
                                                                ;/THIS MUST BE DONE IN
                                                                ;/ORDER TO XFERR COUNTER
                                                                ;/TO BUFFER ON ST2.
010002  052777  001000  171366          BIS     #BIT9,@ASR      ;/GENERATE ON ST2 PULSE
010010  017737  171364  001126          MOV     @ABR,$BDDAT     ;/READ THE PRESET BUFFER,
                                                                ;/PREVIOUS COUNTER
010016  012677  171354                  MOV     (6)+,@ASR       ;/CONTENTS ARE IN $BDDAT.
010022  005737  001126                  TST     $BDDAT          ;/RESTORE CSR
010026  013737  001124  001420          MOV     $GDDAT,$TMP0    ;/$TMP0 USED IN ERROR TYPEOUT.

010034  023737  001124  001126          CMP     $GDDAT,$BDDAT   ;/DID CLOCK ADVANCE ONCE?

010042  001402                          BEQ     3$              ;/YES - NEXT TEST.

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

010044  104011                          ERROR   11              ;/ERROR ON CLOCK1MHZ PULSE
                                                                ;/NOT GENERATED WHEN 10
                                                                ;/OSC PULSES GENERATED.

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

010046  000443                          BR      5$
010050  012700  000011          3$:     MOV     #9.,R0  ;/GET THE NUMBER OF MORE OSC PULSES
                                                        ;/TO BE GENERATED.
```

```
3011  010054  052777  002000  171314  4$:   BIS   #BIT10,@ASR      ;/GENERATE ANOTHER OSC PULSE.
3012  010062  005300                        DEC   R0               ;/WHAT WE WANT TO CHECK
3013  010064  001373                        BNE   4$               ;/1MHZ PULSE ON 9 OSC PULSES.
3014
3015
3016  010066  017746  171304                MOV   @ASR,-(6)        ;/SAVE CSR
3017  010072  011637  001424                MOV   (6),$TMP3        ;/GET CSR.
3018  010076  042737  177707  001424        BIC   #177707,$TMP3    ;/SAVE RATE BITS.
3019  010104  052737  004005  001424        BIS   #BIT11!BIT2!BIT0,$TMP3  ;/SET MODE 2, NO RATE,DISABLE INTERNAL OSC
3020  010112  013777  001424  171256        MOV   $TMP3,@ASR               ;/LOAD CSR.
3021                                                               ;/THIS MUST BE DONE IN
3022                                                               ;/ORDER TO XFERR COUNTER
3023                                                               ;/TO BUFFER ON ST2.
3024  010120  052777  001000  171250        BIS   #BIT9,@ASR       ;/GENERATE ON ST2 PULSE
3025  010126  017737  171246  001126        MOV   @ABR,$BDDAT      ;/READ THE PRESET BUFFER,
3026                                                               ;/PREVIOUS COUNTER
3027  010134  012677  171236                MOV   (6)+,@ASR        ;/CONTENTS ARE IN $BDDAT.
3028  010140  005737  001126                TST   $BDDAT           ;/RESTORE CSR
3029  010144  023737  001124  001126        CMP   $GDDAT,$BDDAT    ;/WAS ANOTHER 1MHZ PULSE GENERATED?
3030  010152  001401                        BEQ   5$               ;/NO - NEXT TEST.
3031

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

3034  010154  104011                        ERROR  11              ;/WE SEEM TO HAVE GENERATED
3035                                                               ;/ANOTHER 1MHZ PULSE ON
3036                                                               ;/ONLY 9 MAINTENANCE
3037                                                               ;/OSC PULSES.
3038
                                    ;;$$$$$$$$$$$$$$$$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$

3041  010156  005077  171214          5$:   CLR   @ASR               ;/CLEAR THE CSR.
3042
3043
3044                                ;;**********************************************************************
3045                                ;*TEST 54       *TEST THE CLOCK'S 100KHZ DIVIDER
3046                                ;;**********************************************************************
3047  010162  000004                TST54:  SCOPE
3048  010164  012737  000005  001160        MOV   #5,$TIMES        ;;DO 5 ITERATIONS
3049
3050  010172  005077  171200                CLR   @ASR             ;/CLEAR THE CSR.
3051  010176  005077  171176                CLR   @ABR             ;/CLEAR THE PRESET BUFFER.
3052  010202  052777  004000  171166        BIS   #BIT11,@ASR      ;/DISABLE THE INTERNAL OSC.
3053  010210  052777  000021  171160        BIS   #1!20,@ASR       ;/ENABLE CLOCK, RATE:100KHZ
3054
3055
3056  010216  012700  177634          10$:  MOV   #-100.,R0        ;/SET TO GENERATE 100 OSC PULSES.
3057
3058  010222  052777  002000  171146  1$:   BIS   #BIT10,@ASR      ;/GENERATE ONE OSC PULSE.
3059  010230  005200                        INC   R0               ;/DONE 100 OSC PULSES?
3060  010232  001373                        BNE   1$               ;/NO - DO ANOTHER ONE.
3061
3062
3063  010234  012737  000001  001124  2$:   MOV   #1,$GDDAT        ;/SET FOR ERROR TYPEOUT - IF ANY.
3064  010242  017746  171130                MOV   @ASR,-(6)        ;/SAVE CSR
```

```
3065  010246  011637  001424                MOV     (6),$TMP3       ;/GET CSR.
3066  010252  042737  177707  001424        BIC     #177707,$TMP3   ;/SAVE RATE BITS.
3067  010260  052737  004005  001424        BIS     #BIT11!BIT2!BIT0,$TMP3  ;/SET MODE 2, NO RATE,DISABLE INTERNAL OSC
3068  010266  013777  001424  171102        MOV     $TMP3,@ASR              ;/LOAD CSR.
3069                                                                        ;/THIS MUST BE DONE IN
3070                                                                        ;/ORDER TO XFERR COUNTER
3071                                                                        ;/TO BUFFER ON ST2.
3072  010274  052777  001000  171074        BIS     #BIT9,@ASR      ;/GENERATE ON ST2 PULSE
3073  010302  017737  171072  001126        MOV     @ABR,$BDDAT     ;/READ THE PRESET BUFFER,
3074                                                                ;/PREVIOUS COUNTER
3075  010310  012677  171062                MOV     (6)+,@ASR       ;/CONTENTS ARE IN $BDDAT.
3076  010314  005737  001126                TST     $BDDAT          ;/RESTORE CSR
3077  010320  013737  001124  001420        MOV     $GDDAT,$TMPO    ;/$TMPO USED IN ERROR TYPEOUT.
3078
3079  010326  023737  001124  001126        CMP     $GDDAT,$BDDAT   ;/DID CLOCK ADVANCE ONCE?
3080
3081  010334  001402                        BEQ     3$              ;/YES - NEXT TEST.
3082

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

3085  010336  104011                        ERROR   11              ;/ERROR ON CLOCK100KHZ PULSE
3086                                                                ;/NOT GENERATED WHEN 100
3087                                                                ;/OSC PULSES GENERATED.
3088

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

3091  010340  000443                        BR      5$
3092  010342  012700  000143        3$:     MOV     #99.,R0 ;/GET THE NUMBER OF MORE OSC PULSES
3093                                                        ;/TO BE GENERATED.
3094
3095  010346  052777  002000  171022  4$:   BIS     #BIT10,@ASR     ;/GENERATE ANOTHER OSC PULSE.
3096  010354  005300                        DEC     R0              ;/WHAT WE WANT TO CHECK
3097  010356  001373                        BNE     4$              ;/100KHZ PULSE ON 99 OSC PULSES.
3098
3099
3100  010360  017746  171012                MOV     @ASR,-(6)       ;/SAVE CSR
3101  010364  011637  001424                MOV     (6),$TMP3       ;/GET CSR.
3102  010370  042737  177707  001424        BIC     #177707,$TMP3   ;/SAVE RATE BITS.
3103  010376  052737  004005  001424        BIS     #BIT11!BIT2!BIT0,$TMP3  ;/SET MODE 2, NO RATE,DISABLE INTERNAL OSC
3104  010404  013777  001424  170764        MOV     $TMP3,@ASR              ;/LOAD CSR.
3105                                                                        ;/THIS MUST BE DONE IN
3106                                                                        ;/ORDER TO XFERR COUNTER
3107                                                                        ;/TO BUFFER ON ST2.
3108  010412  052777  001000  170756        BIS     #BIT9,@ASR      ;/GENERATE ON ST2 PULSE
3109  010420  017737  170754  001126        MOV     @ABR,$BDDAT     ;/READ THE PRESET BUFFER,
3110                                                                ;/PREVIOUS COUNTER
3111  010426  012677  170744                MOV     (6)+,@ASR       ;/CONTENTS ARE IN $BDDAT.
3112  010432  005737  001126                TST     $BDDAT          ;/RESTORE CSR
3113  010436  023737  001124  001126        CMP     $GDDAT,$BDDAT   ;/WAS ANOTHER 100KHZ PULSE GENERATED?
3114  010444  001401                        BEQ     5$              ;/NO - NEXT TEST.
3115

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

3118  010446  104011                        ERROR   11              ;/WE SEEM TO HAVE GENERATED
```

```
                                                                ;/ANOTHER 100KHZ PULSE ON
                                                                ;/ONLY 99 MAINTENANCE
                                                                ;/OSC PULSES.

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

 010450  005077  170722         5$:     CLR     @ASR            ;/CLEAR THE CSR.



                                ;;*******************************************************************
                                ;*TEST 55        *TEST THE CLOCK'S 10KHZ DIVIDER
                                ;;*******************************************************************
 010454  000004                 TST55:  SCOPE
 010456  012737  000005  001160         MOV     #5,$TIMES       ;;DO 5 ITERATIONS

 010464  005077  170706                 CLR     @ASR            ;/CLEAR THE CSR.
 010470  005077  170704                 CLR     @ABR            ;/CLEAR THE PRESET BUFFER.
 010474  052777  004000  170674         BIS     #BIT11,@ASR     ;/DISABLE THE INTERNAL OSC.
 010502  052777  000031  170666         BIS     #1!30,@ASR      ;/ENABLE CLOCK, RATE:10KHZ


 010510  012700  176030         10$:    MOV     #-1000.,R0      ;/SET TO GENERATE 1000 OSC PULSES.

 010514  052777  002000  170654 1$:     BIS     #BIT10,@ASR     ;/GENERATE ONE OSC PULSE.
 010522  005200                         INC     R0              ;/DONE 1000 OSC PULSES?
 010524  001373                         BNE     1$              ;/NO - DO ANOTHER ONE.


 010526  012737  000001  001124 2$:     MOV     #1,$GDDAT       ;/SET FOR ERROR TYPEOUT - IF ANY.
 010534  017746  170636                 MOV     @ASR,-(6)       ;/SAVE CSR
 010540  011637  001424                 MOV     (6),$TMP3       ;/GET CSR.
 010544  042737  177707  001424         BIC     #177707,$TMP3   ;/SAVE RATE BITS.
 010552  052737  004005  001424         BIS     #BIT11!BIT2!BIT0,$TMP3  ;/SET MODE 2, NO RATE,DISABLE INTERNAL OSC
 010560  013777  001424  170610         MOV     $TMP3,@ASR              ;/LOAD CSR.
                                                                ;/THIS MUST BE DONE IN
                                                                ;/ORDER TO XFERR COUNTER
                                                                ;/TO BUFFER ON ST2.
 010566  052777  001000  170602         BIS     #BIT9,@ASR      ;/GENERATE ON ST2 PULSE
 010574  017737  170600  001126         MOV     @ABR,$BDDAT     ;/READ THE PRESET BUFFER,
                                                                ;/PREVIOUS COUNTER
 010602  012677  170570                 MOV     (6)+,@ASR       ;/CONTENTS ARE IN $BDDAT.
 010606  005737  001126                 TST     $BDDAT          ;/RESTORE CSR
 010612  013737  001124  001420         MOV     $GDDAT,$TMP0    ;/$TMP0 USED IN ERROR TYPEOUT.

 010620  023737  001124  001126         CMP     $GDDAT,$BDDAT   ;/DID CLOCK ADVANCE ONCE?

 010626  001402                         BEQ     3$              ;/YES - NEXT TEST.

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

 010630  104011                         ERROR   11              ;/ERROR ON CLOCK10KHZ PULSE
                                                                ;/NOT GENERATED WHEN 1000
                                                                ;/OSC PULSES GENERATED.
```

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

3175  010632  000443                            BR      5$
3176  010634  012700  001747          3$:       MOV     #999.,R0        ;/GET THE NUMBER OF MORE OSC PULSES
3177                                                                    ;/TO BE GENERATED.
3178
3179  010640  052777  002000  170530  4$:       BIS     #BIT10,@ASR     ;/GENERATE ANOTHER OSC PULSE.
3180  010646  005300                            DEC     R0              ;/WHAT WE WANT TO CHECK
3181  010650  001373                            BNE     4$              ;/10KHZ PULSE ON 999 OSC PULSES.
3182
3183
3184  010652  017746  170520                    MOV     @ASR,-(6)       ;/SAVE CSR
3185  010656  011637  001424                    MOV     (6),$TMP3       ;/GET CSR.
3186  010662  042737  177707  001424            BIC     #177707,$TMP3   ;/SAVE RATE BITS.
3187  010670  052737  004005  001424            BIS     #BIT11!BIT2!BIT0,$TMP3  ;/SET MODE 2, NO RATE,DISABLE INTERNAL OSC
3188  010676  013777  001424  170472            MOV     $TMP3,@ASR              ;/LOAD CSR.
3189                                                                    ;/THIS MUST BE DONE IN
3190                                                                    ;/ORDER TO XFERR COUNTER
3191                                                                    ;/TO BUFFER ON ST2.
3192  010704  052777  001000  170464            BIS     #BIT9,@ASR      ;/GENERATE ON ST2 PULSE
3193  010712  017737  170462  001126            MOV     @ABR,$BDDAT     ;/READ THE PRESET BUFFER,
3194                                                                    ;/PREVIOUS COUNTER
3195  010720  012677  170452                    MOV     (6)+,@ASR       ;/CONTENTS ARE IN $BDDAT.
3196  010724  005737  001126                    TST     $BDDAT          ;/RESTORE CSR
3197  010730  023737  001124  001126            CMP     $GDDAT,$BDDAT   ;/WAS ANOTHER 10KHZ PULSE GENERATED?
3198  010736  001401                            BEQ     5$              ;/NO - NEXT TEST.
3199

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

3202  010740  104011                            ERROR   11              ;/WE SEEM TO HAVE GENERATED
3203                                                                    ;/ANOTHER 10KHZ PULSE ON
3204                                                                    ;/ONLY 999 MAINTENANCE
3205                                                                    ;/OSC PULSES.
3206

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

3209  010742  005077  170430          5$:       CLR     @ASR            ;/CLEAR THE CSR.
3210
3211
3212
3213                                    ;;**********************************************************************
3214                                    ;*TEST 56        *TEST THE CLOCK'S 1KHZ DIVIDER
3215                                    ;;**********************************************************************
3216  010746  000004                    TST56:  SCOPE
3217  010750  012737  000005  001160            MOV     #5,$TIMES       ;;DO 5 ITERATIONS
3218
3219  010756  005077  170414                    CLR     @ASR            ;/CLEAR THE CSR.
3220  010762  005077  170412                    CLR     @ABR            ;/CLEAR THE PRESET BUFFER.
3221  010766  052777  004000  170402            BIS     #BIT11,@ASR     ;/DISABLE THE INTERNAL OSC.
3222  010774  052777  000041  170374            BIS     #1!40,@ASR      ;/ENABLE CLOCK, RATE:1KHZ
3223
3224
3225  011002  012700  154360          10$:      MOV     #-10000.,R0     ;/SET TO GENERATE 10000 OSC PULSES.
3226
```

```
011006  052777  002000  170362  1$:     BIS     #BIT10,@ASR             ;/GENERATE ONE OSC PULSE.
011014  005200                          INC     R0                      ;/DONE 10000 OSC PULSES?
011016  001373                          BNE     1$                      ;/NO - DO ANOTHER ONE.


011020  012737  000001  001124  2$:     MOV     #1,$GDDAT               ;/SET FOR ERROR TYPEOUT - IF ANY.
011026  017746  170344                  MOV     @ASR,-(6)               ;/SAVE CSR
011032  011637  001424                  MOV     (6),$TMP3               ;/GET CSR.
011036  042737  177707  001424          BIC     #177707,$TMP3           ;/SAVE RATE BITS.
011044  052737  004005  001424          BIS     #BIT11!BIT2!BIT0,$TMP3   ;/SET MODE 2, NO RATE,DISABLE INTERNAL OSC
011052  013777  001424  170316          MOV     $TMP3,@ASR                 ;/LOAD CSR.
                                                                        ;/THIS MUST BE DONE IN
                                                                        ;/ORDER TO XFERR COUNTER
                                                                        ;/TO BUFFER ON ST2.
011060  052777  001000  170310          BIS     #BIT9,@ASR              ;/GENERATE ON ST2 PULSE
011066  017737  170306  001126          MOV     @ABR,$BDDAT             ;/READ THE PRESET BUFFER,
                                                                        ;/PREVIOUS COUNTER
011074  012677  170276                  MOV     (6)+,@ASR               ;/CONTENTS ARE IN $BDDAT.
011100  005737  001126                  TST     $BDDAT                  ;/RESTORE CSR
011104  013737  001124  001420          MOV     $GDDAT,$TMP0            ;/$TMP0 USED IN ERROR TYPEOUT.

011112  023737  001124  001126          CMP     $GDDAT,$BDDAT           ;/DID CLOCK ADVANCE ONCE?

011120  001402                          BEQ     3$                      ;/YES - NEXT TEST.

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

011122  104011                          ERROR   11                      ;/ERROR ON CLOCK1KHZ PULSE
                                                                        ;/NOT GENERATED WHEN 10000
                                                                        ;/OSC PULSES GENERATED.

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

011124  000443                          BR      5$
011126  012700  023417          3$:     MOV     #9999.,R0               ;/GET THE NUMBER OF MORE OSC PULSES
                                                                        ;/TO BE GENERATED.


011132  052777  002000  170236  4$:     BIS     #BIT10,@ASR             ;/GENERATE ANOTHER OSC PULSE.
011140  005300                          DEC     R0                      ;/WHAT WE WANT TO CHECK
011142  001373                          BNE     4$                      ;/1KHZ PULSE ON 9999 OSC PULSES.


011144  017746  170226                  MOV     @ASR,-(6)               ;/SAVE CSR
011150  011637  001424                  MOV     (6),$TMP3               ;/GET CSR.
011154  042737  177707  001424          BIC     #177707,$TMP3           ;/SAVE RATE BITS.
011162  052737  004005  001424          BIS     #BIT11!BIT2!BIT0,$TMP3   ;/SET MODE 2, NO RATE,DISABLE INTERNAL OSC
011170  013777  001424  170200          MOV     $TMP3,@ASR                 ;/LOAD CSR.
                                                                        ;/THIS MUST BE DONE IN
                                                                        ;/ORDER TO XFERR COUNTER
                                                                        ;/TO BUFFER ON ST2.
011176  052777  001000  170172          BIS     #BIT9,@ASR              ;/GENERATE ON ST2 PULSE
011204  017737  170170  001126          MOV     @ABR,$BDDAT             ;/READ THE PRESET BUFFER,
                                                                        ;/PREVIOUS COUNTER
011212  012677  170160                  MOV     (6)+,@ASR               ;/CONTENTS ARE IN $BDDAT.
```

```
 3281  011216  005737  001126                      TST     $BDDAT          ;/RESTORE CSR
 3282  011222  023737  001124  001126              CMP     $GDDAT,$BDDAT   ;/WAS ANOTHER 1KHZ PULSE GENERATED?
 3283  011230  001401                              BEQ     5$              ;/NO - NEXT TEST.
 3284
                                           ;;$$$$$$$$$$$$$$$$$$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$

 3287  011232  104011                              ERROR   11              ;/WE SEEM TO HAVE GENERATED
 3288                                                                      ;/ANOTHER 1KHZ PULSE ON
 3289                                                                      ;/ONLY 9999 MAINTENANCE
 3290                                                                      ;/OSC PULSES.
 3291
                                           ;;$$$$$$$$$$$$$$$$$$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$

 3294  011234  005077  170136              5$:     CLR     @ASR            ;/CLEAR THE CSR.
 3295
 3296
 3297                                      ;;*************************************************************
 3298                                      ;*TEST 57        *TEST THE CLOCK'S 100HZ DIVIDER
 3299                                      ;;*************************************************************
 3300  011240  000004                      TST57:  SCOPE
 3301  011242  012737  000005  001160              MOV     #5,$TIMES       ;;DO 5 ITERATIONS
 3302
 3303  011250  005077  170122                      CLR     @ASR            ;/CLEAR THE CSR.
 3304  011254  005077  170120                      CLR     @ABR            ;/CLEAR THE PRESET BUFFER.
 3305  011260  052777  004000  170110              BIS     #BIT11,@ASR     ;/DISABLE THE INTERNAL OSC.
 3306  011266  052777  000051  170102              BIS     #1!50,@ASR      ;/ENABLE CLOCK, RATE:100HZ
 3307
 3308  011274  012701  000012                      MOV     #10.,R1
 3309
 3310  011300  012700  154360              10$:    MOV     #-10000.,R0     ;/SET TO GENERATE 10000 OSC PULSES.
 3311
 3312  011304  052777  002000  170064      1$:     BIS     #BIT10,@ASR     ;/GENERATE ONE OSC PULSE.
 3313  011312  005200                              INC     R0              ;/DONE 10000 OSC PULSES?
 3314  011314  001373                              BNE     1$              ;/NO - DO ANOTHER ONE.
 3315
 3316  011316  005301                              DEC     R1
 3317  011320  001367                              BNE     10$
 3318
 3319  011322  012737  000001  001124      2$:     MOV     #1,$GDDAT       ;/SET FOR ERROR TYPEOUT - IF ANY.
 3320  011330  017746  170042                      MOV     @ASR,-(6)       ;/SAVE CSR
 3321  011334  011637  001424                      MOV     (6),$TMP3       ;/GET CSR.
 3322  011340  042737  177707  001424              BIC     #177707,$TMP3   ;/SAVE RATE BITS.
 3323  011346  052737  004005  001424              BIS     #BIT11!BIT2!BIT0,$TMP3  ;/SET MODE 2, NO RATE,DISABLE INTERNAL OSC
 3324  011354  013777  001424  170014              MOV     $TMP3,@ASR              ;/LOAD CSR.
 3325                                                                      ;/THIS MUST BE DONE IN
 3326                                                                      ;/ORDER TO XFERR COUNTER
 3327                                                                      ;/TO BUFFER ON ST2.
 3328  011362  052777  001000  170006              BIS     #BIT9,@ASR      ;/GENERATE ON ST2 PULSE
 3329  011370  017737  170004  001126              MOV     @ABR,$BDDAT     ;/READ THE PRESET BUFFER,
 3330                                                                      ;/PREVIOUS COUNTER
 3331  011376  012677  167774                      MOV     (6)+,@ASR       ;/CONTENTS ARE IN $BDDAT.
 3332  011402  005737  001126                      TST     $BDDAT          ;/RESTORE CSR
 3333  011406  013737  001124  001420              MOV     $GDDAT,$TMP0    ;/$TMP0 USED IN ERROR TYPEOUT.
 3334
```

```
3335  011414  023737  001124  001126          CMP     $GDDAT,$BDDAT   ;/DID CLOCK ADVANCE ONCE?
3336
3337  011422  001402                          BEQ     66$             ;/YES - NEXT TEST
3338
                                        ;;$$$$$$$$$$$$$$$$$$$$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$

3341  011424  104011                          ERROR   11              ;/ERROR ON CLOCK100HZ PULSE
3342                                                                  ;/NOT GENERATED WHEN 10000
3343                                                                  ;/OSC PULSES GENERATED.
3344
                                        ;;$$$$$$$$$$$$$$$$$$$$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$

3347  011426  000447                          BR      5$
3348  011430  012701  000012          66$:    MOV     #10.,R1
3349  011434  012700  023417          3$:     MOV     #9999.,R0       ;/GET THE NUMBER OF MORE OSC PULSES
3350                                                                  ;/TO BE GENERATED.
3351
3352  011440  052777  002000  167730  4$:     BIS     #BIT10,@ASR     ;/GENERATE ANOTHER OSC PULSE.
3353  011446  005300                          DEC     R0              ;/WHAT WE WANT TO CHECK
3354  011450  001373                          BNE     4$              ;/100HZ PULSE ON 9999 OSC PULSES.
3355  011452  005301                          DEC     R1
3356  011454  001367                          BNE     3$
3357
3358
3359  011456  017746  167714                  MOV     @ASR,-(6)       ;/SAVE CSR
3360  011462  011637  001424                  MOV     (6),$TMP3       ;/GET CSR.
3361  011466  042737  177707  001424          BIC     #177707,$TMP3   ;/SAVE RATE BITS.
3362  011474  052737  004005  001424          BIS     #BIT11!BIT2!BIT0,$TMP3  ;/SET MODE 2, NO RATE,DISABLE INTERNAL OSC
3363  011502  013777  001424  167666          MOV     $TMP3,@ASR              ;/LOAD CSR.
3364                                                                  ;/THIS MUST BE DONE IN
3365                                                                  ;/ORDER TO XFERR COUNTER
3366                                                                  ;/TO BUFFER ON ST2.
3367  011510  052777  001000  167660          BIS     #BIT9,@ASR      ;/GENERATE ON ST2 PULSE
3368  011516  017737  167656  001126          MOV     @ABR,$BDDAT     ;/READ THE PRESET BUFFER,
3369                                                                  ;/PREVIOUS COUNTER
3370  011524  012677  167646                  MOV     (6)+,@ASR       ;/CONTENTS ARE IN $BDDAT.
3371  011530  005737  001126                  TST     $BDDAT          ;/RESTORE CSR
3372  011534  023737  001124  001126          CMP     $GDDAT,$BDDAT   ;/WAS ANOTHER 100HZ PULSE GENERATED?
3373  011542  001401                          BEQ     5$              ;/NO - NEXT TEST.
3374
                                        ;;$$$$$$$$$$$$$$$$$$$$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$

3377  011544  104011                          ERROR   11              ;/WE SEEM TO HAVE GENERATED
3378                                                                  ;/ANOTHER 100HZ PULSE ON
3379                                                                  ;/ONLY 9999 MAINTENANCE
3380                                                                  ;/OSC PULSES.
3381
                                        ;;$$$$$$$$$$$$$$$$$$$$$$$$$$$$$>>> ERROR <<<$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$

3384  011546  005077  167624          5$:     CLR     @ASR            ;/CLEAR THE CSR.
3385
3386
3387
3388                                    ;;**********************************************************************
```

```
3389                                    ;*TEST 60       *TEST THE CLOCK'S MODE 2 OPERATION
3390                                            ;*
3391                                            ;*IN THIS TEST WE'LL CHECK MODE 2 OPERATION
3392                                            ;*MODE 2: EXTERNAL EVENTS TIMING MODE
3393                                            ;*SETTING THE GO BIT CAUSES THE COUNTER TO BEGIN COUNTING FROM
3394                                            ;*ZERO AND TO FREE-RUN UNTIL THE GO BIT IS WRITTEN
3395                                            ;*TO A ZERO THE COUNTER WILL CONTINUE COUNTING AFTER
3396                                            ;*OVERFLOW. AN EXTERNAL PULSE FROM SCHMITZ TRIGGER 2
3397                                            ;*(WHEN ST2 GO ENABLE IS A "0") CAUSES DATA TO
3398                                            ;*TRANSFER FROM THE COUNTER TO THE BUFFER/PRESET REG.
3399                                            ;*WHILE THE COUNTER CONTINUES TO RUN.
3400                                            ;*
3401                                            ;*TO TEST THIS MODE, WE'LL DISABLE THE INTERNAL OSC AND USE
3402                                            ;*MAINTENANCE OSC PULSES AS WELL AS A MAINTENANCE
3403                                            ;*ST2.
3404                                            ;*
3405                                    ;;**************************************************************
3406  011552  000004                    TST60:  SCOPE
3407  011554  012737  000020  001160            MOV     #20,$TIMES      ;;DO 20 ITERATIONS
3408
3409  011562  005077  167610                    CLR     @ASR            ;CLEAR THE CSR.
3410  011566  005077  167606                    CLR     @ABR            ;CLEAR THE PRESET REG.
3411  011572  012777  004015  167576            MOV     #004015,@ASR    ;START CLOCK.
3412
3413  011600  012700  177754            1$:     MOV     #-20.,R0        ;SET TO GIVE 20 MAINTENANCE OSC.
3414  011604  052777  002000  167564    2$:     BIS     #BIT10,@ASR     ;GENERATE A MAINTENANCE OSC.
3415  011612  005200                            INC     R0
3416  011614  001373                            BNE     2$              ;IF NOT DONE 20 TIMES, LOOP.
3417
3418  011616  052777  001000  167552    3$:     BIS     #BIT9,@ASR      ;HERE'S THE BIGGIE! AN ST2 HAS BEEN GENERATED
3419  011624  012737  000002  001124            MOV     #2,$GDDAT       ;THE PRESET BUFFER SHOULD BE 2.
3420  011632  017737  167542  001126            MOV     @ABR,$BDDAT     ;READ THE PRESET BUFFER.
3421  011640  023737  001126  001124            CMP     $BDDAT,$GDDAT   ;DID A COUNTER TO PRESET BUFFER OCCUR?
3422  011646  001402                            BEQ     4$              ;YES - NEXT SUBTEST.
3423
                                        ;;SSSSSSSSSSSSSSSSSSSSSS>>> ERROR <<<SSSSSSSSSSSSSSSSSSSSSSSSSSSSSS
3426  011650  104005                            ERROR   5               ;A COUNTER TO PRESET BUFFER DID NOT
3427                                                                    ;HAPPEN PROPERLY.
3428
                                        ;;SSSSSSSSSSSSSSSSSSSSSS>>> ERROR <<<SSSSSSSSSSSSSSSSSSSSSSSSSSSSSS
3431  011652  000434                            BR      5$
3432
3433  011654                            4$:
3434  011654  017746  167516                    MOV     @ASR,-(6)       ;/SAVE CSR
3435  011660  011637  001424                    MOV     (6),$TMP3       ;/GET CSR.
3436  011664  042737  177707  001424            BIC     #177707,$TMP3   ;/SAVE RATE BITS.
3437  011672  052737  004005  001424            BIS     #BIT11!BIT2!BIT0,$TMP3  ;/SET MODE 2, NO RATE,DISABLE INTERNAL OSC
3438  011700  013777  001424  167470            MOV     $TMP3,@ASR              ;/LOAD CSR.
3439                                                                    ;/THIS MUST BE DONE IN
3440                                                                    ;/ORDER TO XFERR COUNTER
3441                                                                    ;/TO BUFFER ON ST2.
3442  011706  052777  001000  167462            BIS     #BIT9,@ASR      ;/GENERATE ON ST2 PULSE
```

```
3443  011714  017737  167460  001126          MOV     @ABR,$BDDAT     ;/READ THE PRESET BUFFER,
3444                                                                    ;/PREVIOUS COUNTER
3445  011722  012677  167450                  MOV     (6)+,@ASR       ;/CONTENTS ARE IN $BDDAT.
3446  011726  005737  001126                  TST     $BDDAT          ;/RESTORE CSR
3447  011732  023737  001124  001126          CMP     $GDDAT,$BDDAT   ;WAS THE COUNTER ACCIDENTLY ZEROED?
3448  011740  001401                          BEQ     5$              ;NO - NEXT TEST.
3449

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

3452  011742  104005                          ERROR   5               ;THE COUNT REGISTER SHOULD NOT
3453                                                                    ;HAVE BEEN EFFECTED BY THE ST2
3454                                                                    ;IN MODE 2.
3455

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

3458  011744                            5$:

3459
3460
3461                                    ;;*****************************************************************
3462                                    ;*TEST 61        *TEST THE CLOCK'S MODE 3 OPERATION
3463                                            ;*
3464                                            ;*IN THIS TEST WE'LL CHECK MODE 3 OPERATION.
3465                                            ;*MODE 3 IS JUST LIKE MODE 2 EXCEPT THAT THE COUNT
3466                                            ;*REG IS ZEROED AFTER AN ST2.
3467                                            ;*
3468                                    ;;*****************************************************************
3469  011744  000004                    TST61:  SCOPE
3470  011746  012737  000020  001160          MOV     #20,$TIMES      ;;DO 20 ITERATIONS
3471
3472  011754  005077  167416                  CLR     @ASR            ;CLEAR THE CSR.
3473  011760  005077  167414                  CLR     @ABR            ;CLEAR THE BUFFER REG.
3474  011764  012777  004017  167404          MOV     #4017,@ASR      ;START CLOCK.
3475
3476  011772  012700  177754          1$:     MOV     #-20.,R0        ;SET TO GIVE 20 MAINTENANCE OSC.
3477  011776  052777  002000  167372  2$:     BIS     #BIT10,@ASR     ;GENERATE A MAINTENANCE OSC.
3478  012004  005200                          INC     R0
3479  012006  001373                          BNE     2$              ;IF NOT DONE 20 TIMES, LOOP.
3480
3481  012010  052777  001000  167360  3$:     BIS     #BIT9,@ASR      ;HERE'S THE BIGGIE! AN ST2 HAS BEEN GENERATED
3482  012016  012737  000002  001124          MOV     #2,$GDDAT       ;THE PRESET BUFFER SHOULD BE 2.
3483  012024  017737  167350  001126          MOV     @ABR,$BDDAT     ;READ THE PRESET BUFFER.
3484  012032  023737  001126  001124          CMP     $BDDAT,$GDDAT   ;DID A COUNTER TO PRESET BUFFER OCCUR?
3485  012040  001402                          BEQ     4$              ;YES - NEXT SUBTEST.
3486

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

3489  012042  104005                          ERROR   5               ;A COUNTER TO PRESET BUFFER DID NOT
3490                                                                    ;HAPPEN PROPERLY.
3491

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

3494  012044  000445                          BR      TST62           ;;
3495
3496  012046  005037  001124          4$:     CLR     $GDDAT          ;EXPECT ZERO BACK FROM COUNT REG.
```

```
3497  012052  017746  167320                MOV     @ASR,-(6)          ;/SAVE CSR
3498  012056  011637  001424                MOV     (6),$TMP3          ;/GET CSR.
3499  012062  042737  177707  001424        BIC     #177707,$TMP3      ;/SAVE RATE BITS.
3500  012070  052737  004005  001424        BIS     #BIT11!BIT2!BIT0,$TMP3  ;/SET MODE 2, NO RATE,DISABLE INTERNAL OSC
3501  012076  013777  001424  167272        MOV     $TMP3,@ASR                 ;/LOAD CSR.
3502                                                                     ;/THIS MUST BE DONE IN
3503                                                                     ;/ORDER TO XFERR COUNTER
3504                                                                     ;/TO BUFFER ON ST2.
3505  012104  052777  001000  167264        BIS     #BIT9,@ASR         ;/GENERATE ON ST2 PULSE
3506  012112  017737  167262  001126        MOV     @ABR,$BDDAT        ;/READ THE PRESET BUFFER,
3507                                                                     ;/PREVIOUS COUNTER
3508  012120  012677  167252                MOV     (6)+,@ASR          ;/CONTENTS ARE IN $BDDAT.
3509  012124  005737  001126                TST     $BDDAT             ;/RESTORE CSR
3510  012130  001402                        BEQ     5$                 ;IF SO - NEXT TEST.
3511

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

3514  012132  104005                        ERROR   5                  ;THE CLOCK FORGOT TO ZERO THE COUNT
3515                                                                     ;REG. AFTER AN ST2 OCCURRED ON
3516                                                                     ;A MODE 3 COUNT.
3517

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

3520  012134  000411                        BR      TST62              ;;
3521  012136                        5$:
3522  012136  005077  167234                CLR     @ASR               ;NOW TRY CLEARING THE CSR.
3523  012142  017737  167230  001126        MOV     @ASR,$BDDAT        ;READ THE CSR - DID IT CLEAR?
3524  012150  001403                        BEQ     TST62              ;;
3525  012152  005037  001124                CLR     $GDDAT             ;NO - RECORD S/B.
3526

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

3529  012156  104002                        ERROR   2                  ;CSR FAILED TO CLEAR
3530

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

3533
3534                                ;;**********************************************************************
3535                                ;*TEST 62        *IF ENABLED,CHECK THRESHOLD ST1 FROM TESTOR
3536                                ;;**********************************************************************
3537  012160  000004                TST62:  SCOPE
3538
3539  012162  012737  000002  001160        MOV     #2,$TIMES          ;;DO 2 ITERATIONS.
3540  012170  005737  001440                TST     EXS                ;OPERATING IN TESTOR MODE?
3541  012174  001002                        BNE     4$                 ;YES DO THIS TEST.
3542  012176  000137  013016                JMP     ENDP               ;NO-END PASS
3543  012202                        4$:
3544
3545  012202  005077  167170                CLR     @ASR               ;YES-CLEAR CSR.
3546  012206  012777  177775  167164        MOV     #-3,@ABR           ;SET TO COUNT THREE TIMES.
3547  012214  012777  000061  167154        MOV     #61,@ASR           ;SET RATE: ST1,MODE 1 GO.
3548  012222  104401  012230                TYPE    ,65$               ;;TYPE ASCIZ STRING
3549  012226  000432                        BR      64$                ;;GET OVER THE ASCIZ
3550                                ;;65$:  .ASCIZ  <200><7><7>#SET ST1 THRESHOLD POT FULLY COUNTERCLOCKWIZE..#<7>
```

```
3551  012314                                  64$:
3552  012314  004737  013700                        JSR     PC,ANYKEY       ;TYPE LAST MESSAGE,AND WAIT FOR OPERATER.
3553  012320  012737  177775  001124                MOV     #-3,$GDDAT      ;DON'T EXPECT COUNT TO CHANGE.
3554  012326  017746  167044                        MOV     @ASR,-(6)       ;/SAVE CSR
3555  012332  011637  001424                        MOV     (6),$TMP3       ;/GET CSR.
3556  012336  042737  177707  001424                BIC     #177707,$TMP3   ;/SAVE RATE BITS.
3557  012344  052737  004005  001424                BIS     #BIT11!BIT2!BIT0,$TMP3  ;/SET MODE 2, NO RATE,DISABLE INTERNAL OSC
3558  012352  013777  001424  167016                MOV     $TMP3,@ASR              ;/LOAD CSR.
3559                                                                        ;/THIS MUST BE DONE IN
3560                                                                        ;/ORDER TO XFERR COUNTER
3561                                                                        ;/TO BUFFER ON ST2.
3562  012360  052777  001000  167010                BIS     #BIT9,@ASR      ;/GENERATE ON ST2 PULSE
3563  012366  017737  167006  001126                MOV     @ABR,$BDDAT     ;/READ THE PRESET BUFFER,
3564                                                                        ;/PREVIOUS COUNTER
3565  012374  012677  166776                        MOV     (6)+,@ASR       ;/CONTENTS ARE IN $BDDAT.
3566  012400  005737  001126                        TST     $BDDAT          ;/RESTORE CSR
3567  012404  001002                                BNE     2$      ;IF NON-ZERO,WE'RE OK.
3568

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

3571  012406  104002                                ERROR   2               ;COUNTERCLOCKWIZE THRESHOLD SETTING
3572                                                                        ;OF ST1 SHOULD HAVE INHIBITED
3573                                                                        ;ST1 FROM CAUSEING CLOCK TO COUNT.
3574

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

3577  012410  000463                                BR      TST63           ;;
3578
3579  012412                                  2$:
3580  012412  104401  012420                        TYPE    ,67$            ;;TYPE ASCIZ STRING
3581  012416  000425                                BR      66$             ;;GET OVER THE ASCIZ
3582                                          ;;67$:  .ASCIZ  <200><7><7>#SET ST1 THRESHOLD POT FULLY CLOCKWIZE#
3583  012472                                  66$:
3584  012472  004737  013700                  3$:   JSR     PC,ANYKEY       ;TYPE LAST MESS. AND WAIT FOR OPERATOR.
3585  012476  017746  166674                        MOV     @ASR,-(6)       ;/SAVE CSR
3586  012502  011637  001424                        MOV     (6),$TMP3       ;/GET CSR.
3587  012506  042737  177707  001424                BIC     #177707,$TMP3   ;/SAVE RATE BITS.
3588  012514  052737  004005  001424                BIS     #BIT11!BIT2!BIT0,$TMP3  ;/SET MODE 2, NO RATE,DISABLE INTERNAL OSC
3589  012522  013777  001424  166646                MOV     $TMP3,@ASR              ;/LOAD CSR.
3590                                                                        ;/THIS MUST BE DONE IN
3591                                                                        ;/ORDER TO XFERR COUNTER
3592                                                                        ;/TO BUFFER ON ST2.
3593  012530  052777  001000  166640                BIS     #BIT9,@ASR      ;/GENERATE ON ST2 PULSE
3594  012536  017737  166636  001126                MOV     @ABR,$BDDAT     ;/READ THE PRESET BUFFER,
3595                                                                        ;/PREVIOUS COUNTER
3596  012544  012677  166626                        MOV     (6)+,@ASR       ;/CONTENTS ARE IN $BDDAT.
3597  012550  005737  001126                        TST     $BDDAT          ;/RESTORE CSR
3598  012554  001001                                BNE     TST63           ;;
3599

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

3602  012556  104002                                ERROR   2               ;CLOCKWIZE THRESHOLD SETTING OF
3603                                                                        ;ST1 SHOULD HAVE INHIBITED CLOCK
3604                                                                        ;FROM COUNTING.
```

```

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


                                        ;;*****************************************************************
                                        ;*TEST 63        *IF ENABLED, CHECK ST1,ST2 IN FROM TESTOR
                                        ;;*****************************************************************
 012560  000004                         TST63:  SCOPE
 012562  012737  000002  001160                 MOV     #2,$TIMES       ;;DO 2 ITERATIONS

 012570  005737  001440                         TST     EXS             ;OPERATING IN TESTOR MODE?
 012574  001510                                 BEQ     ENDP            ;NO-EXIT THIS TEST.

 012576  005077  166574                         CLR     @ASR            ;CLEAR THE CSR
 012602  012777  177775  166570                 MOV     #-3,@ABR        ;SET TO COUNT THREE TIMES
 012610  012777  000061  166560                 MOV     #61,@ASR        ;SET RATE:ST1, MODE1, GO
 012616  104401  012624                         TYPE    ,65$            ;;TYPE ASCIZ STRING
 012622  000433                                 BR      64$             ;;GET OVER THE ASCIZ
                                        ;;65$:  .ASCIZ  <200><7><7>#SET ST1 THRESHOLD POT IN THE MIDDLE OF ITS RANGE.#
 012712                                 64$:
 012712  004737  013700                         JSR     PC,ANYKEY       ;TYPE LAST MESS WAITE FOR OPERATOR.
 012716  005037  001124                         CLR     $GDDAT          ;EXPECT COUNTER TO BE CLEAR
 012722  017746  166450                         MOV     @ASR,-(6)       ;/SAVE CSR
 012726  011637  001424                         MOV     (6),$TMP3       ;/GET CSR.
 012732  042737  177707  001424                 BIC     #177707,$TMP3   ;/SAVE RATE BITS.
 012740  052737  004005  001424                 BIS     #BIT11!BIT2!BIT0,$TMP3  ;/SET MODE 2, NO RATE,DISABLE INTERNAL OSC
 012746  013777  001424  166422                 MOV     $TMP3,@ASR        ;/LOAD CSR.
                                                                        ;/THIS MUST BE DONE IN
                                                                        ;/ORDER TO XFERR COUNTER
                                                                        ;/TO BUFFER ON ST2.
 012754  052777  001000  166414                 BIS     #BIT9,@ASR      ;/GENERATE ON ST2 PULSE
 012762  017737  166412  001126                 MOV     @ABR,$BDDAT     ;/READ THE PRESET BUFFER,
                                                                        ;/PREVIOUS COUNTER
 012770  012677  166402                         MOV     (6)+,@ASR       ;/CONTENTS ARE IN $BDDAT.
 012774  005737  001126                         TST     $BDDAT          ;/RESTORE CSR
                                                                        ;OF NON-ZERO - REPORT ERROR
 013000  001402                                 BEQ     2$

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

 013002  104002                                 ERROR   2               ;INCORRECT # OF ST1'S
                                                                        ;RECEIVED BY CLOCK

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

 013004  000404                                 BR      ENDP

 013006                                 2$:
 013006  005777  166364                         TST     @ASR            ;DID ST2 FLG SET?
 013012  100401                                 BMI     ENDP

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

 013014  104006                                 ERROR   6               ;ST2 FLAG DID SET EVEN THOUGH
```

```
                                                                ;SWITCH WAS TOGGLED.

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

                                                        ;
                                                        ;NOW WE'LL DETERMINE IF WE ARE ALLOWED TO AUTO-SIZE.
                                                        ;IF SO, WE'LL FIND OUT IF THERE ARE OTHER CLOCKS OUT THERE
                                                        ;TO TEST.
                                                        ;
013016  000004                          ENDP:   SCOPE
013020  105737  001215                         TSTB    $ENVM           ;SEE IF APT WILL LET UP AUTO-SIZE.
013024  100537                          2$:     BMI     2$              ;NO - EXIT.

013026  023737  001434  001436                  CMP     MDEVCT,TSTCNT   ;TESTED MAX. UNITS?
013034  001507                          4$:     BEQ     4$              ;YES EXIT.
013036  006337  001426                         ASL     ROTATE          ;POINT NEXT UNIT.
013042  005237  001434                         INC     MDEVCT

013046  062737  000004  001376                 ADD     #4,ASR          ;YES, ADD TO BASE ADDR.
013054  013746  000004                         MOV     ERRVEC,-(6)     ;SAVE CONTENTS OF LOC 4.
013060  012737  013234  000004                 MOV     #1$,ERRVEC      ;SET UP IN CASE NO MORE CLOCKS.

013066  005777  166304                 LOOP:   TST     @ASR            ;TIME OUT HERE IF NO MORE CLOCKS.

                                                                        ;IF HERE, ANOTHER CLOCK FOUND.
013072  005737  001202                         TST     $PASS           ;IS THIS 1ST PASS?
013076  001003                                 BNE     3$              ;NO-GET OUT.
013100  053737  001426  001430                 BIS     ROTATE,UTEST    ;YES-RECORD THIS UNIT.
013106                                  3$:
013106  104401  013114                         TYPE    ,65$            ;;TYPE ASCIZ STRING
013112  000405                                 BR      64$             ;;GET OVER THE ASCIZ
                                        ;;65$:  .ASCIZ  <15><12>"UNIT #"
013126                                  64$:
013126  013746  001204                         MOV     $DEVCT,-(SP)    ;;SAVE $DEVCT FOR TYPEOUT
013132  104402                                 TYPOC                   ;;GO TYPE--OCTAL ASCII(ALL DIGITS)
013134  104401  013142                         TYPE    ,67$            ;;TYPE ASCIZ STRING
013140  000406                                 BR      66$             ;;GET OVER THE ASCIZ
                                        ;;67$:  .ASCIZ  " COMPLETED "
013156                                  66$:
013156  005237  001204                         INC     $DEVCT
013162  104401  013170                         TYPE    ,69$            ;;TYPE ASCIZ STRING
013166  000410                                 BR      68$             ;;GET OVER THE ASCIZ
                                        ;;69$:  .ASCIZ  " TESTING UNIT #"
013210                                  68$:
013210  013746  001204                         MOV     $DEVCT,-(SP)    ;;SAVE $DEVCT FOR TYPEOUT
013214  104402                                 TYPOC                   ;;GO TYPE--OCTAL ASCII(ALL DIGITS)
013216  012637  000004                         MOV     (6)+,ERRVEC     ;RESETORE LOC 4.
013222  062737  000010  001402                 ADD     #10,VECT1       ;UPDATE VECTOR ADDR.
013230  000137  002274                         JMP     LOOP            ;TEST NEW UNIT.
```

```
                                        1$:
013234                                          ADD     #4,SP                   ;/ADD #4 TO STACK POINTER.
013234  062706  000004                         MOV     (6)+,ERRVEC     ;RESTORE LOC 4
013240  012637  000004                         CMP     #0,$DEVCT       ;TESTED ONLY ONE UNIT?
013244  022737  000000  001204                 BEQ     2$              ;YES - NO NEED FOR TYPEOUT.
013252  001424
                                        4$:
013254                                          TYPE    ,71$            ;;TYPE ASCIZ STRING
013254  104401  013262                         BR      70$             ;;GET OVER THE ASCIZ
013260  000405                          ;;71$:  .ASCIZ  <15><12>"UNIT #"
                                        70$:
013274                                          MOV     $DEVCT,-(SP)    ;;SAVE $DEVCT FOR TYPEOUT
013274  013746  001204                         TYPOC                   ;;GO TYPE--OCTAL ASCII(ALL DIGITS)
013300  104402                                  TYPE    ,73$            ;;TYPE ASCIZ STRING
013302  104401  013310                         BR      72$             ;;GET OVER THE ASCIZ
013306  000406                          ;;73$:  .ASCIZ  " COMPLETED "
                                        72$:
013324
                                        2$:     MOV     $BASE,ASR
013324  013737  001250  001376                 MOV     $VECT1,VECT1
013332  013737  001244  001402                 MOV     $DEVCT,LCNT
013340  013737  001204  001442                 INC     LCNT
013346  005237  001442                         MOV     #0,$DEVCT
013352  012737  000000  001204
                                                CLR     MDEVCT          ;BEGIN TESTING 1ST UNIT.
013360  005037  001434                         MOV     #1,ROTATE       ;POINT TO IT.
013364  012737  000001  001426


                                        .SBTTL  END OF PASS ROUTINE

                                        ;;**************************************************************
                                        ;*INCREMENT THE PASS NUMBER ($PASS)
                                        ;*IF THERES A MONITOR GO TO IT
                                        ;*IF THERE ISN'T JUMP TO LOOP

013372                                  $EOP:
                                                NOP
013372  000240                                  CLR     $TSTNM          ;;ZERO THE TEST NUMBER
013374  005037  001102                         CLR     $TIMES          ;;ZERO THE NUMBER OF ITERATIONS
013400  005037  001160                         INC     $PASS           ;;INCREMENT THE PASS NUMBER
013404  005237  001202                         BIC     #100000,$PASS   ;;DON'T ALLOW A NEG. NUMBER
013410  042737  100000  001202                 DEC     (PC)+           ;;LOOP?
013416  005327                          $EOPCT: .WORD   1
013420  000001                                  BGT     $DOAGN          ;;YES
013422  003122                                  MOV     (PC)+,@(PC)+    ;;RESTORE COUNTER
013424  012737                          $ENDCT: .WORD   1
013426  000001                                  $EOPCT
013430  013420                                  TYPE    ,65$            ;;TYPE ASCIZ STRING
013432  104401  013440                         BR      64$             ;;GET OVER THE ASCIZ
013436  000406                          ;;65$:  .ASCIZ  <15><12>#ENDPASS #
                                        64$:
013454
013454  013746  001202                         MOV     $PASS,-(SP)     ;;SAVE $PASS FOR TYPEOUT
013460  104402                                  TYPOC                   ;;GO TYPE--OCTAL ASCII(ALL DIGITS)
```

```
                                        TYPE    ,67$            ;;TYPE ASCIZ STRING
                                        BR      66$             ;;GET OVER THE ASCIZ
                                ;;67$:  .ASCIZ  #  TOTAL ERRORS  #
                                66$:
                                        MOV     ERCNT,-(SP)     ;;SAVE ERCNT FOR TYPEOUT
                                        TYPOC                   ;;GO TYPE--OCTAL ASCII(ALL DIGITS)
                                        TYPE    ,69$            ;;TYPE ASCIZ STRING
                                        BR      68$             ;;GET OVER THE ASCIZ
                                ;;69$:  .ASCIZ  #;  THERE ARE #
                                68$:
                                        MOV     LCNT,-(SP)      ;;SAVE LCNT FOR TYPEOUT
                                        TYPOC                   ;;GO TYPE--OCTAL ASCII(ALL DIGITS)
                                        TYPE    ,71$            ;;TYPE ASCIZ STRING
                                        BR      70$             ;;GET OVER THE ASCIZ
                                ;;71$:  .ASCIZ  #  (OCTAL) UNITS.#
                                70$:
                                        TYPE    ,73$            ;;TYPE ASCIZ STRING
                                        BR      72$             ;;GET OVER THE ASCIZ
                                ;;73$:  .ASCIZ  <200>#THE GOOD UNITS (L TO R) #
                                72$:
                                        MOV     UTEST,-(SP)     ;;SAVE UTEST FOR TYPEOUT
                                        TYPBN                   ;;GO TYPE--BINARY ASCII
                                $GET42: MOV     @#42,R0         ;;GET MONITOR ADDRESS
                                        BEQ     $DOAGN          ;;BRANCH IF NO MONITOR
                                        RESET                   ;;CLEAR THE WORLD
                                $ENDAD: JSR     PC,(R0)         ;;GO TO MONITOR
                                        NOP                     ;;SAVE ROOM
                                        NOP                     ;;FOR
                                        NOP                     ;;ACT11
                                $DOAGN:
                                        JMP     @(PC)+          ;;RETURN
                                $RTNAD: .WORD   LOOP
                                $ENULL: .BYTE   -1,-1,0         ;;NULL CHARACTER STRING
                                        .EVEN

                                        ;
                                        ;THIS ROUTINE TYPES LAST MESSAGE AND WAITS FOR AN  OPERATOR
                                        ;RESPONCE.
                                        ;

                                ANYKEY: TSTB    @$TKB           ;CLEAR TTY READY FLAG.
                                        TYPE    ,65$            ;;TYPE ASCIZ STRING
                                        BR      64$             ;;GET OVER THE ASCIZ
                                ;;65$.  .ASCIZ  <200><7>#SWITCH ST1 3 TIMES,TYPE ANY KEY WHEN DONE..#<7>
                                64$:

                                1$:     TSTB    @$TKS           ;WAIT FOR OPERATOR.
                                        BPL     1$
                                        TSTB    @$TKB           ;CLEAR TTY READY FLAG.
                                        RTS PC

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

```
3821
3822
3823                                    ;
3824                                    ;SWITCH PACK S2 MUST BE SET UP AS FOLLOWS:
3825                                    ;
3826                                    ;       SWITCH  1 - OFF
3827                                    ;               2 - ON
3828                                    ;               3 - OFF
3829                                    ;               4 - OFF
3830                                    ;               5 - ON
3831                                    ;               6 - ON
3832                                    ;               7 - NOT USED
3833                                    ;
3834                                    ; THIS SELECTS TTL THRESHOLDS AND POSITIVE SLOPE FOR
3835                                    ; SCHMITT TRIGGER 1.
3836                                    ;
3837                                    ;PLEASE REMOVE ANY PREVIOUS JUMPER.
3838                                    ;
3839                                    ;JUMPER THE FOLLOWING PINS TOGETHER:
3840                                    ;
3841                                    ;       J1 - SS (ST2 OUT)       TO J1 - VV (ST1-IN)
3842                                    ;
3843                                    ;LOAD AND START AT LOCATION 210
3844                                    ;END PASSES OCCUR IMMEDIATELY AND ARE NOT REPORTED
3845                                    ;ERRORS ARE REPORTED AS IN THE REGULAR LOGIC TEST AND
3846                                    ;THEIR PRINTOUT MAY BE INHIBITED
3847  014006  104407            IOTST1: CKSWR                   ;CHECK THE SWR
3848  014010  005077  165362    1$:     CLR     @ASR            ;CLEAR THE CSR
3849  014014  005077  165360            CLR     @ABR            ;CLEAR THE BUFFER REG.
3850  014020  012777  000061  165350    MOV     #61,@ASR        ;RATE ST1, MODE 0, GO.
3851  014026  052777  001000  165342    BIS     #BIT9,@ASR      ;GENERATE A MAINTENANCE ST2.
3852  014034  012777  000005  165334    MOV     #5,@ASR         ;NOW SET TO READ COUNT REG
3853  014042  052777  001000  165326    BIS     #BIT9,@ASR      ;FORCE COUNT -> BUFFER REG.
3854  014050  027727  165324  000001    CMP     @ABR,#1         ;DID COUNT REG ADVANCE ONCE?
3855  014056  001753                    BEQ     IOTST1          ;YES - LOOP.
3856  014060  104000                    ERROR                   ;ST2 OUT TO ST1 IN FAILED.
3857  014062  000751                    BR      IOTST1
3858
3859                                    ;
3860                            .SBTTL  ;I/O SIGNAL TEST #2 CLOCK OVFLOW OUT TEST.
3861                                    ;
3862
3863                                    ;
3864                                    ;SWITCH PACK S2 MUST BE SET UP AS FOLLOWS:
3865                                    ;
3866                                    ;       SWITCH  1 - OFF
3867                                    ;               2 - OFF
3868                                    ;               3 - OFF
3869                                    ;               4 - ON
3870                                    ;               5 - ON
3871                                    ;               6 - OFF
3872                                    ;               7 - NOT USED
3873                                    ;
3874                                    ; THIS SELECTS TTL THRESHOLDS AND POSITIVE SLOPE FOR
```

```
                                                ; SCHMITT TRIGGER 2.
                                                ;
                                                ;PLEASE REMOVE ANY PREVIOUS JUMPER.
                                                ;
                                                ;JUMPER THE FOLLOWING PINS TOGETHER:
                                                ;
                                                ;       J1 - RR (CLK OV) TO J1 - TT (ST2-IN)
                                                ;
                                                ;LOAD AND START AT LOCATION 214.
                                                ;END PASSES OCCUR IMMEDIATELY AND ARE NOT REPORTED.
                                                ;ERRORS ARE REPORTED AS IN TH REGULAR LOGIC TEST AND
                                                ;THEIR PRINTOUT MAY BE INHIBITED.
                                                ;
014064  104407                        IOTST2: CKSWR                   ;CHECK THE SWR.
014066  005077  165304                        CLR     @ASR            ;CLEAR THE CSR.
014072  012777  177777  165300                MOV     #-1,@ABR        ;PRELOAD PRESET BUFFER.
014100  012777  000063  165270                MOV     #63,@ASR        ;RATE ST1, MODE 1, GO.
014106  052777  000400  165262                BIS     #BIT8,@ASR      ;GENERATE A MAIN. ST1.
014114  000240                                NOP
014116  000240                                NOP
014120  005777  165252                        TST     @ASR            ;DID OVERFLOW SET ST2 FLAG?
014124  100757                                BMI     IOTST2          ;YES - LOOP
014126  104000                                ERROR                   ;CLK OV OUT TO ST2 IN FAILED.
014130  000755                                BR      IOTST2          ;LOOP
                                                ;
                                        .SBTTL  ;I/O SIGNAL TEST #3 ST1 OUT AND ST2 IN
                                                ;
                                                ;
                                                ;SWITCH PACK S2 MUST BE SET UP AS FOLLOWS:
                                                ;       SWITCH  1 - OFF
                                                ;               2 - OFF
                                                ;               3 - OFF
                                                ;               4 - ON
                                                ;               5 - ON
                                                ;               6 - ON
                                                ;               7 - NOT USED
                                                ; THIS SELECTS TTL THRESHOLD AND POSITIVE SLOPE FOR
                                                ; SCHMITT TRIGGER 2.
                                                ;
                                                ;PLEASE REMOVE ANY PREVIOUS JUMPERS.
                                                ;
                                                ;JUMPER THE FOLLOWING PINS TOGETHER:
                                                ;       J1 - UU (ST1 OUT)       TO J1 - TT (ST2-IN)
                                                ;
                                                ;LOAD AND START AT LOCATION 220
                                                ;END PASSES OCCUR IMMEDIATELY AND ARE NOT REPORTED
                                                ;ERRORS ARE REPORTED AS IN THE REGULAR LOGIC TEST AND
                                                ;THEIR PRINTOUT MAY BE INHIBITED
                                                ;
014132  104407                        IOTST3: CKSWR                   ;CHECK THE SWR
014134  012777  000001  165234                MOV     #1,@ASR         ;SET GO BIT.
014142  052777  000400  165226                BIS     #BIT8,@ASR      ;GENERATE A MAIN. ST1.
```

```
                014150  005777  165222          TST     @ASR            ;DID ST2 FLAG SET?
                014154  100401                  BMI     1$
                014156  104000                  ERROR                   ;ST1 OUT TO ST2 IN FAILED
                014160  032777  010000  165210  1$:     BIT     #BIT12,@ASR     ;DID "FOR" BIT SET?
                014166  001761                  BEQ     IOTST3          ;NO - GOOD!
                014170  104000                  ERROR                   ;"FOR" BIT SET ON ONLY 1 ST2.
                014172  000757                  BR      IOTST3          ;LOOP
                                                .SBTTL
                                                .SBTTL  *SYSMAC ROUTINES
                                                .SBTTL
                                        .SBTTL  BINARY TO OCTAL (ASCII) AND TYPE
                                        ;;**********************************************************************
                                        ;*THIS ROUTINE IS USED TO CHANGE A 16-BIT BINARY NUMBER TO A 6-DIGIT
                                        ;*OCTAL (ASCII) NUMBER AND TYPE IT.
                                        ;*$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
                014174  017646  000000  $TYPOS: MOV     @(SP),-(SP)     ;;PICKUP THE MODE
                014200  116637  000001  014417  MOVB    1(SP),$OFILL    ;;LOAD ZERO FILL SWITCH
                014206  112637  014421          MOVB    (SP)+,$OMODE+1  ;;NUMBER OF DIGITS TO TYPE
                014212  062716  000002          ADD     #2,(SP)         ;;ADJUST RETURN ADDRESS
                014216  000406                  BR      $TYPON
                014220  112737  000001  014417  $TYPOC: MOVB    #1,$OFILL       ;;SET THE ZERO FILL SWITCH
                014226  112737  000006  014421          MOVB    #6,$OMODE+1     ;;SET FOR SIX(6) DIGITS
                014234  112737  000005  014416  $TYPON: MOVB    #5,$OCNT        ;;SET THE ITERATION COUNT
                014242  010346                  MOV     R3,-(SP)        ;;SAVE R3
                014244  010446                  MOV     R4,-(SP)        ;;SAVE R4
                014246  010546                  MOV     R5,-(SP)        ;;SAVE R5
                014250  113704  014421          MOVB    $OMODE+1,R4     ;;GET THE NUMBER OF DIGITS TO TYPE
                014254  005404                  NEG     R4
                014256  062704  000006          ADD     #6,R4           ;;SUBTRACT IT FOR MAX. ALLOWED
                014262  110437  014420          MOVB    R4,$OMODE       ;;SAVE IT FOR USE
                014266  113704  014417          MOVB    $OFILL,R4       ;;GET THE ZERO FILL SWITCH
```

```
3983  014272  016605  000012              MOV     12(SP),R5       ;;PICKUP THE INPUT NUMBER
3984  014276  005003                      CLR     R3              ;;CLEAR THE OUTPUT WORD
3985  014300  006105              1$:     ROL     R5              ;;ROTATE MSB INTO "C"
3986  014302  000404                      BR      3$              ;;GO DO MSB
3987  014304  006105              2$:     ROL     R5              ;;FORM THIS DIGIT
3988  014306  006105                      ROL     R5
3989  014310  006105                      ROL     R5
3990  014312  010503                      MOV     R5,R3
3991  014314  006103              3$:     ROL     R3              ;;GET LSB OF THIS DIGIT
3992  014316  105337  014420              DECB    $OMODE          ;;TYPE THIS DIGIT?
3993  014322  100016                      BPL     7$              ;;BR IF NO
3994  014324  042703  177770              BIC     #177770,R3      ;;GET RID OF JUNK
3995  014330  001002                      BNE     4$              ;;TEST FOR 0
3996  014332  005704                      TST     R4              ;;SUPPRESS THIS 0?
3997  014334  001403                      BEQ     5$              ;;BR IF YES
3998  014336  005204              4$:     INC     R4              ;;DON'T SUPPRESS ANYMORE 0'S
3999  014340  052703  000060              BIS     #'0,R3          ;;MAKE THIS DIGIT ASCII
4000  014344  052703  000040      5$:     BIS     #' ,R3          ;;MAKE ASCII IF NOT ALREADY
4001  014350  110337  014414              MOVB    R3,8$           ;;SAVE FOR TYPING
4002  014354  104401  014414              TYPE    ,8$             ;;GO TYPE THIS DIGIT
4003  014360  105337  014416      7$:     DECB    $OCNT           ;;COUNT BY 1
4004  014364  003347                      BGT     2$              ;;BR IF MORE TO DO
4005  014366  002402                      BLT     6$              ;;BR IF DONE
4006  014370  005204                      INC     R4              ;;INSURE LAST DIGIT ISN'T A BLANK
4007  014372  000744                      BR      2$              ;;GO DO THE LAST DIGIT
4008  014374  012605              6$:     MOV     (SP)+,R5        ;;RESTORE R5
4009  014376  012604                      MOV     (SP)+,R4        ;;RESTORE R4
4010  014400  012603                      MOV     (SP)+,R3        ;;RESTORE R3
4011  014402  016666  000002  000004      MOV     2(SP),4(SP)     ;;SET THE STACK FOR RETURNING
4012  014410  012616                      MOV     (SP)+,(SP)
4013  014412  000002                      RTI                     ;;RETURN
4014  014414     000              8$:     .BYTE   0               ;;STORAGE FOR ASCII DIGIT
4015  014415     000                      .BYTE   0               ;;TERMINATOR FOR TYPE ROUTINE
4016  014416     000              $OCNT:  .BYTE   0               ;;OCTAL DIGIT COUNTER
4017  014417     000              $OFILL: .BYTE   0               ;;ZERO FILL SWITCH
4018  014420  000000              $OMODE: .WORD   0               ;;NUMBER OF DIGITS TO TYPE
4019                                      .SBTTL  BINARY TO ASCII AND TYPE ROUTINE
4020
4021                                      ;;**************************************************************
4022                                      ;*THIS ROUTINE IS USED TO CHANGE A 16-BIT BINARY NUMBER TO A 16-BIT
4023                                      ;*BINARY-ASCII NUMBER AND TYPE IT.
4024                                      ;*CALL:
4025                                      ;*      MOV     NUMBER,-(SP)    ;;NUMBER TO BE TYPED
4026                                      ;*      TYPBN                   ;;TYPE IT
4027
4028  014422  010146              $TYPBN: MOV     R1,-(SP)        ;;SAVE R1 ON THE STACK
4029  014424  016601  000006              MOV     6(SP),R1        ;;GET THE INPUT NUMBER
4030  014430  000261                      SEC                     ;;SET "C" SO CAN KEEP TRACK OF THE NUMBER OF BITS
4031  014432  112737  000060  014474  1$: MOVB    #'0,$BIN        ;;SET CHARACTER TO AN ASCII "0".
4032  014440  006101                      ROL     R1              ;;GET THIS BIT
4033  014442  001406                      BEQ     2$              ;;DONE?
4034  014444  105537  014474              ADCB    $BIN            ;;NO--SET THE CHARACTER EQUAL TO THIS BIT
4035  014450  104401  014474              TYPE    ,$BIN           ;;GO TYPE THIS BIT
4036  014454  000241                      CLC                     ;;CLEAR "C" SO CAN KEEP TRACK OF BITS
```

```
4037  014456  000765                        BR      1$              ;;GO DO THE NEXT BIT
4038  014460  012601                2$:     MOV     (SP)+,R1        ;;POP THE STACK INTO R1
4039  014462  016666  000002  000004        MOV     2(SP),4(SP)     ;;ADJUST THE STACK
4040  014470  012616                        MOV     (SP)+,(SP)
4041  014472  000002                        RTI                     ;;RETURN TO USER
4042  014474     000     000        $BIN:   .BYTE   0,0             ;;STORAGE FOR ASCII CHAR. AND TERMINATOR
4043
4044
4045                                .SBTTL  ERROR HANDLER ROUTINE
4046
4047                                ;;**************************************************************
4048                                ;*THIS ROUTINE WILL INCREMENT THE ERROR FLAG AND THE ERROR COUNT,
4049                                ;*SAVE THE ERROR ITEM NUMBER AND THE ADDRESS OF THE ERROR CALL
4050                                ;*AND GO TO $ERRTYP ON ERROR
4051                                ;*THE SWITCH OPTIONS PROVIDED BY THIS ROUTINE ARE:
4052                                ;*SW15=1         HALT ON ERROR
4053                                ;*SW13=1         INHIBIT ERROR TYPEOUTS
4054                                ;*SW10=1         BELL ON ERROR
4055                                ;*SW09=1         LOOP ON ERROR
4056                                ;*CALL
4057                                ;*      ERROR   N       ;;ERROR=EMT AND N=ERROR ITEM NUMBER
4058
4059  014476                        $ERROR:
4060  014476  104407                        CKSWR                   ;;TEST FOR CHANGE IN SOFT-SWR
4061  014500  105237  001103        7$:     INCB    $ERFLG          ;;SET THE ERROR FLAG
4062  014504  001775                        BEQ     7$              ;;DON'T LET THE FLAG GO TO ZERO
4063  014506  013777  001102  164426        MOV     $TSTNM,@DISPLAY ;;DISPLAY TEST NUMBER AND ERROR FLAG
4064  014514  032777  002000  164416        BIT     #BIT10,@SWR     ;;BELL ON ERROR?
4065  014522  001402                        BEQ     1$              ;;NO - SKIP
4066  014524  104401  001164                TYPE    ,$BELL          ;;RING BELL
4067  014530  005237  001112        1$:     INC     $ERTTL          ;;COUNT THE NUMBER OF ERRORS
4068  014534  011637  001116                MOV     (SP),$ERRPC     ;;GET ADDRESS OF ERROR INSTRUCTION
4069  014540  162737  000002  001116        SUB     #2,$ERRPC
4070  014546  117737  164344  001114        MOVB    @$ERRPC,$ITEMB  ;;STRIP AND SAVE THE ERROR ITEM CODE
4071  014554  032777  020000  164356        BIT     #BIT13,@SWR     ;;SKIP TYPEOUT IF SET
4072  014562  001004                        BNE     20$             ;;SKIP TYPEOUTS
4073  014564  004737  014704                JSR     PC,$ERRTYP      ;;GO TO USER ERROR ROUTINE
4074  014570  104401  001171                TYPE    ,$CRLF
4075  014574                        20$:
4076  014574  122737  000001  001214        CMPB    #APTENV,$ENV    ;;RUNNING IN APT MODE
4077  014602  001007                        BNE     2$              ;;NO,SKIP APT ERROR REPORT
4078  014604  113737  001114  014616        MOVB    $ITEMB,21$      ;;SET ITEM NUMBER AS ERROR NUMBER
4079  014612  004737  016376                JSR     PC,$ATY4        ;;REPORT FATAL ERROR TO APT
4080  014616     000        21$:    .BYTE   0
4081  014617     000                .BYTE   0
4082  014620  000777        22$:    BR      22$             ;;APT ERROR LOOP
4083  014622  005777  164312        2$:     TST     @SWR            ;;HALT ON ERROR
4084  014626  100002                        BPL     3$              ;;SKIP IF CONTINUE
4085  014630  000000                        HALT                    ;;HALT ON ERROR!
4086  014632  104407                        CKSWR                   ;;TEST FOR CHANGE IN SOFT-SWR
4087  014634  032777  001000  164276  3$:   BIT     #BIT09,@SWR     ;;LOOP ON ERROR SWITCH SET?
4088  014642  001402                        BEQ     4$              ;;BR IF NO
4089  014644  013716  001110                MOV     $LPERR,(SP)     ;;FUDGE RETURN FOR LOOPING
4090  014650  005737  001162        4$:     TST     $ESCAPE         ;;CHECK FOR AN ESCAPE ADDRESS
```

```
                                        BEQ     5$              ;;BR IF NONE
                                        MOV     $ESCAPE,(SP)    ;;FUDGE RETURN ADDRESS FOR ESCAPE
                                5$:
                                        INC     ERCNT           ;/UPDATE ERROR COUNT.
                                        BNE     10$             ;/BUT DON'T LET IT OVERFLOW.
                                        DEC     ERCNT           ;/KEEP AT 177777 IF OVERFLOW.
                                10$:
                                        BIC     ROTATE,UTEST    ;/REMOVE UNIT FROM LIST OF GOOD ONES.
                                        RTI                     ;/EXIT.

                                .SBTTL  ERROR MESSAGE TYPEOUT ROUTINE

                                ;;**************************************************************
                                ;*THIS ROUTINE USES THE "ITEM CONTROL BYTE" ($ITEMB) TO DETERMINE WHICH
                                ;*ERROR IS TO BE REPORTED. IT THEN OBTAINS, FROM THE "ERROR TABLE" ($ERRTB),
                                ;*AND REPORTS THE APPROPRIATE INFORMATION CONCERNING THE ERROR.

                                $ERRTYP:
                                        TYPE    ,$CRLF          ;;"CARRIAGE RETURN" & "LINE FEED"
                                        MOV     R0,-(SP)        ;;SAVE R0
                                        CLR     R0              ;;PICKUP THE ITEM INDEX
                                        BISB    @#$ITEMB,R0
                                        BNE     1$              ;;IF ITEM NUMBER IS ZERO, JUST
                                                                ;;TYPE THE PC OF THE ERROR
                                        MOV     $ERRPC,-(SP)    ;;SAVE $ERRPC FOR TYPEOUT
                                                                ;;ERROR ADDRESS
                                        TYPOC                   ;;GO TYPE--OCTAL ASCII(ALL DIGITS)
                                        BR      6$              ;;GET OUT
                                1$:     DEC     R0              ;;ADJUST THE INDEX SO THAT IT WILL
                                        ASL     R0              ;;      WORK FOR THE ERROR TABLE
                                        ASL     R0
                                        ASL     R0
                                        ADD     #$ERRTB,R0      ;;FORM TABLE POINTER
                                        MOV     (R0)+,2$        ;;PICKUP "ERROR MESSAGE" POINTER
                                        BEQ     3$              ;;SKIP TYPEOUT IF NO POINTER
                                        TYPE                    ;;TYPE THE "ERROR MESSAGE"
                                2$:     .WORD   0               ;;"ERROR MESSAGE" POINTER GOES HERE
                                        TYPE    ,$CRLF          ;;"CARRIAGE RETURN" & "LINE FEED"
                                3$:     MOV     (R0)+,4$        ;;PICKUP "DATA HEADER" POINTER
                                        BEQ     5$              ;;SKIP TYPEOUT IF 0
                                        TYPE                    ;;TYPE THE "DATA HEADER"
                                4$:     .WORD   0               ;;"DATA HEADER" POINTER GOES HERE
                                        TYPE    ,$CRLF          ;;"CARRIAGE RETURN" & "LINE FEED"
                                5$:     MOV     (R0),R0         ;;PICKUP "DATA TABLE" POINTER
                                        BNE     7$              ;;GO TYPE THE DATA
                                6$:     MOV     (SP)+,R0        ;;RESTORE R0
                                        TYPE    ,$CRLF          ;;"CARRIAGE RETURN" & "LINE FEED"
                                        RTS     PC              ;;RETURN
                                7$:
                                        MOV     @(R0)+,-(SP)    ;;SAVE @(R0)+ FOR TYPEOUT
                                        TYPOC                   ;;GO TYPE--OCTAL ASCII(ALL DIGITS)
                                        TST     (R0)            ;;IS THERE ANOTHER NUMBER?
                                        BEQ     6$              ;;BR IF NO
```

```
4145  015026  104401  015034                  TYPE    ,8$             ;;TYPE TWO(2) SPACES
4146  015032  000771                          BR      7$              ;;LOOP
4147  015034  020040    000           8$:     .ASCIZ  / /             ;;TWO(2) SPACES
4148          015040                          .EVEN
4149                                .SBTTL  SCOPE HANDLER ROUTINE
4150
4151                                ;;**********************************************************************
4152                                ;*THIS ROUTINE CONTROLS THE LOOPING OF SUBTESTS. IT WILL INCREMENT
4153                                ;*AND LOAD THE TEST NUMBER($TSTNM) INTO THE DISPLAY REG.(DISPLAY<7:0>)
4154                                ;*AND LOAD THE ERROR FLAG ($ERFLG) INTO DISPLAY<15:08>
4155                                ;*THE SWITCH OPTIONS PROVIDED BY THIS ROUTINE ARE:
4156                                ;*SW14=1         LOOP ON TEST
4157                                ;*SW11=1         INHIBIT ITERATIONS
4158                                ;*SW09=1         LOOP ON ERROR
4159                                ;*SW08=1         LOOP ON TEST IN SWR<7:0>
4160                                ;*CALL
4161                                ;*      SCOPE           ;;SCOPE=IOT
4162
4163  015040                        $SCOPE:
4164  015040  104407                         CKSWR                   ;;TEST  FOR CHANGE IN SOFT-SWR
4165  015042  104407                         CKSWR
4166  015044  032777  040000  164066  1$:    BIT     #BIT14,@SWR     ;;LOOP ON PRESENT TEST?
4167  015052  001114                         BNE     $OVER           ;;YES IF SW14=1
4168                                ;#####START OF CODE FOR THE XOR TESTER#####
4169  015054  000416                $XTSTR: BR      6$              ;;IF RUNNING ON THE "XOR" TESTER CHANGE
4170                                                                ;;THIS INSTRUCTION TO A "NOP" (NOP=240)
4171  015056  013746  000004                 MOV     @#ERRVEC,-(SP)  ;;SAVE THE CONTENTS OF THE ERROR VECTOR
4172  015062  012737  015102  000004         MOV     #5$,@#ERRVEC    ;;SET FOR TIMEOUT
4173  015070  005737  177060                 TST     @#177060        ;;TIME OUT ON XOR?
4174  015074  012637  000004                 MOV     (SP)+,@#ERRVEC  ;;RESTORE THE ERROR VECTOR
4175  015100  000463                         BR      $SVLAD          ;;GO TO THE NEXT TEST
4176  015102  022626                5$:     CMP     (SP)+,(SP)+     ;;CLEAR THE STACK AFTER A TIME OUT
4177  015104  012637  000004                 MOV     (SP)+,@#ERRVEC  ;;RESTORE THE ERROR VECTOR
4178  015110  000423                         BR      7$              ;;LOOP ON THE PRESENT TEST
4179  015112                        6$:;#####END OF CODE FOR THE XOR TESTER#####
4180  015112  032777  000400  164020         BIT     #BIT08,@SWR     ;;LOOP ON SPEC. TEST?
4181  015120  001404                         BEQ     2$              ;;BR IF NO
4182  015122  127737  164012  001102         CMPB    @SWR,$TSTNM     ;;ON THE RIGHT TEST?    SWR<7:0>
4183  015130  001465                         BEQ     $OVER           ;;BR IF YES
4184  015132  105737  001103         2$:     TSTB    $ERFLG          ;;HAS AN ERROR OCCURRED?
4185  015136  001421                         BEQ     3$              ;;BR IF NO
4186  015140  123737  001115  001103         CMPB    $ERMAX,$ERFLG   ;;MAX. ERRORS FOR THIS TEST OCCURRED?
4187  015146  101015                         BHI     3$              ;;BR IF NO
4188  015150  032777  001000  163762         BIT     #BIT09,@SWR     ;;LOOP ON ERROR?
4189  015156  001404                         BEQ     4$              ;;BR IF NO
4190  015160  013737  001110  001106  7$:    MOV     $LPERR,$LPADR   ;;SET LOOP ADDRESS TO LAST SCOPE
4191  015166  000446                         BR      $OVER
4192  015170  105037  001103         4$:     CLRB    $ERFLG          ;;ZERO THE ERROR FLAG
4193  015174  005037  001160                 CLR     $TIMES          ;;CLEAR THE NUMBER OF ITERATIONS TO MAKE
4194  015200  000415                         BR      1$              ;;ESCAPE TO THE NEXT TEST
4195  015202  032777  004000  163730  3$:    BIT     #BIT11,@SWR     ;;INHIBIT ITERATIONS?
4196  015210  001011                         BNE     1$              ;;BR IF YES
4197  015212  005737  001202                 TST     $PASS           ;;IF FIRST PASS OF PROGRAM
4198  015216  001406                         BEQ     1$              ;;      INHIBIT ITERATIONS
```

```
4199  015220  005237  001104                 INC     $ICNT           ;;INCREMENT ITERATION COUNT
4200  015224  023737  001160  001104         CMP     $TIMES,$ICNT    ;;CHECK THE NUMBER OF ITERATIONS MADE
4201  015232  002024                         BGE     $OVER           ;;BR IF MORE ITERATION REQUIRED
4202  015234  012737  000001  001104 1$:     MOV     #1,$ICNT        ;;REINITIALIZE THE ITERATION COUNTER
4203  015242  013737  015320  001160         MOV     $MXCNT,$TIMES   ;;SET NUMBER OF ITERATIONS TO DO
4204  015250  105237  001102         $SVLAD: INCB    $TSTNM          ;;COUNT TEST NUMBERS
4205  015254  113737  001102  001200         MOVB    $TSTNM,$TESTN   ;;SET TEST NUMBER IN APT MAILBOX
4206  015262  011637  001106                 MOV     (SP),$LPADR     ;;SAVE SCOPE LOOP ADDRESS
4207  015266  011637  001110                 MOV     (SP),$LPERR     ;;SAVE ERROR LOOP ADDRESS
4208  015272  005037  001162                 CLR     $ESCAPE         ;;CLEAR THE ESCAPE FROM ERROR ADDRESS
4209  015276  112737  000001  001115         MOVB    #1,$ERMAX       ;;ONLY ALLOW ONE(1) ERROR ON NEXT TEST
4210  015304  013777  001102  163630 $OVER:  MOV     $TSTNM,@DISPLAY ;;DISPLAY TEST NUMBER
4211  015312  013716  001106                 MOV     $LPADR,(SP)     ;;FUDGE RETURN ADDRESS
4212  015316  000002                         RTI                     ;;FIXES PS
4213  015320  003720                 $MXCNT: 2000.                   ;;MAX. NUMBER OF ITERATIONS
4214                                  .SBTTL  TTY INPUT ROUTINE
4215
4216                                  ;;**************************************************************
4217                                  .ENABL  LSB
4218
4219                                  ;;**************************************************************
4220                                  ;*SOFTWARE SWITCH REGISTER CHANGE ROUTINE.
4221                                  ;*ROUTINE IS ENTERED FROM THE TRAP HANDLER, AND WILL
4222                                  ;*SERVICE THE TEST FOR CHANGE IN SOFTWARE SWITCH REGISTER TRAP CALL
4223                                  ;*WHEN OPERATING IN TTY FLAG MODE.
4224  015322  022737  000176  001140 $CKSWR: CMP     #SWREG,SWR      ;;IS THE SOFT-SWR SELECTED?
4225  015330  001074                         BNE     15$             ;;BRANCH IF NO
4226  015332  105777  163606                 TSTB    @$TKS           ;;CHAR THERE?
4227  015336  100071                         BPL     15$             ;;IF NO, DON'T WAIT AROUND
4228  015340  117746  163602                 MOVB    @$TKB,-(SP)     ;;SAVE THE CHAR
4229  015344  042716  177600                 BIC     #^C177,(SP)     ;;STRIP-OFF THE ASCII
4230  015350  022726  000007                 CMP     #7,(SP)+        ;;IS IT A CONTROL G?
4231  015354  001062                         BNE     15$             ;;NO, RETURN TO USER
4232  015356  123727  001134  000001         CMPB    $AUTOB,#1       ;;ARE WE RUNNING IN AUTO-MODE?
4233  015364  001456                         BEQ     15$             ;;BRANCH IF YES
4234
4235  015366  104401  016047                 TYPE    ,$CNTLG         ;;ECHO THE CONTROL-G (^G)
4236  015372  104401  016054         $GTSWR: TYPE    ,$MSWR          ;;TYPE CURRENT CONTENTS
4237  015376  013746  000176                 MOV     $SWREG,-(SP)    ;;SAVE SWREG FOR TYPEOUT
4238  015402  104402                         TYPOC                   ;;GO TYPE--OCTAL ASCII(ALL DIGITS)
4239  015404  104401  016065                 TYPE    ,$MNEW          ;;PROMPT FOR NEW SWR
4240  015410  005046                 19$:    CLR     -(SP)           ;;CLEAR COUNTER
4241  015412  005046                         CLR     -(SP)           ;;THE NEW SWR
4242  015414  105777  163524         7$:     TSTB    @$TKS           ;;CHAR THERE?
4243  015420  100375                         BPL     7$              ;;IF NOT TRY AGAIN
4244
4245  015422  117746  163520                 MOVB    @$TKB,-(SP)     ;;PICK UP CHAR
4246  015426  042716  177600                 BIC     #^C177,(SP)     ;;MAKE IT 7-BIT ASCII
4247
4248
4249
4250  015432  021627  000025         9$:     CMP     (SP),#25        ;;IS IT A CONTROL-U?
4251  015436  001005                         BNE     10$             ;;BRANCH IF NOT
4252  015440  104401  016042                 TYPE    ,$CNTLU         ;;YES, ECHO CONTROL-U (^U)
```

```
4253  015444  062706  000006          20$:    ADD     #6,SP           ;;IGNORE PREVIOUS INPUT
4254  015450  000757                          BR      19$             ;;LET'S TRY IT AGAIN
4255
4256
4257  015452  021627  000015          10$:    CMP     (SP),#15        ;;IS IT A <CR>?
4258  015456  001022                          BNE     16$             ;;BRANCH IF NO
4259  015460  005766  000004                  TST     4(SP)           ;;YES, IS IT THE FIRST CHAR?
4260  015464  001403                          BEQ     11$             ;;BRANCH IF YES
4261  015466  016677  000002  163444          MOV     2(SP),@SWR      ;;SAVE NEW SWR
4262  015474  062706  000006          11$:    ADD     #6,SP           ;;CLEAR UP STACK
4263  015500  104401  001171          14$:    TYPE    ,$CRLF          ;;ECHO <CR> AND <LF>
4264  015504  123727  001135  000001          CMPB    $INTAG,#1       ;;RE-ENABLE TTY KBD INTERRUPTS?
4265  015512  001003                          BNE     15$             ;;BRANCH IF NOT
4266  015514  012777  000100  163422          MOV     #100,@$TKS      ;;RE-ENABLE TTY KBD INTERRUPTS
4267  015522  000002          15$:    RTI                             ;;RETURN
4268  015524  004737  016310          16$:    JSR     PC,$TYPEC       ;;ECHO CHAR
4269  015530  021627  000060                  CMP     (SP),#60        ;;CHAR < 0?
4270  015534  002420                          BLT     18$             ;;BRANCH IF YES
4271  015536  021627  000067                  CMP     (SP),#67        ;;CHAR > 7?
4272  015542  003015                          BGT     18$             ;;BRANCH IF YES
4273  015544  042726  000060                  BIC     #60,(SP)+       ;;STRIP-OFF ASCII
4274  015550  005766  000002                  TST     2(SP)           ;;IS THIS THE FIRST CHAR
4275  015554  001403                          BEQ     17$             ;;BRANCH IF YES
4276  015556  006316                          ASL     (SP)            ;;NO, SHIFT PRESENT
4277  015560  006316                          ASL     (SP)            ;;    CHAR OVER TO MAKE
4278  015562  006316                          ASL     (SP)            ;;    ROOM FOR NEW ONE.
4279  015564  005266  000002          17$:    INC     2(SP)           ;;KEEP COUNT OF CHAR
4280  015570  056616  177776                  BIS     -2(SP),(SP)     ;;SET IN NEW CHAR
4281  015574  000707                          BR      7$              ;;GET THE NEXT ONE
4282  015576  104401  001170          18$:    TYPE    ,$QUES          ;;TYPE ?<CR><LF>
4283  015602  000720                          BR      20$             ;;SIMULATE CONTROL-U
4284                                  .DSABL  LSB
4285
4286
4287                                  ;;**************************************************************
4288                                  ;*THIS ROUTINE WILL INPUT A SINGLE CHARACTER FROM THE TTY
4289                                  ;*CALL:
4290                                  ;*      RDCHR                   ;;INPUT A SINGLE CHARACTER FROM THE TTY
4291                                  ;*      RETURN HERE             ;;CHARACTER IS ON THE STACK
4292                                  ;*                              ;;WITH PARITY BIT STRIPPED OFF
4293                                  ;
4294
4295  015604  011646          $RDCHR: MOV     (SP),-(SP)      ;;PUSH DOWN THE PC
4296  015606  016666  000004  000002          MOV     4(SP),2(SP)     ;;SAVE THE PS
4297  015614  105777  163324          1$:     TSTB    @$TKS           ;;WAIT FOR
4298  015620  100375                          BPL     1$              ;;A CHARACTER
4299  015622  117766  163320  000004          MOVB    @$TKB,4(SP)     ;;READ THE TTY
4300  015630  042766  177600  000004          BIC     #^C<177>,4(SP)  ;;GET RID OF JUNK IF ANY
4301  015636  026627  000004  000023          CMP     4(SP),#23       ;;IS IT A CONTROL-S?
4302  015644  001013                          BNE     3$              ;;BRANCH IF NO
4303  015646  105777  163272          2$:     TSTB    @$TKS           ;;WAIT FOR A CHARACTER
4304  015652  100375                          BPL     2$              ;;LOOP UNTIL ITS THERE
4305  015654  117746  163266                  MOVB    @$TKB,-(SP)     ;;GET CHARACTER
4306  015660  042716  177600                  BIC     #^C177,(SP)     ;;MAKE IT 7-BIT ASCII
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4307  015664  022627  000021                  CMP     (SP)+,#21       ;;IS IT A CONTROL-Q?
4308  015670  001366                          BNE     2$              ;;IF NOT DISCARD IT
4309  015672  000750                          BR      1$              ;;YES, RESUME
4310  015674  026627  000004  000140  3$:     CMP     4(SP),#140      ;;IS IT UPPER CASE?
4311  015702  002407                          BLT     4$              ;;BRANCH IF YES
4312  015704  026627  000004  000175          CMP     4(SP),#175      ;;IS IT A SPECIAL CHAR?
4313  015712  003003                          BGT     4$              ;;BRANCH IF YES
4314  015714  042766  000040  000004          BIC     #40,4(SP)       ;;MAKE IT UPPER CASE
4315  015722  000002                  4$:     RTI                     ;;GO BACK TO USER
4316                                  ;;**************************************************
4317                                  ;*THIS ROUTINE WILL INPUT A STRING FROM THE TTY
4318                                  ;*CALL:
4319                                  ;*      RDLIN                   ;;INPUT A STRING FROM THE TTY
4320                                  ;*      RETURN HERE             ;;ADDRESS OF FIRST CHARACTER WILL BE ON THE STACK
4321                                  ;*                              ;;TERMINATOR WILL BE A BYTE OF ALL 0'S
4322
4323  015724  010346                  $RDLIN: MOV     R3,-(SP)        ;;SAVE R3
4324  015726  012703  016032          1$:     MOV     #$TTYIN,R3      ;;GET ADDRESS
4325  015732  022703  016042          2$:     CMP     #$TTYIN+8.,R3   ;;BUFFER FULL?
4326  015736  101405                          BLOS    4$              ;;BR IF YES
4327  015740  104410                          RDCHR                   ;;GO READ ONE CHARACTER FROM THE TTY
4328  015742  112613                          MOVB    (SP)+,(R3)      ;;GET CHARACTER
4329  015744  122713  000177          10$:    CMPB    #177,(R3)       ;;IS IT A RUBOUT
4330  015750  001003                          BNE     3$              ;;SKIP IF NOT
4331  015752  104401  001170          4$:     TYPE    $QUES           ;;TYPE A '?'
4332  015756  000763                          BR      1$              ;;CLEAR THE BUFFER AND LOOP
4333  015760  111337  016030          3$:     MOVB    (R3),9$         ;;ECHO THE CHARACTER
4334  015764  104401  016030                  TYPE    9$
4335  015770  122723  000015                  CMPB    #15,(R3)+       ;;CHECK FOR RETURN
4336  015774  001356                          BNE     2$              ;;LOOP IF NOT RETURN
4337  015776  105063  177777                  CLRB    -1(R3)          ;;CLEAR RETURN (THE 15)
4338  016002  104401  001172                  TYPE    $LF             ;;TYPE A LINE FEED
4339  016006  012603                          MOV     (SP)+,R3        ;;RESTORE R3
4340  016010  011646                          MOV     (SP),-(SP)      ;;ADJUST THE STACK AND PUT ADDRESS OF THE
4341  016012  016666  000004  000002          MOV     4(SP),2(SP)     ;;      FIRST ASCII CHARACTER ON IT
4342  016020  012766  016032  000004          MOV     #$TTYIN,4(SP)
4343  016026  000002                          RTI                     ;;RETURN
4344  016030     000                  9$:     .BYTE   0               ;;STORAGE FOR ASCII CHAR. TO TYPE
4345  016031     000                          .BYTE   0               ;;TERMINATOR
4346  016032  000010                  $TTYIN: .BLKB   8.              ;;RESERVE 8 BYTES FOR TTY INPUT
4347  016042  052536  005015     000  $CNTLU: .ASCIZ  /↑U/<15><12>    ;;CONTROL "U"
4348  016047     136  006507  000012  $CNTLG: .ASCIZ  /↑G/<15><12>    ;;CONTROL "G"
4349  016054  005015  053523  020122  $MSWR:  .ASCIZ  <15><12>/SWR = /
4350  016062  020075     000
4351  016065     040  047040  053505  $MNEW:  .ASCIZ  /  NEW = /
4352  016072  036440  000040
4353                                  .SBTTL  TYPE ROUTINE
4354
4355                                  ;;**************************************************************
4356                                  ;*ROUTINE TO TYPE ASCIZ MESSAGE. MESSAGE MUST TERMINATE WITH A 0 BYTE.
4357                                  ;*THE ROUTINE WILL INSERT A NUMBER OF NULL CHARACTERS AFTER A LINE FEED.
4358                                  ;*NOTE1:        $NULL CONTAINS THE CHARACTER TO BE USED AS THE FILLER CHARACTER.
4359                                  ;*NOTE2:        $FILLS CONTAINS THE NUMBER OF FILLER CHARACTERS REQUIRED.
4360                                  ;*NOTE3:        $FILLC CONTAINS THE CHARACTER TO FILL AFTER.
```

```
                                        ;*
                                        ;*CALL:
                                        ;*1) USING A TRAP INSTRUCTION
                                        ;*      TYPE    ,MESADR         ;;MESADR IS FIRST ADDRESS OF AN ASCIZ STRING
                                        ;*OR
                                        ;*      TYPE
                                        ;*      MESADR
                                        ;*
016076  105737  001157          $TYPE:  TSTB    $TPFLG          ;;IS THERE A TERMINAL?
016102  100002                          BPL     1$              ;;BR IF YES
016104  000000                          HALT                    ;;HALT HERE IF NO TERMINAL
016106  000430                          BR      3$              ;;LEAVE
016110  010046                  1$:     MOV     R0,-(SP)        ;;SAVE R0
016112  017600  000002                  MOV     @2(SP),R0       ;;GET ADDRESS OF ASCIZ STRING
016116  122737  000001  001214          CMPB    #APTENV,$ENV    ;;RUNNING IN APT MODE
016124  001011                          BNE     62$             ;;NO GO CHECK FOR APT CONSOLE
016126  132737  000100  001215          BITB    #APTSPOOL,$ENVM ;;SPOOL MESSAGE TO APT
016134  001405                          BEQ     62$             ;;NO GO CHECK FOR CONSOLE
016136  010037  016146                  MOV     R0,61$          ;;SETUP MESSAGE ADDRESS FOR APT
016142  004737  016366                  JSR     PC,$ATY3        ;;SPOOL MESSAGE TO APT
016146  000000                  61$:    .WORD   0               ;;MESSAGE ADDRESS
016150  132737  000040  001215  62$:    BITB    #APTCSUP,$ENVM  ;;APT CONSOLE SUPPRESSED
016156  001003                          BNE     60$             ;;YES,SKIP TYPE OUT
016160  112046                  2$:     MOVB    (R0)+,-(SP)     ;;PUSH CHARACTER TO BE TYPED ONTO STACK
016162  001005                          BNE     4$              ;;BR IF IT ISN'T THE TERMINATOR
016164  005726                          TST     (SP)+           ;;IF TERMINATOR POP IT OFF THE STACK
016166  012600                  60$:    MOV     (SP)+,R0        ;;RESTORE R0
016170  062716  000002          3$:     ADD     #2,(SP)         ;;ADJUST RETURN PC
016174  000002                          RTI                     ;;RETURN
016176  122716  000011          4$:     CMPB    #HT,(SP)        ;;BRANCH IF <HT>
016202  001430                          BEQ     8$
016204  122716  000200                  CMPB    #CRLF,(SP)      ;;BRANCH IF NOT <CRLF>
016210  001006                          BNE     5$
016212  005726                          TST     (SP)+           ;;POP  <CR><LF> EQUIV
016214  104401                          TYPE                    ;;TYPE A CR AND LF
016216  001171                          $CRLF
016220  10503?  016354                  CLRB    $CHARCNT        ;;CLEAR CHARACTER COUNT
016224  000755                          BR      2$              ;;GET NEXT CHARACTER
016226  004737  016310          5$:     JSR     PC,$TYPEC       ;;GO TYPE THIS CHARACTER
016232  123726  001156          6$:     CMPB    $FILLC,(SP)+    ;;IS IT TIME FOR FILLER CHARS.?
016236  001350                          BNE     2$              ;;IF NO GO GET NEXT CHAR.
016240  013746  001154                  MOV     $NULL,-(SP)     ;;GET # OF FILLER CHARS. NEEDED
                                                                ;;AND THE NULL CHAR.
016244  105366  000001          7$:     DECB    1(SP)           ;;DOES A NULL NEED TO BE TYPED?
016250  002770                          BLT     6$              ;;BR IF NO--GO POP THE NULL OFF OF STACK
016252  004737  016310                  JSR     PC,$TYPEC       ;;GO TYPE A NULL
016256  105337  016354                  DECB    $CHARCNT        ;;DO NOT COUNT AS A COUNT
016262  000770                          BR      7$              ;;LOOP

                                ;HORIZONTAL TAB PROCESSOR

016264  112716  000040          8$:     MOVB    #' ,(SP)        ;;REPLACE TAB WITH SPACE
016270  004737  016310          9$:     JSR     PC,$TYPEC       ;;TYPE A SPACE
```

```
 4415  016274  132737  000007  016354          BITB    #7,$CHARCNT     ;;BRANCH IF NOT AT
 4416  016302  001372                          BNE     9$              ;;TAB STOP
 4417  016304  005726                          TST     (SP)+           ;;POP SPACE OFF STACK
 4418  016306  000724                          BR      2$              ;;GET NEXT CHARACTER
 4419  016310  105777  162634          $TYPEC: TSTB    @$TPS           ;;WAIT UNTIL PRINTER IS READY
 4420  016314  100375                          BPL     $TYPEC
 4421  016316  116677  000002  162626          MOVB    2(SP),@$TPB     ;;LOAD CHAR TO BE TYPED INTO DATA REG.
 4422  016324  122766  000015  000002          CMPB    #CR,2(SP)       ;;IS CHARACTER A CARRIAGE RETURN?
 4423  016332  001003                          BNE     1$              ;;BRANCH IF NO
 4424  016334  105037  016354                  CLRB    $CHARCNT        ;;YES--CLEAR CHARACTER COUNT
 4425  016340  000406                          BR      $TYPEX          ;;EXIT
 4426  016342  122766  000012  000002  1$:     CMPB    #LF,2(SP)       ;;IS CHARACTER A LINE FEED?
 4427  016350  001402                          BEQ     $TYPEX          ;;BRANCH IF YES
 4428  016352  105227                          INCB    (PC)+           ;;COUNT THE CHARACTER
 4429  016354  000000          $CHARCNT:.WORD  0               ;;CHARACTER COUNT STORAGE
 4430  016356  000207          $TYPEX: RTS     PC
 4431
 4432                          .SBTTL  APT COMMUNICATIONS ROUTINE
 4433
 4434                          ;;**************************************************************
 4435  016360  112737  000001  016624  $ATY1:  MOVB    #1,$FFLG        ;;TO REPORT FATAL ERROR
 4436  016366  112737  000001  016622  $ATY3:  MOVB    #1,$MFLG        ;;TO TYPE A MESSAGE
 4437  016374  000403                          BR      $ATYC
 4438  016376  112737  000001  016624  $ATY4:  MOVB    #1,$FFLG        ;;TO ONLY REPORT FATAL ERROR
 4439  016404                          $ATYC:
 4440  016404  010046                          MOV     R0,-(SP)        ;;PUSH R0 ON STACK
 4441  016406  010146                          MOV     R1,-(SP)        ;;PUSH R1 ON STACK
 4442  016410  105737  016622                  TSTB    $MFLG           ;;SHOULD TYPE A MESSAGE?
 4443  016414  001450                          BEQ     5$              ;;IF NOT:  BR
 4444  016416  122737  000001  001214          CMPB    #APTENV,$ENV    ;;OPERATING UNDER APT?
 4445  016424  001031                          BNE     3$              ;;IF NOT:  BR
 4446  016426  132737  000100  001215          BITB    #APTSPOOL,$ENVM ;;SHOULD SPOOL MESSAGES?
 4447  016434  001425                          BEQ     3$              ;;IF NOT:  BR
 4448  016436  017600  000004                  MOV     @4(SP),R0       ;;GET MESSAGE ADDR.
 4449  016442  062766  000002  000004          ADD     #2,4(SP)                ;;BUMP RETURN ADDR.
 4450  016450  005737  001174          1$:     TST     $MSGTYPE        ;;SEE IF DONE W/ LAST XMISSION?
 4451  016454  001375                          BNE     1$              ;;IF NOT:  WAIT
 4452  016456  010037  001210                  MOV     R0,$MSGAD       ;;PUT ADDR IN MAILBOX
 4453  016462  105720                  2$:     TSTB    (R0)+           ;;FIND END OF MESSAGE
 4454  016464  001376                          BNE     2$
 4455  016466  163700  001210                  SUB     $MSGAD,R0       ;;SUB START OF MESSAGE
 4456  016472  006200                          ASR     R0              ;;GET MESSAGE LNGTH IN WORDS
 4457  016474  010037  001212                  MOV     R0,$MSGLGT      ;;PUT LENGTH IN MAILBOX
 4458  016500  012737  000004  001174          MOV     #4,$MSGTYPE     ;;TELL APT TO TAKE MSG.
 4459  016506  000413                          BR      5$
 4460  016510  017637  000004  016534  3$:     MOV     @4(SP),4$       ;;PUT MSG ADDR IN JSR LINKAGE
 4461  016516  062766  000002  000004          ADD     #2,4(SP)                ;;BUMP RETURN ADDRESS
 4462  016524  013746  177776                  MOV     177776,-(SP)    ;;PUSH 177776 ON STACK
 4463  016530  004737  016076                  JSR     PC,$TYPE        ;;CALL TYPE MACRO
 4464  016534  000000                  4$:     .WORD   0
 4465  016536                          5$:
 4466  016536  105737  016624          10$:    TSTB    $FFLG           ;;SHOULD REPORT FATAL ERROR?
 4467  016542  001416                          BEQ     12$             ;;IF NOT:  BR
 4468  016544  005737  001214                  TST     $ENV            ;;RUNNING UNDER APT?
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4469  016550  001413                      BEQ     12$             ;;IF NOT:  BR
4470  016552  005737  001174      11$:    TST     $MSGTYPE        ;;FINISHED LAST MESSAGE?
4471  016556  001375                      BNE     11$             ;;IF NOT:  WAIT
4472  016560  017637  000004  001176      MOV     @4(SP),$FATAL   ;;GET ERROR #
4473  016566  062766  000002  000004      ADD     #2,4(SP)                ;;BUMP RETURN ADDR.
4474  016574  005237  001174              INC     $MSGTYPE        ;;TELL APT TO TAKE ERROR
4475  016600  105037  016624      12$:    CLRB    $FFLG           ;;CLEAR FATAL FLAG
4476  016604  105037  016623              CLRB    $LFLG           ;;CLEAR LOG FLAG
4477  016610  105037  016622              CLRB    $MFLG           ;;CLEAR MESSAGE FLAG
4478  016614  012601                      MOV     (SP)+,R1        ;;POP STACK INTO R1
4479  016616  012600                      MOV     (SP)+,R0        ;;POP STACK INTO R0
4480  016620  000207                      RTS     PC              ;;RETURN
4481  016622     000          $MFLG:  .BYTE   0               ;;MESSG. FLAG
4482  016623     000          $LFLG:  .BYTE   0               ;;LOG FLAG
4483  016624     000          $FFLG:  .BYTE   0               ;;FATAL FLAG
4484          016626                  .EVEN
4485          000200          APTSIZE=200
4486          000001          APTENV=001
4487          000100          APTSPOOL=100
4488          000040          APTCSUP=040
4489                          .SBTTL  POWER DOWN AND UP ROUTINES
4490
4491                          ;;*****************************************************************
4492                          ;POWER DOWN ROUTINE
4493  016626  012737  016766  000024  $PWRDN: MOV     #$ILLUP,@#PWRVEC ;;SET FOR FAST UP
4494  016634  012737  000340  000026          MOV     #340,@#PWRVEC+2 ;;PRIO:7
4495  016642  010046                  MOV     R0,-(SP)        ;;PUSH R0 ON STACK
4496  016644  010146                  MOV     R1,-(SP)        ;;PUSH R1 ON STACK
4497  016646  010246                  MOV     R2,-(SP)        ;;PUSH R2 ON STACK
4498  016650  010346                  MOV     R3,-(SP)        ;;PUSH R3 ON STACK
4499  016652  010446                  MOV     R4,-(SP)        ;;PUSH R4 ON STACK
4500  016654  010546                  MOV     R5,-(SP)        ;;PUSH R5 ON STACK
4501  016656  017746  162256          MOV     @$WR,-(SP)      ;;PUSH @SWR ON STACK
4502  016662  010637  016772          MOV     SP,$SAVR6       ;;SAVE SP
4503  016666  012737  016700  000024  MOV     #$PWRUP,@#PWRVEC ;;SET UP VECTOR
4504  016674  000000                  HALT
4505  016676  000776                  BR      .-2             ;;HANG UP
4506
4507                          ;;*****************************************************************
4508                          ;POWER UP ROUTINE
4509  016700  012737  016766  000024  $PWRUP: MOV     #$ILLUP,@#PWRVEC ;;SET FOR FAST DOWN
4510  016706  013706  016772          MOV     $SAVR6,SP       ;;GET SP
4511  016712  005037  016772          CLR     $SAVR6          ;;WAIT LOOP FOR THE TTY
4512  016716  005237  016772      1$:     INC     $SAVR6          ;;WAIT FOR THE INC
4513  016722  001375                  BNE     1$              ;;OF  WORD
4514  016724  012677  162210          MOV     (SP)+,@SWR      ;;POP STACK INTO @SWR
4515  016730  012605                  MOV     (SP)+,R5        ;;POP STACK INTO R5
4516  016732  012604                  MOV     (SP)+,R4        ;;POP STACK INTO R4
4517  016734  012603                  MOV     (SP)+,R3        ;;POP STACK INTO R3
4518  016736  012602                  MOV     (SP)+,R2        ;;POP STACK INTO R2
4519  016740  012601                  MOV     (SP)+,R1        ;;POP STACK INTO R1
4520  016742  012600                  MOV     (SP)+,R0        ;;POP STACK INTO R0
4521  016744  012737  016626  000024  MOV     #$PWRDN,@#PWRVEC ;;SET UP THE POWER DOWN VECTOR
4522  016752  012737  000340  000026  MOV     #340,@#PWRVEC+2 ;;PRIO:7
```

```
                                                TYPE                    ;REPORT THE POWER FAILURE
                                $PWRMG:         .WORD   $POWER          ;;POWER FAIL MESSAGE POINTER
                                                RTI
                                $ILLUP:         HALT                    ;;THE POWER UP SEQUENCE WAS STARTED
                                                BR      .-2             ;; BEFORE THE POWER DOWN WAS COMPLETE
                                $SAVR6:         0                       ;;PUT THE SP HERE
                                $POWER:         .ASCIZ  <15><12>"POWER"
                                                .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 PCITK 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.

017004  011637  017050          IOTRD:  MOV     (6),TRTO        ;GET WHERE WE CAME TO.
017010  162737  000004  017050          SUB     #4,TRTO         ;FORM READ ADDR.

017016  023727  017050  001000          CMP     TRTO,#1000      ;DID TRAP FROM LESS THAN ADDR. 1000?
017024  003402                          BLE     2$              ;NO-CONTINUE.

017026  000000          1$:             HALT                    ;A BUSS ERROR TIME OUT TRAP BROUGHT US HERE.
                                                                ;ADDRESS CONTAINED IN TRTO.

017030  000776                          BR      1$              ;DON'T ALLOW CONTINUE.

017032  016637  000004  017052  2$:     MOV     4(6),TRFRO      ;GET TRAPPED FROM ADDR.
017040  062706  000004                  ADD     #4,SP                   ;/ADD #4 TO STACK POINTER.

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

017044  104004                          ERROR   4               ;ERROR! ILLEGAL INTERRUPT OR
                                                                ;INTERRUPT TO WRONG VECTOR.
                                                                ;IF TEST NO. IS LESS THAN 10,ITS
                                                                ;LIKELY(BUT NO EXCLUSIVELY)TO BE A
                                                                ;DEVICE OTHER THAN THE DEVICE UNDER TEST.
                                                                ;IF THE INTERRUPT OCCURED
                                                                ;DURING AN INTERRUPT TEST, I'D
                                                                ;SUSPECT A PROBLEM WITH THE DEVICE UNDER TEST.
                                                                ;IF THE ADDRESS THE INTERRUPT
```

```
                                                        ;VECTORED TO IS WITHIN THE RANGE OF
                                                        ;VECTORS ASSIGNED TO THE DEVICE,
                                                        ;THEN I'D SUSPECT THE DEVICE
                                                        ;INTERRUPTD ILLEGALLY.
                                                        ;IF THE ADDRESS THE INTERRUPT
                                                        ;VECTORED TO IS OUTSIDE OF THE
                                                        ;RANGE ASSIGNED TO THE DEVICE
                                                        ;I'D SUSPECT THAT THE
                                                        ;DEVICE PUT THE WRONG INTERRUPT
                                                        ;VICTOR ON THE BUS DURING THE INTERRUPT
                                                        ;PROCESS.
                                                        ;       NOTE:
                                                        ;FOR THIS ERROR - DON'T USE
                                                        ; "LOOP ON ERROR" OPTION.
                                                        ;ALSO EXPECT THAT THE INTERRUPT TEST TO
                                                        ;WILL REPOT THAT THE DEVICE DIDN'T
                                                        ;INTERRUPT.
                                                        ;FOLLOW THE RECOMMENDED PROCEEDURE
                                                        ; IN THE DOCUMENT (ON THIS DIAGNOSTIC)
                                                        ;FOR LOOPING ON TEST.

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

 4601  017046  000002                        RTI
 4602  017050  000000              TRTO:     .WORD   0               ;CONTAINS ADDR. WE TRAPPED OR INTERRUPTED TO.
 4603  017052  000000              TRFRO:    .WORD   0               ;CONTAINS ADDR. WE TRAPPED OR INTR. FROM.
 4604                              .SBTTL  TRAP DECODER
 4605
 4606                              ;;**********************************************************************
 4607                              ;*THIS ROUTINE WILL PICKUP THE LOWER BYTE OF THE "TRAP" INSTRUCTION
 4608                              ;*AND USE IT TO INDEX THROUGH THE TRAP TABLE FOR THE STARTING ADDRESS
 4609                              ;*OF THE DESIRED ROUTINE. THEN USING THE ADDRESS OBTAINED IT WILL
 4610                              ;*GO TO THAT ROUTINE.
 4611
 4612  017054  010046              $TRAP:    MOV     R0,-(SP)        ;;SAVE R0
 4613  017056  016600  000002              MOV     2(SP),R0        ;;GET TRAP ADDRESS
 4614  017062  005740                      TST     -(R0)           ;;BACKUP BY 2
 4615  017064  111000                      MOVB    (R0),R0         ;;GET RIGHT BYTE OF TRAP
 4616  017066  006300                      ASL     R0              ;;POSITION FOR INDEXING
 4617  017070  016000  017110              MOV     $TRPAD(R0),R0   ;;INDEX TO TABLE
 4618  017074  000200                      RTS     R0              ;;GO TO ROUTINE
 4619
 4620
 4621                              ;;THIS IS USE TO HANDLE THE "GETPRI" MACRO
 4622
 4623  017076  011646              $TRAP2:   MOV     (SP),-(SP)      ;;MOVE THE PC DOWN
 4624  017100  016666  000004  000002       MOV     4(SP),2(SP)     ;;MOVE THE PSW DOWN
 4625  017106  000002                      RTI                     ;;RESTORE THE PSW
 4626
 4627                              .SBTTL  TRAP TABLE
 4628
 4629                              ;*THIS TABLE CONTAINS THE STARTING ADDRESSES OF THE ROUTINES CALLED
 4630                              ;*BY THE "TRAP" INSTRUCTION.
```

```
                                        ;       ROUTINE
                                        ;       -------
017110  017076                          $TRPAD: .WORD   $TRAP2
017112  016076                                  $TYPE   ;;CALL=TYPE     TRAP+1(104401)  TTY TYPEOUT ROUTINE
017114  014220                                  $TYPOC  ;;CALL=TYPOC    TRAP+2(104402)  TYPE OCTAL NUMBER (WITH LEADING ZEROS)
017116  014174                                  $TYPOS  ;;CALL=TYPOS    TRAP+3(104403)  TYPE OCTAL NUMBER (NO LEADING ZEROS)
017120  014234                                  $TYPON  ;;CALL=TYPON    TRAP+4(104404)  TYPE OCTAL NUMBER (AS PER LAST CALL)
017122  014422                                  $TYPBN  ;;CALL=TYPBN    TRAP+5(104405)  TYPE BINARY (ASCII) NUMBER

017124  015372                                  $GTSWR  ;;CALL=GTSWR    TRAP+6(104406)  GET SOFT-SWR SETTING

017126  015322                                  $CKSWR  ;;CALL=CKSWR    TRAP+7(104407)  TEST FOR CHANGE IN SOFT-SWR
017130  015604                                  $RDCHR  ;;CALL=RDCHR    TRAP+10(104410) TTY TYPEIN CHARACTER ROUTINE
017132  015724                                  $RDLIN  ;;CALL=RDLIN    TRAP+11(104411) TTY TYPEIN STRING ROUTINE
017134  005015  046103  041517  EM1:    .ASCIZ  <15><12>/CLOCK SR FUNCTION ERROR/
017142  020113  051123  043040
017150  047125  052103  047511
017156  020116  051105  047522
017164  000122
017166  005015  046103  041517  EM2:    .ASCIZ  <15><12>/CLOCK SR DATA ERROR/
017174  020113  051123  042040
017202  052101  020101  051105
017210  047522  000122
017214  005015  046103  041517  EM3:    .ASCIZ  <15><12>/CLOCK BR DATA ERROR/
017222  020113  051102  042040
017230  052101  020101  051105
017236  047522  000122
017242  044600  052116  051105  EM4:    .ASCIZ  <200>/INTERRUPT ERROR/
017250  052522  052120  042440
017256  051122  051117     000
017263     015  041412  052517  EM5:    .ASCIZ  <15><12>/COUNT REG. ERROR/
017270  052116  051040  043505
017276  020056  051105  047522
017304  000122
017306  005015  047503  047125  EM11:   .ASCIZ  <15><12>#COUNT ERROR #
017314  020124  051105  047522
017322  020122     000
017325     015  041412  052517  EM12:   .ASCIZ  <15><12>#COUNT FUNCTION ERROR#
017332  052116  043040  047125
017340  052103  047511  020116
017346  051105  047522  000122
017354  005015  046103  041517  EM16:   .ASCIZ  <15><12>#CLOCK INTERRUPT ERROR #
017362  020113  047111  042524
017370  051122  050125  020124
017376  051105  047522  020122
017404     000
017405     015  051012  050105  EM20:   .ASCIZ  <15><12>#REPEATABILITY ERROR #
017412  040505  040524  044502
017420  044514  054524  042440
017426  051122  051117  000040
017434  005015  042101  051104  EM26:   .ASCIZ  <15><12>#ADDRESSING ERROR#
017442  051505  044523  043516
017450  042440  051122  051117
```

```
 4685  017456      000
 4686
 4687  017457      015  042412  051122  DH1:    .ASCIZ  <15><12>#ERRPC  ASR     WAS     S/B#
 4688  017464  041520  040411  051123
 4689  017472  053411  051501  051411
 4690  017500  041057      000
 4691  017503      015  042412  051122  DH3:    .ASCIZ  <15><12>#ERRPC  ABR     WAS     S/B#
 4692  017510  041520  040411  051102
 4693  017516  053411  051501  051411
 4694  017524  041057      000
 4695  017527      200  051105  050122  DH4A:   .ASCIZ  <200>#ERRPC   TO      FROM ADDR.#
 4696  017534  020103  020040  047524
 4697  017542  020040  020040  020040
 4698  017550  051106  046517  040440
 4699  017556  042104  027122      000
 4700  017563      015  042412  051122  DH12:   .ASCIZ  <15><12>#ERRPC  ASR     #
 4701  017570  041520  040411  051123
 4702  017576  000011
 4703  017600  005015  051105  050122  DH20:   .ASCIZ  <15><12>#ERRPC  ASR     2NDCNT  1STNCT  3RDCNT#
 4704  017606  004503  051501  004522
 4705  017614  047062  041504  052116
 4706  017622  030411  052123  041516
 4707  017630  004524  051063  041504
 4708  017636  052116      000
 4709  017641      015  042412  051122  DH26:   .ASCIZ  <15><12>#ERRPC  CLOCK ADDR.#
 4710  017646  041520  041411  047514
 4711  017654  045503  040440  042104
 4712  017662  027122      000
 4713
 4714          017666                          .EVEN
 4715
 4716  017666  001116  001376  001126  DT1:    .WORD   $ERRPC,ASR,$BDDAT,$GDDAT,0
 4717  017674  001124  000000
 4718  017700  001116  001400  001126  DT3:    .WORD   $ERRPC,ABR,$BDDAT,$GDDAT,0
 4719  017706  001124  000000
 4720  017712  001116  017050  017052  DT4:    .WORD   $ERRPC,TRTO,TRFRO,0
 4721  017720  000000
 4722  017722  001116  001376  000000  DT12:   .WORD   $ERRPC,ASR,0
 4723  017730  001116  001376  001126  DT20:   .WORD   $ERRPC,ASR,$BDDAT,$GDDAT,$TMP0,0
 4724  017736  001124  001420  000000
 4725  017744  001116  001376  001126  DT22:   .WORD   $ERRPC,ASR,$BDDAT,$TMP0,0
 4726  017752  001420  000000
 4727  017756  001116  001420  000000  DT26:   .WORD   $ERRPC,$TMP0,0
 4728
 4729  017764  000000  000000          DF0:    .WORD   0,0
 4730
 4731          000001                          .END
```

ABASE = 170420 833# 920 961 1063 1064
ABR = 001400 1064# 1196* 1197* 1248 1255 1732* 1734* 1735 1750* 1752 1771* 1773* 1774
1789* 1791 1900* 1917 1945* 1962 2041* 2045 2130* 2143 2171* 2202 2219*
2238* 2277* 2302* 2336* 2352 2387* 2403 2438* 2454 2489* 2505 2540* 2556
2595* 2611 2640* 2659 2685* 2723* 2827* 2884* 2901 2922* 2942 2967* 2989
3025 3051* 3073 3109 3135* 3157 3193 3220* 3242 3278 3304* 3329 3368
3410* 3420 3443 3473* 3483 3506 3546* 3563 3594 3619* 3636 3849* 3854
3890* 4718

ACDW1 = 000000 920 963
ACDW2 = 000000 920
ACPUOP= 000000 920 935
ADDW0 = 000000 920
ADDW1 = 000000 920
ADDW10= 000000 920
ADDW11= 000000 920
ADDW12= 000000 920
ADDW13= 000000 920
ADDW14= 000000 920
ADDW15= 000000 920
ADDW2 = 000000 920
ADDW3 = 000000 920
ADDW4 = 000000 920
ADDW5 = 000000 920
ADDW6 = 000000 920
ADDW7 = 000000 920
ADDW8 = 000000 920
ADDW9 = 000000 920
ADEVCT= 000000 920 926
ADEVM = 000000 920 962
AENV = 000000 920 931
AENVM = 000000 920 932
AFATAL= 000000 920 923
AMADR1= 000000 920 948
AMADR2= 000000 920 952
AMADR3= 000000 920 955
AMADR4= 000000 920 958
AMAMS1= 000000 920 942
AMAMS2= 000000 920 950
AMAMS3= 000000 920 953
AMAMS4= 000000 920 956
AMSGAD= 000000 920 928
AMSGLG= 000000 920 929
AMSGTY= 000000 920 922
AMTYP1= 000000 920 943
AMTYP2= 000000 920 951
AMTYP3= 000000 920 954
AMTYP4= 000000 920 957
ANYKEY 013700 3552 3584 3625 3807#
APASS = 000000 920 925
APRIOR= 000200 835# 920 1069
APTCSU= 000040 4383 4488#
APTENV= 000001 4076 4376 4444 4486#
APTSIZ= 000200 1133 4485#
APTSP0= 000100 4378 4446 4487#

ASR 001376 1063# 1147* 1196 1214 1221 1287* 1288* 1290 1303* 1305 1332* 1333* 1335
1348* 1350 1377* 1378* 1380 1393* 1395 1422* 1423* 1425 1438* 1440 1467*
1468* 1470 1483* 1485 1512* 1513* 1515 1528* 1530 1557* 1558* 1560 1573*
1575 1602* 1603* 1605 1618* 1620 1647* 1648* 1650 1663* 1665 1692* 1693*
1695 1708* 1710 1823* 1824* 1829 1862* 1864* 1868* 1874* 1876 1899* 1904*
1908 1912* 1916* 1919* 1944* 1949* 1953 1957* 1961* 1964* 1995* 1999 2068*
2069* 2071 2103* 2104* 2105 2118* 2129* 2131* 2132* 2134 2138* 2142* 2145*
2170* 2175* 2177* 2193 2197* 2201* 2204* 2218* 2237* 2240* 2242* 2244 2275*
2279* 2281* 2285 2301* 2303* 2305* 2307 2318* 2335* 2337* 2343 2347* 2351*
2354* 2370* 2386* 2388* 2394 2398* 2402* 2405* 2421* 2437* 2439* 2445 2449*
2453* 2456* 2472* 2488* 2490* 2496 2500* 2504* 2507* 2523* 2539* 2541* 2547
2551* 2555* 2558* 2574* 2594* 2596* 2602 2606* 2610* 2613* 2629* 2639* 2642*
2644* 2650 2654* 2658* 2661* 2664 2676* 2684* 2686* 2691 2722* 2725* 2726*
2750* 2763* 2765* 2766* 2789* 2800* 2801* 2802* 2803* 2805 2808 2826* 2828*
2834 2837 2853* 2854* 2855* 2857* 2859* 2862 2875* 2883* 2887* 2888* 2892
2896* 2900* 2903* 2914* 2921* 2923* 2924* 2927* 2933 2937* 2941* 2944* 2956*
2966* 2968* 2969* 2974* 2980 2984* 2988* 2991* 3011* 3016 3020* 3024* 3027*
3041* 3050* 3052* 3053* 3058* 3064 3068* 3072* 3075* 3095* 3100 3104* 3108*
3111* 3125* 3134* 3136* 3137* 3142* 3148 3152* 3156* 3159* 3179* 3184 3188*
3192* 3195* 3209* 3219* 3221* 3222* 3227* 3233 3237* 3241* 3244* 3264* 3269
3273* 3277* 3280* 3294* 3303* 3305* 3306* 3312* 3320 3324* 3328* 3331* 3352*
3359 3363* 3367* 3370* 3384* 3409* 3411* 3414* 3418* 3434 3438* 3442* 3445*
3472* 3474* 3477* 3481* 3497 3501* 3505* 3508* 3522* 3523 3545* 3547* 3554
3558* 3562* 3565* 3585 3589* 3593* 3596* 3618* 3620* 3627 3631* 3635* 3638*
3653 3682* 3686 3732* 3848* 3850* 3851* 3852* 3853* 3889* 3891* 3892* 3895
3927* 3928* 3929 3933 4716 4722 4723 4725

ASWREG= 000000 920 933
ATESTN= 000000 920 924
AUNIT = 000000 920 927
AUSWR = 000000 920 934
AVECT1= 000440 834# 920 959 1065 1066 1067 1068
AVECT2= 000000 920 960
BIT0 = 000001 817# 1693 1694 1708 1904 1911 1949 1956 2131 2137 2175 2196 2240
2279 2285 2307 2337 2346 2388 2397 2439 2448 2490 2499 2541 2550
2596 2605 2642 2653 2765 2809 2853 2857 2859 2888 2895 2924 2936
2983 3019 3067 3103 3151 3187 3236 3272 3323 3362 3437 3500 3557
3588 3630

BIT00 = 000001 807# 817 2105
BIT01 = 000002 806# 816
BIT02 = 000004 805# 815
BIT03 = 000010 804# 814
BIT04 = 000020 803# 813
BIT05 = 000040 802# 812
BIT06 = 000100 801# 811
BIT07 = 000200 800# 810
BIT08 = 000400 799# 809 4180
BIT09 = 001000 798# 808 4087 4188
BIT1 = 000002 816# 1648 1649 1663 2181
BIT10 = 002000 797# 2017 2061 2927 2974 3011 3058 3095 3142 3179 3227 3264 3312
3352 3414 3477 4064
BIT11 = 004000 796# 1378 1379 1393 1911 1956 2017 2061 2137 2196 2346 2397 2448
2499 2550 2605 2653 2887 2895 2923 2936 2968 2983 3019 3052 3067
3103 3136 3151 3187 3221 3236 3272 3305 3323 3362 3437 3500 3557
3588 3630 4195

```
BIT12 = 010000          795#  2017  2061  2589  2805  2809  2834  2865  3933
BIT13 = 020000          794#  1333  1334  1348  2103  4071
BIT14 = 040000          793#  1288  1289  1303  2765  4166
BIT15 = 100000          792#  2809
BIT2  = 000004          815#  1603  1604  1618  1911  1956  2086  2137  2196  2346  2397  2448  2499
                       2550  2605  2653  2895  2936  2983  3019  3067  3103  3151  3187  3236  3272
                       3323  3362  3437  3500  3557  3588  3630
BIT3  = 000010          814#  1558  1559  1573  2888  2924
BIT4  = 000020          813#  1513  1514  1528  2131  2175  2240  2279
BIT5  = 000040          812#  1468  1469  1483  2131  2175  2234  2240  2279
BIT6  = 000100          811#  1423  1424  1438
BIT7  = 000200          810#
BIT8  = 000400          809#  2132  2177  2242  2281  2305  2644  2726  3892  3928
BIT9  = 001000          808#  1916  1961  2069  2104  2142  2201  2351  2402  2453  2504  2555  2610
                       2658  2766  2802  2803  2854  2855  2900  2941  2988  3024  3072  3108  3156
                       3192  3241  3277  3328  3367  3418  3442  3481  3505  3562  3593  3635  3851
                       3853
BPTVEC= 000014          824#
CKSWR = 104407         3847  3888  3926  4060  4086  4164  4165  4643#
CR    = 000015          732#  4422  4432
CRLF  = 000200          733#  1167  4393  4432
DDISP = 177570          739#   901  1121
DF0     017764          988    996  1004  1012  1020  1028  1036  1044  1052  1060  4729#
DH1     017457          986    994  1018  1050  4687#
DH12    017563         1026   1034  4700#
DH20    017600         1042   4703#
DH26    017641         1058   4709#
DH3     017503         1002   4691#
DH4A    017527         1010   4695#
DISPLA  001142          901#  1121*  1129*  4063*  4210*
DISPRE  000174          700#  1129
DR      001414         1070#  2018  2086  2181
DR2     001416         1071#  2017*  2061*
DSWR  = 177570          738#   900  1120
DT1     017666          987    995  1019  4716#
DT12    017722         1027   1035  4722#
DT20    017730         1043   4723#
DT22    017744         1051   4725#
DT26    017756         1059   4727#
DT3     017700         1003   4718#
DT4     017712         1011   4720#
EMTVEC= 000030          827#  1105*  1106*
EM1     017134          985   4646#
EM11    017306         1049   4666#
EM12    017325         1025   4669#
EM16    017354         1033   4673#
EM2     017166          993   4651#
EM20    017405         1041   4678#
EM26    017434         1057   4682#
EM3     017214         1001   4655#
EM4     017242         1009   4659#
EM5     017263         1017   4662#
ENDP    013016         3542  3616  3650  3654  3670#
ERCNT   001432         1077#  1181*  3771  4095*  4097*
```

```
ERRVEC= 000004          820#  1118   1119*  1130*  1145*  1211   1212*  1236*  1245   1246*  1270*  3683   3684*
                       3710*  3716*  4171   4172*  4174*  4177*
EXS     001440         1080#  1084*  1089*  1093*  1169   2015   2059   2084   2179   2229   2253   3540   3615
GNS   = ****** U       1166   1173   1178   3550   3582   3623   3695   3701   3706   3723   3729   3763   3769
                       3775   3781   3785   3810   4635   4636   4637   4638   4639   4641   4643   4644   4645
GTSWR = 104406         1161   4641#
HT    = 000011          730#  4391   4432
IOTRD   017004          698   1145   4552#
IOTST1  014006          710   3847#  3855   3857
IOTST2  014064          711   3888#  3896   3898
IOTST3  014132          712   3926#  3934   3936
IOTVEC= 000020          825#  1103*  1104*
LCNT    001442         1081#  3734*  3735*  3777
LF    = 000012          731#  4426   4432
LOOP    002274         1185#  3712   3798
MDEVCT  001434         1078#  1180*  3677   3680*  3738*
PC    =%000007          751#  3552*  3584*  3625*  3755*  3758*  3792*  3797   3816*  4073*  4079*  4139*  4268*
                       4381*  4400*  4407*  4414*  4428*  4430*  4463*  4480*
PIRQ  = 177772           737#
PIRQVE= 000240           831#
PRIOR   001412         1069#
PR0   = 000000           754#
PR1   = 000040           755#
PR2   = 000100           756#
PR3   = 000140           757#
PR4   = 000200           758#
PR5   = 000240           759#
PR6   = 000300           760#
PR7   = 000340           761#
PS    = 177776           734#   735
PSW   = 177776           735#
PWRVEC= 000024           826#  1109*  1110*  4493*  4494*  4503*  4509*  4521*  4522*
RDCHR = 104410          4327   4644#
RDLIN = 104411          4645#
RESVEC= 000010           821#
ROTATE  001426         1075#  1183*  1184   3679*  3691   3739*  4099
RSTART  002104          709   1168#
R0    =%000000          742#  2235*  2258*  2338*  2340*  2389*  2391*  2440*  2442*  2491*  2493*  2542*  2544*
                       2597*  2599*  2645*  2647*  2687*  2688*  2829*  2830*  2889*  2890*  2925*  2930*  2972*
                       2975*  3008*  3012*  3056*  3059*  3092*  3096*  3140*  3143*  3176*  3180*  3225*  3228*
                       3261*  3265*  3310*  3313*  3349*  3353*  3413*  3415*  3476*  3478*  3789*  3792   4111
                       4112*  4113*  4120*  4121*  4122*  4123*  4124*  4125   4130   4135*  4137*  4141   4143
                       4374   4375*  4380   4385   4388*  4440   4448*  4452   4453   4455*  4456*  4457   4479*
                       4495   4520*  4612   4613*  4614   4615*  4616*  4617*  4618*
R1    =%000001          743#  3308*  3316*  3348*  3355*  4028   4029*  4032*  4038*  4441   4478*  4496   4519*
R2    =%000002          744#  4497   4518*
R3    =%000003          745#  3975   3984*  3990*  3991*  3994*  3999*  4000*  4001   4010*  4323   4324*  4325
                       4328*  4329   4333   4335   4337*  4339*  4498   4517*
R4    =%000004          746#  3976   3978*  3979*  3980*  3981   3982*  3996   3998*  4006*  4009*  4499   4516*
R5    =%000005          747#  3977   3983*  3985*  3987*  3988*  3989*  3990   4008*  4500   4515*
R6    =%000006          748#  1097*  1098*  1099
R7    =%000007          749#
SP    =%000006          750#  1101*  1118*  1126*  1130   1139*  1140*  1211*  1220*  1236   1245*  1254*  1270
                       2717*  2718*  2729*  2730*  2736*  2737*  2749*  2758*  2759*  2768*  2769*  2775*  2776*
```

```
                    2788*  3697*  3708*  3715*  3725*  3765*  3771*  3777*  3787*  3967*  3968   3969   3970*
                    3975*  3976*  3977*  3983   4008   4009   4010   4011*  4012*  4028*  4029   4038   4039*
                    4040*  4068   4089*  4092*  4111*  4116*  4137   4141*  4171*  4174   4176   4177   4206
                    4207   4211*  4228*  4229*  4230   4237*  4240*  4241*  4245*  4246*  4250   4253*  4257
                    4259   4261   4262*  4269   4271   4273*  4274   4276*  4277*  4278*  4279*  4280*  4295*
                    4296*  4299*  4300*  4301   4305*  4306*  4307   4310   4312   4314*  4323*  4328   4339
                    4340*  4341*  4342*  4374*  4375   4385*  4387   4388   4389*  4391   4393   4395   4401
                    4403*  4405*  4413*  4417   4421   4422   4426   4440*  4441*  4448   4449*  4460   4461*
                    4462*  4472   4473*  4478   4479   4495*  4496*  4497*  4498*  4499*  4500*  4501*  4502
                    4510*  4514   4515   4516   4517   4518   4519   4520   4564*  4612*  4613   4623*  4624*
STACK  = 001100      725*  1101
START  = 001474      708   1091*
STKLMT= 177774       736*
SWR    = 001140      900*  1099   1120*  1122   1128*  1135*  1159   2589   4064   4071   4083   4087   4166
                    4180   4182   4188   4195   4224   4261*  4501   4514*
SWREG  = 000176      701*  1128   1159   4224   4237
SW0    = 000001      789*
SW00   = 000001      779*   789
SW01   = 000002      778*   788
SW02   = 000004      777*   787
SW03   = 000010      776*   786
SW04   = 000020      775*   785
SW05   = 000040      774*   784
SW06   = 000100      773*   783
SW07   = 000200      772*   782
SW08   = 000400      771*   781
SW09   = 001000      770*   780
SW1    = 000002      788*
SW10   = 002000      769*
SW11   = 004000      768*
SW12   = 010000      767*
SW13   = 020000      766*
SW14   = 040000      765*
SW15   = 100000      764*
SW2    = 000004      787*
SW3    = 000010      786*
SW4    = 000020      785*
SW5    = 000040      784*
SW6    = 000100      783*
SW7    = 000200      782*
SW8    = 000400      781*
SW9    = 001000      780*
TBITVE= 000014       822*
TKVEC  = 000060      829*
TPVEC  = 000064      830*
TRAPVE= 000034       828*  1107*  1108*
TRFRO  = 017052     4563*  4603*  4720
TRTO   = 017050     4552*  4553*  4555   4602*  4720
TRTVEC= 000014       823*
TSTCNT  001436      1079*  1085*  1088*  1092*  3677
TSTSTR  001444       717   1084*
TST1    002362      1203*
TST10   003204      1509*
TST11   003302      1554*
```

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TST12   003400          1599#
TST13   003476          1644#
TST14   003574          1689#
TST15   003672          1730#
TST16   003762          1769#
TST17   004052          1820#
TST2    002454          1242#
TST20   004124          1859#
TST21   004206          1896#
TST22   004334          1941#
TST23   004462          1991#
TST24   004550          2013    2016    2019    2037#
TST25   004622          2060    2066#
TST26   004672          2083    2085    2087    2101#
TST27   004726          2127#
TST3    002516          1284#
TST30   005036          2167#
TST31   005246          2191    2227#
TST32   005362          2252    2254    2257    2273#
TST33   005424          2299#
TST34   005472          2331#
TST35   005622          2382#
TST36   005752          2433#
TST37   006102          2484#
TST4    002614          1329#
TST40   006232          2535#
TST41   006362          2586#
TST42   006522          2592    2636#
TST43   006664          2682#
TST44   006724          2713#
TST45   007044          2755#
TST46   007150          2798#
TST47   007224          2823#
TST5    002712          1374#
TST50   007310          2851#
TST51   007402          2880#
TST52   007536          2919#
TST53   007670          2963#
TST54   010162          3047#
TST55   010454          3131#
TST56   010746          3216#
TST57   011240          3300#
TST6    003010          1419#
TST60   011552          3406#
TST61   011744          3469#
TST62   012160          3494    3520    3524    3537#
TST63   012560          3577    3598    3612#
TST7    003106          1464#
TYPBN = 104405          3788    4639#
TYPE  = 104401          1153    1171    1176    3548    3580    3621    3693    3699    3704    3721    3727    3761    3767
                        3773    3779    3783    3808    4002    4035    4066    4074    4110    4127    4129    4132    4134
                        4138    4145    4235    4236    4239    4252    4263    4282    4331    4334    4338    4396    4523
                        4635#
TYPOC = 104402          3698    3709    3726    3766    3772    3778    4118    4142    4238    4636#
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TYPON = 104404          4638#
TYPOS = 104403          4637#
UTEST   001430          1076#   1184*   3691*   3787    4099*
VECTP   001404          1066#   1188*   1189*
VECT1   001402          1065#   1146*   1187*   1188    1190    2727*   3711*   3733*
VECT2   001406          1067#   1190*   1191*   1192    2764*
VECT2P  001410          1068#   1192*   1193*
WSTART= 001460           715    1087#
$APTHD  001000           860     866#
$ASTAT= ****** U        4466    4481
$ATYC   016404          4437    4439#
$ATY1   016360          4435#
$ATY3   016366          4381    4436#
$ATY4   016376          4079    4438#
$AUTOB  001134           897#   1163*   4232    4353
$BASE   001250           961#   1147    3732
$BDADR  001122           892#
$BDDAT  001126           894#   1290*   1291    1305*   1335*   1336    1350*   1380*   1381    1395*   1425*   1426    1440*
                        1470*   1471    1485*   1515*   1516    1530*   1560*   1561    1575*   1605*   1606    1620*   1650*
                        1651    1665*   1695*   1696    1710*   1735*   1737    1752*   1774*   1776    1791*   1829*   1831
                        1834    1876*   1877    1879    1917*   1920    1922    1962*   1965    1967    1999*   2045*   2143*
                        2146    2202*   2205    2207    2352*   2355    2403*   2406    2454*   2457    2505*   2508    2556*
                        2559    2611*   2614    2659*   2662    2808*   2837*   2862*   2865    2901*   2904    2942*   2945
                        2989*   2992    2995    3025*   3028    3029    3073*   3076    3079    3109*   3112    3113    3157*
                        3160    3163    3193*   3196    3197    3242*   3245    3248    3278*   3281    3282    3329*   3332
                        3335    3368*   3371    3372    3420*   3421    3443*   3446    3447    3483*   3484    3506*   3509
                        3523*   3563*   3566    3594*   3597    3636*   3639    4716    4718    4723    4725
$BELL   001164           912#   4066    4102
$BIN    014474          4031*   4034*   4035    4042#
$CDW1   001254           963#
$CHARC  016354          4398*   4408*   4415    4424*   4429#
$CKSWR  015322          4224#   4643
$CMTAG  001100           880#   1096    1097    1105    1111    1112
$CM3  = 000000           910#
$CNTLG  016047          4235    4348#
$CNTLU  016042          4252    4347#
$CPUOP  001222           935#
$CRLF   001171           914#   4074    4102    4110    4129    4134    4138    4263    4347    4397    4432
$DEVCT  001204           926#   1144*   3697    3703*   3708    3717    3725    3734    3736*
$DEVM   001252           962#
$DCAGN  013670          3757    3790    3796#
$ENDAD  013660           846    3792#
$ENDCT  013426          3759#
$ENULL  013674          3799#
$ENV    001214           931#   1157    4076    4376    4444    4468
$ENVM   001215           932#   1133    3673    4378    4383    4446
$EOP    013372          3749#
$EOPCT  013420          3756#   3760
$ERFLG  001103           883#   4061*   4102    4154    4184    4186    4192*   4214
$ERMAX  001115           889#   1113*   4186    4209*   4214
$ERROR  014476          1105    4059#
$ERRPC  001116           890#   4068*   4069*   4070    4102    4116    4716    4718    4720    4722    4723    4725    4727
$ERRTB  001256           980#   4124
$ERRTY  014704          4073    4109#
```

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$ERTTL  001112          887#  4067*  4102
$ESCAP  001162          911#  1112*  4090  4092  4102  4208*
$ETABL  001214          930#
$ETEND  001256          872   964#
$FATAL  001176          923#  4472*
$FFLG   016624         4435*  4438*  4466  4475*  4483#
$FILLC  001156          908#  4401   4432
$FILLS  001155          907#  4432
$GDADR  001120          891#
$GDDAT  001124          893#  1289*  1291  1304*  1334*  1336  1349*  1379*  1381  1394*  1424*  1426  1439*
                       1469*  1471   1484*  1514*  1516  1529*  1559*  1561  1574*  1604*  1606  1619*  1649*
                       1651   1664*  1694*  1696  1709*  1733*  1734  1737  1751*  1772*  1773  1776  1790*
                       1831*  1832*  1877*  1878*  1906*  1922  1951*  1967  1994*  2040*  2172*  2206*  2207
                       2219   2220   2667*  2809*  2838*  2864*  2885*  2979*  2993  2995  3029  3063*  3077
                       3079   3113   3147*  3161  3163  3197  3232*  3246  3248  3282  3319*  3333  3335
                       3372   3419*  3421  3447  3482*  3484  3496*  3525*  3553*  3626*  4716  4718  4723
$GET42  013650          3789#
$GTSWR  015372         4236#  4641
$HD   = 000001          675   676
$HIBTS  001000          867#
$ICNT   001104          884#  4199*  4200  4202*  4213
$ILLUP  016766         4493   4509   4526#
$INTAG  001135          898#  4264   4353
$ITEMB  001114          888#  4070*  4078  4102  4113
$LF     001172          915#  4102   4338  4347  4432
$LFLG   016623         4476*  4482#
$LPADR  001106          885#  1114*  1205*  4190*  4206*  4211  4213
$LPERR  001110          886#  1115*  1207*  2173*  4089  4190  4207*  4213
$MADR1  001226          948#
$MADR2  001232          952#
$MADR3  001236          955#
$MADR4  001242          958#
$MAIL   001174          868   872   921#  1132  1157  4076  4205  4376
$MAMS1  001224          942#
$MAMS2  001230          950#
$MAMS3  001234          953#
$MAMS4  001240          956#
$MBADR  001002          868#
$MFLG   016622         4436*  4442   4477*  4481#
$MNEW   016065         4239   4351#
$MSGAD  001210          928#  4452*  4455
$MSGLG  001212          929#  4457*
$MSGTY  001174          922#  4450   4458*  4470  4474*
$MSWR   016054         4236   4349#
$MTYP1  001225          943#
$MTYP2  001231          951#
$MTYP3  001235          954#
$MTYP4  001241          957#
$MXCNT  015320         4203   4213#
$NULL   001154          906#  4403   4432
$NWTST= 000001         1200#  1239#  1276#  1278  1321#  1323  1366#  1368  1411#  1413  1456#  1458  1501#
                       1503   1546#  1548  1591#  1593  1636#  1638  1681#  1683  1727#  1766#  1811#  1813
                       1850#  1852   1893#  1938#  1984#  1986  2029#  2031  2063#  2098#  2124#  2158#  2160
                       2224#  2270#  2296#  2323#  2325  2374#  2376  2425#  2427  2476#  2478  2527#  2529
```

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                    2578#  2580   2633#  2679#  2710#  2752#  2795#  2820#  2848#  2877#  2916#  2960#  3044#
                    3128#  3213#  3297#  3388#  3390   3461#  3463   3534#  3609#
$OCNT   014416      3974*  4003*  4016#
$OMODE  014420      3969*  3973*  3978   3981*  3992*  4018#
$OVER   015304      4167   4183   4191   4201   4210#
$PASS   001202       925#  1132*  1182*  3689   3753*  3754*  3765   3799   4197   4214
$PASTM  001006       870#
$POWER  016774      4524   4529#
$PWRDN  016626      1109   4493#  4521
$PWRMG  016762      4524#
$PWRUP  016700      4503   4509#
$QUES   001170       913#  4102   4282   4331   4347   4432
$RDCHR  015604      4295#  4644
$RDDEC= ****** U    4646
$RDLIN  015724      4323#  4645
$RDOCT= ****** U    4646
$RDSZ = 000010      4316#
$RTNAD  013672      3798#
$R2A  = ****** U    4646
$SAVRE= ****** U    4646
$SAVR6  016772      4502*  4510   4511*  4512*  4528#
$SCOPE  015040      1103   4163#
$SETUP= 000117      1084#  1102   1103   1105   1107   1109   1111   1112   1114   1153   1154   3751   4060
                    4086   4094   4164   4219   4353
$STUP = 177777      1084#
$SVLAD  015250      4175   4204#
$SVPC = 000244       844#   849
$SWR  = 167400       657#   675    681    682    683    684    685    686    687    837#   910    911    912
                    1111   1112   1114   1115   1204   1243   1285   1330   1375   1420   1465   1510   1555
                    1600   1645   1690   1731   1770   1821   1860   1897   1942   1992   2038   2067   2102
                    2128   2168   2228   2274   2300   2332   2383   2434   2485   2536   2587   2637   2683
                    2714   2756   2799   2824   2852   2881   2920   2964   3048   3132   3217   3301   3407
                    3470   3538   3613   3746   3752   3791   3797   3799   4051   4052   4053   4054   4055
                    4064   4071   4083   4087   4102   4155   4156   4157   4158   4159   4166   4178   4180
                    4181   4184   4185   4186   4193   4194   4195   4207   4210   4213   4525
$SWREG  001216       933#  1135
$SWRMK= 000000       687    688    4159   4160   4182
$TESTN  001200       924#  4205*
$TIMES  001160       910#  1111*  1204*  1285*  1330*  1375*  1420*  1465*  1510*  1555*  1600*  1645*  1690*
                    1821*  1860*  1897*  1942*  1992*  2038*  2168*  2332*  2383*  2434*  2485*  2536*  2587*
                    2637*  2714*  2824*  2881*  2964*  3048*  3132*  3217*  3301*  3407*  3470*  3539*  3613*
                    3752*  4193*  4200   4203*  4213
$TKB    001146       903#  3807   3815   4217   4228   4245   4299   4305
$TKS    001144       902#  3813   4217   4226   4242   4266*  4297   4303
$TMP0   001420      1072#  1221*  1255*  2993*  3077*  3161*  3246*  3333*  4723   4725   4727
$TMP1   001422      1073#
$TMP3   001424      1074#  1909*  1910*  1911*  1912   1954*  1955*  1956*  1957   2135*  2136*  2137*  2138
                    2194*  2195*  2196*  2197   2344*  2345*  2346*  2347   2395*  2396*  2397*  2398   2446*
                    2447*  2448*  2449   2497*  2498*  2499*  2500   2548*  2549*  2550*  2551   2603*  2604*
                    2605*  2606   2651*  2652*  2653*  2654   2893*  2894*  2895*  2896   2934*  2935*  2936*
                    2937   2981*  2982*  2983*  2984   3017*  3018*  3019*  3020   3065*  3066*  3067*  3068
                    3101*  3102*  3103*  3104   3149*  3150*  3151*  3152   3185*  3186*  3187*  3188   3234*
                    3235*  3236*  3237   3270*  3271*  3272*  3273   3321*  3322*  3323*  3324   3360*  3361*
                    3362*  3363   3435*  3436*  3437*  3438   3498*  3499*  3500*  3501   3555*  3556*  3557*
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                    3558    3586*   3587*   3588*   3589    3628*   3629*   3630*   3631
$TN    = 000064      675#     838#   1200    1204#   1239    1243#   1276    1285#   1321    1330#   1366    1375#   1411
                    1420#   1456    1465#   1501    1510#   1546    1555#   1591    1600#   1636    1645#   1681    1690#
                    1727    1731#   1766    1770#   1811    1821#   1850    1860#   1893    1897#   1938    1942#   1984
                    1992#   2013    2016    2019    2029    2038#   2060    2063    2067#   2083    2085    2087    2098
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.SBTTL           677     689     722     840     851     873     917     966    1095    1149    1154    1200    1239    1276    1321
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                1893    1938    1984    2029    2063    2098    2120    2121    2122    2124    2158    2224    2270    2296    2323
                2374    2425    2476    2527    2578    2633    2679    2705    2706    2707    2710    2752    2791    2792    2793
                2795    2820    2848    2877    2916    2960    3044    3128    3213    3297    3388    3461    3534    3609    3742
                3819    3860    3901    3938    3939    3940    3942    4019    4045    4102    4149    4214    4353    4432    4489
                4604    4627
.TITLE           665
.WORD            697     698     700     701     703     848     867     868     869     870     871     872     881     884     885
                886     887     890     891     892     893     894     895     896     899     900     901     922     923     924
                925     926     927     928     929     933     934     935     948     952     955     958     959     960     961
```

```
  962   963  1063  1064  1065  1066  1067  1068  1069  1070  1071  1072  1073  1074  1075
 1076  1077  1078  1079  1080  1081  3756  3759  3798  4018  4128  4133  4382  4429  4464
 4524  4602  4603  4634  4716  4718  4720  4722  4723  4725  4727  4729
```

ERRORS DETECTED: 0

```
*,DVKWAB.SEQ/CRF/SOL/NL:TOC=DSKZ:DVKWAB.SML,DVKWAB.P11
RUN-TIME:  20 24 2 SECONDS
CORE USED:  34K
```

LO9

```
Spooler runtime 4 Seconds, 40 KCS, 460 disk reads, 3 disk writes, 114 pages
/[illegible] Date 01-Dec-77 [illegible] Monitor IPC-0 [illegible] (3C1) VM KL10 [illegible]
00000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000111111111111111111111111111111111110
00000000111111111122222222223333333333444444444455555555556666666666777777777788888888889999999999000000000011111111112222222222333 12
[illegible]23456789012 **
00000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000111111111111111111111111111111111110
00000000111111111122222222223333333333444444444455555555556666666666777777777788888888889999999999000000000011111111112222222222333 12
```