

# PDP11

WATCHDOG TIMER  
MD-11-DBQAA-A

EP-DBQAA-A-DL-A  
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**digital**  
MADE IN USA

The microfiche card contains a grid of frames. The first column of frames contains technical specifications and diagrams. The second column contains detailed tables of data, likely timing or configuration parameters. The third and fourth columns contain further technical details and diagrams. The fifth and sixth columns contain additional data tables and diagrams. The frames are arranged in a regular grid pattern, typical of microfiche storage.



.REM 2

DB0000 P11

IDENTIFICATION

|               |                      |
|---------------|----------------------|
| PRODUCT CODE: | MAINDEC-11-DBGAA-A-D |
| PRODUCT NAME: | WATCH DOG DIAGNOSTIC |
| DATE:         |                      |
| MAINTAINER:   | DIAGNOSTIC GROUP     |
| AUTHOR:       | GEORGE BAISLEY       |

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 MAYNARD, MASSACHUSETTS 01754

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1. ABSTRACT

THE FUNCTION OF THE WATCHDOG DIAGNOSTICS IS TO VERIFY THAT THE WATCH DOG TIMER PERFORMS AS SPECIFIED BY THE PRINT SET. THE WATCH DOG PACKAGE CONSISTS OF ONE TAPE. THE WATCH DOG TIMER HARDWARE IS COMPOSED OF TWO INDEPENDENT FUNCTIONAL PARTS: A. WATCH DOG TIMER AND B. WATCH DOG LINE CLOCK EACH HAVE THEIR OWN VECTOR AND DEVICE ADDRESSES. THE LINE CLOCK PORTION OF THE DIAGNOSTICS REQUIRES THE OPERATOR TO MONITOR IT'S OPERATION WITH A CLOCK CAPABLE OF MEASURING TIME IN SECONDS.

2. REQUIREMENTS

2.1 EQUIPMENT

PDP-11/40 ONLY WITH WATCH DOG TIMER

PDP-11/20 MAY BE USED, HOWEVER IT WILL NOT EXERCISE THE RESTART LOGIC PORTION AND THEREFORE WILL FAIL THOSE FUNCTIONS.

2.2 STORAGE

2.2.1. PROGRAM STORAGE

THIS PROGRAM LOADS IN 4K OF MEMORY

3. LOADING PROCEDURE

3.1 METHOD

PROGRAM IS IN ABSOLUTE FORMAT AND IS LOADED USING THE ABSOLUTE LOADER

ABSOLUTE LOADER START ADDRESS #500

| MEMORY SIZE | *   |
|-------------|-----|
| 4K          | 17  |
| 8K          | 37  |
| 12K         | 57  |
| 16K         | 77  |
| 20K         | 117 |
| 24K         | 137 |
| 28K         | 157 |

3.1.1. LOAD ADDRESS OF ABS LOADER INTO SWITCHES

3.1.2. DEPRESS "LOAD ADDRESS" KEY ON CONSOLE

3.1.3. DEPRESS "START" KEY ON CONSOLE

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- 4. STARTING PROCEDURE
  - A. SET SWITCH REGISTER TO 000200
  - B. DEPRESS "LOAD ADDRESS" KEY
  - C. DEPRESS START

THE PROGRAM WILL JUMP TO THE DIAGNOSTIC MONITOR AND TYPE OUT THE OPERATING INSTRUCTIONS. THIS IS ONCE ONLY CODE. TO RETYPE THE OPERATING INSTRUCTION THE OPERATOR MAY EITHER RELOAD THE PROGRAM OR LOAD THE ADDRESS "MONITOR" IN THE SWITCH REGISTER AND DEPRESS START.

4.1 CONTROL SWITCH SETTINGS

- SR15 HALT ON ERROR
- SR14 SCOPE LOOP (SCOPE ON TEST OR ERROR)
- SR13 INHIBIT ERROR PRINTOUT
- SR12 SHORT ERROR REPORT
- SR11 INHIBIT ITERATIONS

4.2 STARTING ADDRESSES

| ADDRESSES | COMMENT   |
|-----------|---|
| 000200    | NORMAL START<br><br>WITH 200 LEFT IN THE SWITCHES THE PROGRAM TYPES OUT FULL INSTRUCTIONS ONCE AND ABBREVIATED INSTRUCTIONS THEREAFTER. WITH THE SWITCHES ZERO THE PROGRAM SETUP EITHER THE DEFAULT OR PREVIOUSLY SELECTED PARAMETERS AND IMMEDIATELY ASKS FOR DYNAMIC SWITCH SETTINGS. |
| MONITOR   | RELOAD TAPE FOR RETYPING OF INSTRUCTIONS  |
| 000042    | IF THIS LOCATION IS NONZERO THE PROGRAM ASSUMES IT IS RUNNING UNDER ACT11 OR DDP AND USES THE DEFAULT PARAMETERS  |

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5. OPERATING PROCEDURE

STARTING FROM 200 CAUSES THE FOLLOWING TYPE OUT.

MAINDEC-11-DBQAA-A-D

DYNAMIC SWITCH SETTINGS

SR15 HALT ON ERROR  
SR14 SCOPE LOOP  
SR13 INHIBIT ERROR PRINTOUT  
SR12 SHORT ERROR REPORT  
SR11 INHIBIT ITERATIONS

TYPE: <D>, FOR DEFAULT PARAMETERS  
<P>, FOR PREVIOUS PARAMETERS  
<S>, FOR SELECT PARAMETERS  
<N>, FOR START WITH THIS TEST NUMBER

D,P,S,N?

IN RESPONSE TO THIS LAST QUESTION THE OPERATOR IS REQUIRED TO TYPE ONE OF THE LETTERS IN THE STRING. ON THE FIRST TIME THRU THIS DIAGNOSTIC TYPE "D" FOR DEFAULT TO SET UP PARAMETERS, OR TYPE "S" TO SELECT PARAMETERS.

TYPE "P" OR "N" AFTER THE PARAMETERS HAVE BEEN SELECTED FROM PREVIOUS RUNS.

IF ANY CHARACTER OTHER THAN ONE IN THE STRING IS TYPED THE MONITOR WILL REJECT THE CHARACTER AND RETYPE THE STRING.

IF, IN RESPONSE TO THE STRING, THE OPERATOR TYPES AN "S" THE SELECTION SEQUENCE IS ENTERED AND THE FOLLOWING DIALOGUE TAKES PLACE.

NOTE: THESE ARE THE DEFAULT PARAMETERS: TYPING <CR> IS EQUIVALENT TO TYPING THE DEFAULT PARAMETER.

TEST NUMBER: 1  
BASE ADDRESS: 172400  
VECTOR ADDRESS: 300  
WD PRIORITY LEVEL: 6

TIMEOUT VALUE IN MILLISECS + TOLERANCE: 140  
TRIGGER VALUE IN MILLISECS (5% OF TIMOUT VALUE): 7

CLOCK FREQ IN HZ: 1000  
RESTART ADDRESS: 173776  
SET SWITCHES

AT ANY TIME DURING THE 'S' ELECTION SEQUENCE A CONTROL C MAY BE TYPED AND THE MONITOR WILL ASK AGAIN "D,P,S,N?"

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5.1 "TEST NUMBER: 1"

HERE THE MONITOR IS ASKING FOR THE NUMBER OF THE FIRST TEST IN THE CHAINING SEQUENCE. THE DEFAULT ANSWER IS (1) ONE, THE FIRST TEST IN THE CHAIN. THE OPERATOR MAY TYPE ANY TEST NUMBER AS SPECIFIED IN THE LISTING; HOWEVER, AT THIS WRITING THERE IS NO CHECK TO SEE IF THE OPERATOR SELECTED A NONEXISTANT TEST NUMBER. HENCEFORTH THE NUMBER TYPED AFTER THE COLON IS THE DEFAULT PARAMETER UNTIL CHANGED....TYPING A <CR> IS EQUIVALENT TO TYPING THIS DEFAULT PARAMETER.

"BASE ADDRESS: 172400"

THIS IS THE BASE ADDRESS FOR THE WATCH DOG TIMER AND ASSOCIATED LINE CLOCK. BY TYPING THE CORRECT BASE ADDRESS; CLKCSR, WDCSR, AND WDDAT ARE GENERATED AUTOMATICALLY. EG. 172400,172404,172406 RESPECTIVELY

TYPING <CR> WILL GENERATE THE DEFAULT PARAMETERS. 172400,172404,172406

"VECTOR ADDRESS: 300"

THE WATCH DOG TIMER IS CUT TO INTERRUPT TO ADDRESS 300 AT THE FACTORY. BY TYPING THE CORRECT VECTOR ADDRESS; CLKIV, CLKIS, WDIV, AND WDIS ARE GENERATED AUTOMATICALLY EG. 300, 302, 304, 306 RESPECTIVELY

TYPING <CR> WILL GENERATE THE DEFAULT PARAMETERS 300, 302, 304, 306

"WD PRIORITY LEVEL: 6"

THIS IS THE DEVICE INTERRUPT PRIORITY LEVEL - THE W.D.T. IS FACTORY WIRED TO LEVEL 6. BY TYPING THE WRONG PRIORITY LEVEL THE DIAGNOSTIC WILL RESPOND WITH ERRORS IN THE PROGRAM ACCORDINGLY.

TYPING <CR> WILL SET UP THE DEFAULT VALUE 6.

"TIMEOUT VALUE IN MILLISECS + TOLERANCE : 140"

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TIMEOUT (OR TIMOUT) IS THE WATCH DOG'S TIME OUT VALUE. THAT IS, UNLESS IT IS "UPDATED" WITHIN THE PRECUT VALUE THE WATCH DOG RELAY WILL FALL CAUSING RESTART, ETC.

BY TYPING THE CORRECT TIMOUT VALUE IN MILLISECS (DECIMAL NUMBERS ONLY, NO FRACTIONS OR DECIMAL POINT), THE DIAGNOSTIC WILL PASS THE TESTS. BY REDUCING THIS NUMBER AT THE MONITOR LEVEL (TYPING "S" ELECT PARAMETERS) AND ALTERNATELY RUNNING THE PROGRAM THE ACTUAL PRECUT VALUE OF TIMOUT CAN BE ASCERTAINED.... THE PROGRAM WILL FAIL BY SPECIFYING THAT A TOO LOW VALUE OF TIMOUT WAS TYPED IN. BY REPEATEDLY RUNNING THE PROGRAM AND RESELECTING THE TIMOUT VALUE, IT CAN BE DETERMINED TO AN ACCURACY OF + 1 MSEC.

TYPING <CR> WILL SET UP THE DEFAULT VALUE .40 (MILLISECONDS IN DECIMAL NUMBERS)

NOTE1: TYPE WHOLE DECIMAL NUMBERS ONLY, FRACTIONS WILL CAUSE ERRORS, THE LOWEST ACCEPTABLE NUMBER IS 1.

NOTE2: THE HIGHEST VALUE THAT WILL BE ACCEPTED IS 10000 MILLISECONDS (10 SECS) TYPING A NUMBER HIGHER THAN 10000 WILL CAUSE ERRORS WITHIN THE PROGRAM (DO NOT USE COMMAS).

"TRIGER VALUE IN MILLISECS (5% OF TIMOUT VALUE): 7"

TRIGGER (OR TRIGER) IS THE WATCH DOG'S TOO SOON (OR TOOSN) VALUE. THAT IS, IF THE WATCH DOG IS "UPDATED" IN LESS TIME THAN 5% OF TIMOUT VALUE THE WATCH DOG WILL GENERATE THE TOOSN BIT AND CAUSE INTERRUPT (IF INTERRUPT ENABLE IS SET).

BY TYPING THE CORRECT TRIGER VALUE IN MILLISECS (DECIMAL NUMBERS ONLY, NO FRACTIONS, OR DECIMAL POINT), THE DIAGNOSTIC WILL PASS THE TESTS. BY REDUCING THIS NUMBER AT THE MONITOR LEVEL (TYPING "S" ELECT PARAMETERS) AND ALTERNATELY RUNNING THE PROGRAM, THE ACTUAL PRECUT VALUE OF TRIGER CAN BE ASCERTAINED.... THE PROGRAM WILL FAIL BY SPECIFYING THAT A TOO LOW VALUE OF TRIGER WAS TYPED IN. BY REPEATEDLY RUNNING THE PROGRAM AND RESELECTING THE TRIGER VALUE, IT CAN BE DETERMINED TO AN ACCURACY OF + 1 MSEC.

TYPING <CR> WILL SET UP THE DEFAULT VALUE 7 (MILLISECONDS IN DECIMAL NUMBERS)

NOTE1: TYPE WHOLE DECIMAL NUMBERS ONLY, FRACTIONS WILL CAUSE ERRORS; THE LOWEST ACCEPTABLE NUMBER IS 1.

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NOTE2: THE HIGHEST VALUE THAT WILL BE ACCEPTED IS 10000 MILL-  
ISECONDS (10 SECS). TYPING A NUMBER HIGHER THAN 10000 WILL  
CAUSE ERRORS WITHIN THE PROGRAM (DO NOT USE COMMAS). THIS NUMBER  
SHOULD NEVER HAVE TO BE USED AS TRIGER VALUE WILL NOT EXCEED  
5% OF TIMEOUT VALUE.

"CLOCK FREQ IN HZ: 1000"

THIS IS THE WATCH DOG'S LINE CLOCK FREQUENCY PRECUT AT THE  
FACTORY. OTHER ACCEPTABLE FREQUENCIES ARE 50, 60, 100, AND 200  
HZ. TYPING OTHER THAN SPECIFIED FREQUENCIES WILL GENERATE AN  
ERROR WITHIN THE PROGRAM.

TYPING <CR> WILL SET UP THE DEFAULT VALUE 1000

"RESTART ADDRESS: 173776"

THIS NUMBER IS THE RESTART ADDRESS.....IT IS NECESSARY THAT  
BEFORE RUNNING THE DIAGNOSTIC THAT THIS NUMBER BE STRAPPED OR  
SWITCHED IN THE WATCH DOG TIMER, DO NOT USE ANY VALID R.O.M.  
STARTING ADDRESS.....

SHOULD THE ABOVE NUMBER BE IN CONFLICT WITH ANY VALID R.O.M.  
ADDRESS, CHOOSE ANY NUMBER FROM 173000 TO 173776 AND STRAP THE  
WATCH DOG TIMER ACCORDINGLY.

"SET SWITCHES"

HERE THE MONITOR ASKS FOR THE CONSOLE SWITCH SETTINGS

SR15 HALT ON ERROR  
SR14 SCOPE LOOP  
SR13 INHIBIT ERROR PRINTOUT  
SR12 SHORT ERROR REPORT  
SR11 INHIBIT ITERATIONS

LOAD THE SWITCH REGISTER WITH THE APPROPRIATE FUNCTION AND  
TYPE <CR>

5.2 PROGRAM AND/OR OPERATOR ACTION

THE TYPICAL APPROACH SHOULD BE

1. SET SR15 - HALT ON ERROR WHEN AN ERROR HALT OCCURS.
2. CLEAR SR15
3. SET SR14 AND DEPRESS "CONTINUE" ON CONSOLE. PROGRAM WILL  
SCOPE ON ERROR.
4. IF ERROR IS REPETITIVE SET SR13 AND SCOPE ERROR

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5. SET SR11 IF THE TEST IS FAILING ON A PARTICULAR PASS I.E.  
2ND AND NOT THE 1ST

THE ERROR PC SHOULD BRING THE OPERATOR TO A POINT IN THE LISTING WHERE THE ERROR IS DOCUMENTED. THEN USING THE PRINTS AND THE FLOWS THE ERROR CAN BE TRACED TO ITS SOURCE.

AT ANY TIME DURING THE INITIALIZATION OR TESTING THE OPERATOR CAN TYPE CONTROL C AND CONTROL WILL BE RETURNED TO THE MONITOR. SOME TESTS ARE 5 TO 10 SECONDS IN DURATION SO THE RESPONSE TO CONTROL C WILL NOT BE INSTANTANEOUS.

THE RESTART ADDRESS IS 200. IF THIS ADDRESS IS LEFT IN THE CONSOLE SWITCHES WHEN "START" IS PRESSED, THE MONITOR WILL TYPE OUT "P, P, S, N?". IF THE SWITCHES ARE ZEROED THE TYPE OUT WILL BE "SET SWITCHES".

## 6. ERRORS

TYPICALLY ERROR REPORTS TAKE THE FOLLOWING FORMAT.

ERROR PC 002776

THIS INDICATES THAT WHILE EXECUTING THE TESTS AN ERROR STATE WAS DETECTED AND IS DOCUMENTED AT PROGRAM COUNT 002776 AND TEST 3

A TYPICAL APPROACH MIGHT BE; TYPE CONTROL C, RESULTS

D, P, S, N? N  
TEST NUMBER: 3  
SET SWITCHES

IN RESPONSE TO SWITCHES SET THE FOLLOWING

SR15=0 HALT ON ERROR  
SR14=1 SCOPE  
TYPE <CR>

IF THE ERROR IS REPEATABLE SET SR13 INHIBIT PRINT AND START TROUBLE SHOOTING. REFER TO LISTING FOR THE COMMENTS ASSOCIATED WITH THE ERROR.

\*\*\*\*\*

ADDED NOTE: MANY ERRORS THAT MAY BE ENCOUNTERED WILL NOT BE THERE WHEN EXAMINING THE CONTENTS OF THE SWITCH REGISTER. THIS IS PRIMARILY DUE TO THE TIMING CHARACTERISTICS WITHIN THE WATCH DOG TIMER. IN MANY CASES WHEN TIMING PLAYS AN IMPORTANT ROLE IN THE DIAGNOSTIC ROUTINE, THE DATA IS STORED AT A TEMPORARY TAG LOCATION PRIOR TO HALTING ON ERROR. THEREFORE, BACK-UP INTO THE DIAGNOSTICS TO FIND WHERE THIS DATA IS TEMPORARILY HELD; LOAD IT'S PC INTO THE SWITCH REGISTER AND 'EXAMINE'. GOOD LUCK!

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### 6.2 ERROR RECOVERY

PROGRAM CAN BE RESTARTED AT ANY TIME BY LOAD ADDRESS 200 AND

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DEPRESS START

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7. RESTRICTIONS

7.1 STARTING RESTRICTIONS

- A. DISCONNECT THE USERS CABLE AND INSTALL THE JUMPER PLUG THAT WAS SUPPLIED WITH THE WATCH DOG TIMER.
- B. STRAP THE RESTART ADDRESS TO AN UNUSED R.O.M. ADDRESS PREFERABLY 173776. SHOULD THIS ADDRESS BE USED, CHOOSE ANY OTHER ADDRESS BETWEEN 173000 TO 173776 AND LOAD THIS WHEN "S" ELECTING PARAMETERS.
- C. SHOULD THE JUMPER PLUG BE UNAVAILABLE; JUMPER THE FOLLOWING:

PIN 8 TO PIN 2  
 PIN 5 TO PIN 7  
 PIN 6 TO PIN 3  
 PIN 10 TO PIN 3  
 PIN 11 TO PIN 1, THRU A SWITCH (RESTART SWITCH)  
 PIN 9 TO PIN 1  
 PIN 17 TO PIN 16  
 PIN 15 TO PIN 14

ALL OF THESE JUMPERS MUST BE IN PRIOR TO RUNNING ANY OF THE FEED BACK LOOP TESTS. THEY ARE NOT REQUIRED IF ONLY THE LINE CLOCK PORTION OF THE WATCH DOG IS TO BE TESTED. SEE LISTINGS FOR DETAILED INFORMATION.

8. MISCELLANEOUS

- A. DISCONNECT USERS CABLE AND INSERT JUMPER PLUG - SEE SECTION 7.1
- B. IT IS IMPORTANT TO RUN THE LINE CLOCK PORTION BEFORE ATTEMPTING TO RUN THE WATCH DOG PORTION; IN PARTICULAR THE MNCLK TEST AS ALL WATCH DOG TIMING IS BASED UPON THE PRESENCE OF THE MAINTENANCE CLOCK (MNCLK).
- C. LINE CLOCK ACCURACY TESTS AT BEST ARE CLOSE APPROXIMATIONS, PRECISION MEASUREMENT IS BEYOND THE SCOPE OF THIS DIAGNOSTIC.

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9. PROGRAM DESCRIPTION

THE PROGRAM CONSISTS OF A SERIES OF SMALL TESTS THAT CHECK EACH OF THE INDIVIDUAL FUNCTIONS AND CHARACTERISTICS OF THE WATCH DOG TIMER AND ASSOCIATED LINE CLOCK.

| TEST NAME              | DESCRIPTION   |
|------------------------|---|
| TEST 1<br>(LINE CLOCK) | TEST THAT START CLEARS LINE CLOCK INTERRUPT ENABLE BIT  |
| TEST 2<br>(LINE CLOCK) | TEST THAT CLOCK INTERRUPTS TO CORRECT VECTOR ADDRESS  |
| TEST 3<br>(LINE CLOCK) | TEST THAT CLOCK INTERRUPT PUSHES CONDITION CODES AND PROGRAM COUNTER ONTO STACK   |
| TEST 4<br>(LINE CLOCK) | TEST THAT RESET SETS CLOCK FLAG (TICK)  |
| TEST 5<br>(LINE CLOCK) | TEST LINE CLOCK REPEATABILITY TO MAKE SURE THAT OVER TWO EQUAL PERIODS OF TIME THE LINE CLOCK PUTS OUT THE SAME NUMBER OF PULSES. |
| TEST 6<br>(LINE CLOCK) | TEST LINE CLOCK REPEATABILITY WITH INTERRUPT  |
| TEST 7<br>(LINE CLOCK) | LINE CLOCK ACCURACY TEST (CLOCK CAPABLE OF MEASURING TIME IN SECONDS IS REQUIPED)   |

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|     |                       |                                      |
|-----|-----------------------|--------------------------------------|
| 449 | TEST 10               | MAINTENANCE CLOCK BIT TEST (MNCLK)   |
| 450 | (LINE CLOCK/WD TIMER) |                                      |
| 451 | TEST 11               | MNCLK ACCURACY TEST                  |
| 452 | (LINE CLOCK/WD TIMER) | (CLOCK CAPABLE OF MEASURING TIME     |
| 453 |                       | IN SECONDS IS REQUIRED)              |
| 454 |                       |                                      |
| 455 | TEST 12               | TEST THAT CHECKS BITS: READ/WRITE    |
| 456 | (WDT)                 | ABILITY OF WD DATA (WDAT)            |
| 457 |                       |                                      |
| 458 | TEST 13               | TEST THAT CHECKS TOO SOON (TOOSN)    |
| 459 | (WDT)                 | BIT; READ/SET ABILITY OF WDCSR       |
| 460 |                       |                                      |
| 461 | TEST 14               | TEST THAT CHECKS BITS WD INTERRUPT   |
| 462 | (WDT)                 | ENABLE (WDIEN), EXTERNAL REQUEST     |
| 463 |                       | (EXTREQ), AND WD ENABLE (WDENAB);    |
| 464 |                       | READ/WRITE ABILITY OF WDCSR          |
| 465 |                       |                                      |
| 466 | TEST 15               | TEST THAT WATCH DOG INTERRUPTS TO    |
| 467 | (WDT)                 | CORRECT VECTOR ADDRESS AND           |
| 468 |                       | TOOSN BIT IS SET BY "UPDATING" TOO   |
| 469 |                       | FAST (TOO SOON)                      |
| 470 |                       |                                      |
| 471 | TEST 16               | TEST THAT CHECKS THE UPDATE SEQUENCE |
| 472 | (WDT)                 | IN REVERSE DOES NOT CAUSE AN ACT-    |
| 473 |                       | UAL 'UPDATE'                         |
| 474 |                       |                                      |
| 475 | TEST 17               | TEST THAT CHECKS WD RELAY IS PICKED  |
| 476 | (WDT)                 | AND DROPS IN TIME SPECIFIED BY       |
| 477 |                       | TIMEOUT. THIS TEST CAN BE USED       |
| 478 |                       | TO DETERMINE ACTUAL TIME OUT VALUE   |
| 479 |                       | + OR - 1 MSEC. SEE SECTION 5.1       |
| 480 |                       |                                      |
| 481 |                       | NOTE: IT IS IMPORTANT THAT TIMEOUT   |
| 482 |                       | BE SELECTED TO PASS THIS TEST WITH   |
| 483 |                       | A VALUE JUST OVER THE PRECUT VALUE   |
| 484 |                       | OF "TIMEOUT".                        |
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TEST 20  
(WDT)

TEST THAT CHECKS TOOSN BIT NOT  
SET IN TIME SPECIFIED BY TRIGER.  
THIS TEST CAN BE USED TO DETERMINE  
ACTUAL TRIGGER VALUE + OR - 1 MSEC.  
SEE SECTION 5.1

NOTE: IT IS IMPORTANT THAT TRIGER  
BE SELECTED TO PASS THIS TEST WITH  
A VALUE JUST OVER THE PRECUT VALUE  
OF "TRIGGER".

TEST 21  
(FEEDBACK LOOP)

TEST THAT CHECKS REMOTE SENSE LOGIC.  
START LOGIC AND RESTART LOGIC.  
IT IS IMPORTANT THAT THE DEVICE  
IS OPERATING ON AN 11/40 FOR THIS  
TEST. ALSO RESTART ADDRESS SHALL  
BE DETERMINED PRIOR TO RUNNING  
THIS TEST.



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146 MAIN ST. MAYNARD, MA. 01754  
MAINTAINER: DIAGNOSTICS  
AUTHOR: G. BAISLEY

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: TRAP HERE IF ADDRESS  
: LINES DROP  
: TRAP PC POINTS TO HALT  
: TRAP PC POINTS TO HALT  
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|     |        |        |                            |   |                        |
|-----|--------|--------|----------------------------|---|------------------------|
| 728 | 000360 | 000362 | .+2                        | : | TRAP PC POINTS TO HALT |
| 729 | 000362 | 000000 | HALT                       | : |                        |
| 730 | 000364 | 000366 | .+2                        | : | TRAP PC POINTS TO HALT |
| 731 | 000366 | 000000 | HALT                       | : |                        |
| 732 | 000370 | 000372 | .+2                        | : | TRAP PC POINTS TO HALT |
| 733 | 000372 | 000000 | HALT                       | : |                        |
| 734 | 000374 | 000376 | .+2                        | : | TRAP PC POINTS TO HALT |
| 735 | 000376 | 000000 | HALT                       | : |                        |
| 736 | 000400 | 000402 | .+2                        | : | TRAP PC POINTS TO HALT |
| 737 | 000402 | 000000 | HALT                       | : |                        |
| 738 |        |        |                            |   |                        |
| 739 |        | 104400 | SCOPE=TRAP                 | : | SCOPE LOOP TRAP        |
| 740 |        |        |                            |   |                        |
| 741 |        | 100000 | BIT15=100000               |   |                        |
| 742 |        | 040000 | BIT14=40000                |   |                        |
| 743 |        | 020000 | BIT13=20000                |   |                        |
| 744 |        | 010000 | BIT12=10000                |   |                        |
| 745 |        | 004000 | BIT11=4000                 |   |                        |
| 746 |        | 002000 | BIT10=2000                 |   |                        |
| 747 |        | 001000 | BIT9=1000                  |   |                        |
| 748 |        | 000400 | BIT8=400                   |   |                        |
| 749 |        | 000200 | BIT7=200                   |   |                        |
| 750 |        | 000100 | BIT6=100                   |   |                        |
| 751 |        | 000040 | BIT5=40                    |   |                        |
| 752 |        | 000020 | BIT4=20                    |   |                        |
| 753 |        | 000010 | BIT3=10                    |   |                        |
| 754 |        | 000004 | BIT2=4                     |   |                        |
| 755 |        | 000002 | BIT1=2                     |   |                        |
| 756 |        | 000001 | BIT0=1                     |   |                        |
| 757 |        | 000000 | HERE=0                     |   |                        |
| 758 |        |        | ;REGISTER DEFINITIONS      |   |                        |
| 759 |        |        |                            |   |                        |
| 760 |        | 000000 | R0=%0                      |   |                        |
| 761 |        | 000001 | R1=%1                      |   |                        |
| 762 |        | 000002 | R2=%2                      |   |                        |
| 763 |        | 000003 | R3=%3                      |   |                        |
| 764 |        | 000004 | R4=%4                      |   |                        |
| 765 |        | 000005 | R5=%5                      |   |                        |
| 766 |        | 000005 | TTY=%5                     |   |                        |
| 767 |        | 000006 | R6=%6                      |   |                        |
| 768 |        | 000006 | SP=%6                      |   | ;STACK POINTER         |
| 769 |        | 000007 | PC=%7                      |   | ;PROGRAM COUNTER       |
| 770 |        |        |                            |   |                        |
| 771 |        | 000004 | TYPE=ICT                   |   |                        |
| 772 |        | 000240 | NOP=240                    |   |                        |
| 773 |        | 177776 | PS=177776                  |   | ;PROCESSOR STATUS      |
| 774 |        | 177570 | SWR=177570                 |   |                        |
| 775 |        | 177570 | SR=177570                  |   | ;SWITCH REGISTER       |
| 776 |        |        | ;PROCESSOR PRIORITY LEVELS |   |                        |
| 777 |        | 000000 | LEVEL0=000                 |   |                        |
| 778 |        | 000040 | LEVEL1=040                 |   |                        |
| 779 |        | 000100 | LEVEL2=100                 |   |                        |
| 780 |        | 000140 | LEVEL3=140                 |   |                        |
| 781 |        | 000200 | LEVEL4=200                 |   |                        |
| 782 |        | 000240 | LEVEL5=240                 |   |                        |
| 783 |        | 000300 | LEVEL6=300                 |   |                        |

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784          000340          LEVEL7=340
785
786
787          ;TTY ADDRESSES
788 000404 177560          TKS:177560
789 000406 177562          TKB:177562
790 000410 177564          TPS:177564
791 000412 177566          TPB:177566
792
793          ;MISC DEFINITIONS
794          000015          CR=15
795          000012          LF=12
796
797          ;EMT DEFINITIONS
798
799 000414 104000          ERROR          ;TRAPS TO T.ERROR
800 000416 104001          SAVRG          ;TRAPS TO T.SAVRG
801 000420 104002          RSTRG          ;TRAPS TO T.RSTRG
802 000422 104003          ACCEPTO        ;TRAPS TO T.ACCEPTO
803 000424 104004          KEY.TO.RO        ;TRAPS TO T.KEY.TO.RO
804
805
806          ;TRAP INITIALIZATION
807
808          000020          .=20
809 000020 013150 000340          .IOT,LEVEL7          ;TTY OUTPUT TRAP,LEVEL 7
810
811          000024          .=24
812 000024 013552 000340          PFAIL,LEVEL7          ;POWER FAIL TRAP
813
814          000030          .=30
815 000030 012322 000340          EMTDECODER,LEVEL7    ;EMT DECODER TRAP,LEVEL 7
816
817          000034          .=34
818 000034 012536 000340          SCOPEC,LEVEL7        ;SCOPE TRAP
819          000200          .=200
820
821 000200 000137 001100          START: JMP      @#BEGIN          ;GO TO BEGINNING OF PROGRAM
822
823          001100          .=1100
824
825 001100 012706 001100          BEGIN: MOV      @#BEGIN,SP          ;SET UP STACK POINTER
826 001104 012767 000340 176664          MOV      @#LEVEL7,PS          ;PRIORITY LEVEL 7
827 001112 005737 000042          TST      @#42          ;ACT!!
828 001116 001404          BEQ      BGN0          ;BR IF NO
829 001120 004767 006214          JSR      PC,DEFAULT          ;INSERT DEFAULT PARAMETERS
830 001124 000137 007310          JMP      @#MON13
831 001130 005327 000001          BGN0: DEC      @1          ;ONCE ONLY
832 001134 001002          BNE      BGN1
833 001136 000137 006346          JMP      @#MONITOR
834 001142 032767 000200 176420          BGN1: BIT      @200,SR          ;TEST FOR FAST START
835 001150 001402          BEQ      BGN2          ;BRANCH IF FAST START
836 001152 000137 006404          JMP      @#MON1.0
837 001156 012706 001100          BGN2: MOV      @#BEGIN,SP
838 001162 012767 000340 176606          MOV      @#LEVEL7,PS
839 001170 000137 007252          JMP      @#MON10          ;USE PREVIOUS PARAMETERS
  
```

|     |        |        |  |
|-----|--------|--------|--|
| 840 |        |        |  |
| 841 |        |        | ;DEFINITIONS                                   |
| 842 |        |        | :CLOCK CSR XXXD                                |
| 843 |        | 000200 | TICK=BIT7                                      |
| 844 |        | 000100 | CLKEN=BIT6                                     |
| 845 |        |        | :WATCH DOG CSR XXX4                            |
| 846 |        | 000200 | FLAG=BIT7                                      |
| 847 |        | 000100 | WDIEN=BIT6                                     |
| 848 |        | 000040 | TOOSN=BIT5                                     |
| 849 |        | 000020 | REMSN=BIT4                                     |
| 850 |        | 000010 | EXTREQ=BIT3                                    |
| 851 |        | 000004 | WDENAB=BIT2                                    |
| 852 |        | 000002 | WDRLY=BIT1                                     |
| 853 |        | 000001 | X=BIT0   |
| 854 |        |        | :WATCH DOG DATA XXX6                           |
| 855 |        | 000010 | MNCLK=BIT3                                     |
| 856 |        | 000004 | WD2=BIT2                                       |
| 857 |        | 000002 | WD1=BIT1                                       |
| 858 |        | 000001 | X=BIT0   |
| 859 |        |        | :WATCH DOG VECTOR AND DEVICE ADDRESSES         |
| 860 | 001174 | 000000 | CLKIV:0  |
| 861 | 001176 | 000000 | CLKIS:0  |
| 862 | 001200 | 000000 | WDIV:0   |
| 863 | 001202 | 000000 | WDIS:0   |
| 864 |        |        | :WATCH DOG ADDRESSES                           |
| 865 | 001204 | 000000 | CLKCSR:0                                       |
| 866 | 001206 | 000000 | VOID:0   |
| 867 | 001210 | 000000 | WDCSR:0  |
| 868 | 001212 | 000000 | WDDAT:0  |
| 869 |        |        | :DEFAULT VECTOR AND DEVICE ADDRESS             |
| 870 | 001214 | 000300 | DFLTIV: 300 ;CLKIV                             |
| 871 | 001216 | 000302 | 302 ;CLKIS                                     |
| 872 | 001220 | 000304 | 304 ;WDIV                                      |
| 873 | 001222 | 000306 | 306 ;WDIS                                      |
| 874 | 001224 | 172400 | DFLTAD: 172400 ;CLKCSR                         |
| 875 | 001226 | 172402 | 172402 ;VOID                                   |
| 876 | 001230 | 172404 | 172404 ;WDCSR                                  |
| 877 | 001232 | 172406 | 172406 ;WDDAT                                  |
| 878 |        |        | :DEFAULT MISC. PARAMETERS                      |
| 879 | 001234 | 000214 | DFLMSC: 140. ;TIMOUT                           |
| 880 | 001236 | 000007 | 7. ;TRIGER                                     |
| 881 | 001240 | 001750 | 1000. ;CLOCKF                                  |
| 882 | 001242 | 173776 | 173776 ;ROMADD                                 |
| 883 | 001244 | 176030 | -1000. ;SEC1                                   |
| 884 | 001246 | 166170 | -5000. ;SECS                                   |
| 885 | 001250 | 154360 | -10000. ;SEC10                                 |
| 886 |        |        |  |
| 887 |        |        | ;MISC SCRATCH PAD                              |
| 888 |        |        |  |
| 889 | 001252 | 000030 | FEEDBK: 24. ;SCHMIDT TRIGGER TIME              |
| 890 | 001254 | 000005 | RLYPT: 5. ;RELAY PICK TIME                     |
| 891 | 001256 | 000300 | WDPRT: LEVEL6                                  |
| 892 | 001260 | 000000 | FIRST.TST:0                                    |
| 893 | 001262 | 003720 | TIMRUN: 2000. ;REAL TIME OF 2 SEC. USING MNCLK |
| 894 | 001264 | 000000 | SAVR1: 0                                       |
| 895 | 001266 | 000000 | SAVR2: 0                                       |

|     |        |        |                |                                   |
|-----|--------|--------|----------------|-----------------------------------|
| 896 | 001270 | 000000 | TIMOUT:0       |                                   |
| 897 | 001272 | 000000 | TRIGER:0       |                                   |
| 898 | 001274 | 00000J | CLOCKF:0       |                                   |
| 899 | 001276 | 000000 | DECNUM:0       |                                   |
| 900 | 001300 | 000000 | TTRIG:0        |                                   |
| 901 | 001302 | 000000 | LESS1: 0       |                                   |
| 902 | 001304 | 000000 | XCNT:0         |                                   |
| 903 | 001306 | 000000 | WDBASE: 0      |                                   |
| 904 | 001310 | 000000 | WDIBAS: 0      |                                   |
| 905 | 001312 | 000000 | LOCTRP: 0      |                                   |
| 906 | 001314 | 000026 | TRANST: 22.    | ; SAVE RESTART ADDRESS HERE       |
| 907 | 001316 | 176030 | SEC1: -1000.   | ; TRANSISTOR SATURATE TIME        |
| 908 | 001320 | 166170 | SEC5: -5000.   | ; DEFAULT VALUE                   |
| 909 | 001322 | 154360 | SEC10: -10000. |                                   |
| 910 | 001324 | 011610 | MNCLKT: 5000.  | ; DEFAULT VALUE-MNCLK TIME=5 SEC. |
| 911 | 001326 | 000000 | BUFF2: 0       |                                   |
| 912 | 001330 | 000000 | BUFF1: 0       |                                   |
| 913 | 001332 | 173776 | ROMADD: 173776 | ; DEFAULT RESTART ADDRESS         |
| 914 |        |        |                |                                   |
| 915 |        |        |                |                                   |
| 916 |        |        |                |                                   |

```

917 ;*****
918 ;TEST 1 W D LINE CLOCK BIT TESTS
919 ;*****
920 001334 104400 †ST1: SCOPE
921 001336 012767 000010 011310 MOV #10,ICOUNT ;ITERATION COUNT
922 001344 012767 000001 011160 MOV #1,ERTSTN ;SAVE TEST # FOR ERROR REPCRT
923 001352 012767 001360 011300 MOV #SCP1,RETURN ;SCOPE LOOP RETURN ADRS
924 001360 SCP1:
925
926 :TEST THAT START CLEARS LINE CLOCK INTERRUPT ENABLE BIT
927 001360 032777 000100 177616 LKTEST: BIT #CLKEN,@CLKCSR
928 001366 001401 BEQ .+4 ;BRANCH IF NO ERROR CONDITION
929 001370 104000 ERROR ;ERROR, CLOCK INTERRUPTS ENABLE NOT CLEARED BY START
930 :TEST THAT START SETS CLOCK TICK
931 001372 105777 177606 LK1: †STB @CLKCSR
932 001376 100401 BMI .+4 ;BRANCH IF NO ERROR CONDITION
933 001400 104000 ERROR ;ERROR, CLOCK TICK NOT SET BY START
934 :TEST THAT CLOCK TICK WILL SET AFTER SUFFICIENT PERIOD OF TIME
935 001402 005077 177576 LK2: CLR @CLKCSR
936 001406 005000 CLR R0
937 001410 105777 177570 LK2A: TSTB @CLKCSR ;IS CLOCK TICK SET
938 001414 100403 BMI LK3
939 001416 005200 INC R0 ;NO, INCREMENT COUNT
940 001420 001373 BNE LK2A ;WAIT SUFFICIENT AMOUNT OF TIME FOR CLOCK
941 001422 104000 ERROR ;ERROR,CLOCK TICK FAILED TO SET
942 :TEST THAT INTERRUPT ENABLE BIT MAY BE SET
943 001424 005077 177554 LK3: CLR @CLKCSR
944 001430 105777 177550 TSTB @CLKCSR
945 001434 100375 BPL .-4 ;SYNC CLOCK
946 001436 012767 000340 176332 MOV #LEVEL7,PS ;SET PRIORITY 7
947 001444 012777 000100 177532 MOV #100,@CLKCSR ;CLEAR CLOCK TICK AND SET INTERRUPT ENABLE
948 001452 032777 000100 177524 BIT #CLKEN,@CLKCSR ;IS INTERRUPT ENABLE SET?
949 001460 001001 BNE .+4 ;BRANCH IF NO ERROR CONDITION
950 001462 104000 ERROR ;INTERRUPT ENABLE NOT SET
951 :TEST THAT INTERRUPT ENABLE BIT MAY BE CLEARED
952 001464 005077 177514 LK4: CLR @CLKCSR
953 001470 105777 177510 TSTB @CLKCSR
954 001474 100375 BPL .-4 ;SYNC CLOCK
955 001476 012777 000100 177500 MOV #100,@CLKCSR ;CLEAR CLOCKFLAG AND SET INTERRUPT ENABLE
956 001504 005077 177474 CLR @CLKCSR ;CLEAR INTERRUPT ENABLE
957 001510 032777 000100 177466 BIT #CLKEN,@CLKCSR
958 001516 001401 BEQ .+4 ;BRANCH IF NO ERROR CONDITION
959 001520 104000 ERROR ;INTERRUPT ENABLE NOT CLEARED
960 001522 105777 177456 TSTB @CLKCSR ;WAIT FOR CLOCK TICK
961 001526 100375 BPL .-4
962
963
  
```

# K02

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 DBQAAA.P11 T2 INTERRUPT ENABLE TEST

```

964 ;*****
965 ;TEST 2 INTERRUPT ENABLE TEST
966 ;*****
967 001530 104400 ST2: SCOPE
968 001532 012767 0C0010 J11114 MOV #10,ICOUNT ;ITERATION COUNT
969 001540 012767 000002 010764 MOV #2,ERTSTN ;SAVE TEST # FOR ERROR REPCRT
970 001546 012767 001554 011104 MOV #SCP2,RETURN ;SCOPE LOOP RETURN ADRS
971 001554 SCP2:
972
973 ;TEST THAT CLOCK INTERRUPTS TO CORRECT VECTOR ADDRESS
974 001554 016777 177476 177414 LK5: MOV WDPRT,@CLKIS
975 001562 016767 177514 176206 MOV LESS1,PS ;SET PROCESSOR PRIORITY LESS THAN LINE CLOCK
976 001570 012777 001630 177376 MOV #LK5B,@CLKIV ;SET UP VECTOR RETURN POINTER
977 001576 005077 177402 CLR @CLKCSR
978 001602 105777 177376 TSTB @CLKCSR
979 001606 100375 BPL .-4 ;SYNC CLOCK
980 001610 012777 000100 177366 MOV #100,@CLKCSR ;ENABLE INTERRUPT AND CLEAR CLOCK TICK
981 001616 005000 CLR RD
982 001620 005200 LK5A: INC RD
983 001622 001376 BNE LK5A ;WAIT FOR INTERRUPT
984 001624 104000 ERROR ;INTERRUPT FAILED TO OCCUR
985 001626 000433 BR LK6 ;
986 001630 016777 177342 177336 LK5B: MOV CLKIS,@CLKIV ;RESTORE TRAPCATCHER
987 001636 012777 000003 177332 MOV #0,@CLKIS ;
988 001644 105777 177334 TSTB @CLKCSR
989 001650 100401 BMI .+4 ;BRANCH IF NO ERROR CONDITION
990 001652 104000 ERROR ;INTERRUPT NOT CAUSED BY CLOCK
991 001654 012716 001670 MOV #LK5.1,(SP) ;LOAD RETURN ADDRESS
992 001660 012767 000340 176110 MOV #LEVEL7,PS ;RESTORE PROC STATUS
993 001666 000002 RTI
994 001670 000240 LK5.1: NOP
995
996
  
```

# L02

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 DBQARA.P11 T3 CHECK CORRECT COND. CODES AND PROGRAM COUNTER ON STACK

```

997 ;*****
998 ;TEST 3 CHECK CORRECT COND. CODES AND PROGRAM COUNTER ON STACK
999 ;*****
1000 001672 104400 TST3: SCOPE
1001 001E74 012767 0C0010 010752 MOV #10,ICOUNT ;ITERATION COUNT
1002 001702 012767 000003 010622 MOV #3,ERTSTN ;SAVE TEST # FOR ERROR REPORT
1003 001710 012767 001716 010742 MOV #SCP3,RETURN ;SCOPE LOOP RETURN ADRS
1004 001716 SCP3:
1005
1006 ;TEST THAT CLOCK INTERRUPT PUSHES COND. CODES AND PROGRAM COUNTER ONTO STACK
1007 001716 016777 177334 177252 LK6: MOV WDPRT,CLKIS
1008 001724 005077 177254 CLR CLKCSR
1009 001730 105777 177250 TSTB CLKCSR
1010 001734 100375 BPL .-4 ;SYNC CLOCK
1011 001736 012777 001764 177230 MOV #LK6A,CLKIV ;SET UP VECTOR RETURN
1012 001744 016767 177332 176024 MOV LESS1,PS ;SET PROC. PRIORITY
1013 001752 012777 000100 177224 MOV #100,CLKCSR ;SET ENABLE BIT
1014 001760 000277 SCC ;SET ALL COND. CODES
1015 001762 000001 WAIT ;WAIT FOR INTERRUPT
1016 001764 016777 177206 177202 LK6A: MOV CLKIS,CLKIV ;RESTORE CLKIV
1017 001772 012777 000000 177176 MOV #0,CLKIS
1018 002000 012767 000340 175770 MOV #LEVEL7,PS ;RESTORE PRCC. STATUS
1019 002006 011637 001330 MOV (SP),#BUFF1 ;PC
1020 002012 016637 000002 001326 MOV 2(SP),#BUFF2 ;PS
1021 002020 022737 001764 001330 CMP #LK6A,#BUFF1
1022 002026 001401 BEQ .+4 ;BRANCH IF NO ERROR CONDITION
1023 002030 104000 ERROR ;WRONG PC PUSHED ONTO STACK
1024 002032 162737 000017 001326 SUB #17,#BUFF2 ;SUBTRACT CONDITION CODES
1025 002040 026737 177236 001326 CMP LESS1,#BUFF2
1026 002046 001401 BEQ .+4 ;BRANCH IF NO ERROR CONDITION
1027 002050 104000 ERROR ;WRONG PS PUSHED ONTO STACK
1028 002052 012716 002060 MOV #LK6.1,(SP) ;LOAD RETURN ADDRESS
1029 002056 000002 RTI
1030 002060 000240 LK6.1: NOP
1031
1032

```

M02

.MAIN. MACY11 27(732) 15-OCT-76 11:28 PAGE 26  
DBQAAA.P11 T4 RESET TEST

|      |        |        |        |        |
|------|--------|--------|--------|--------|
| 1033 |        |        |        |        |
| 1034 |        |        |        |        |
| 1035 |        |        |        |        |
| 1036 | 002062 | 104400 |        |        |
| 1037 | 002064 | 012767 | 000010 | 010562 |
| 1038 | 002072 | 012767 | 000004 | 010432 |
| 1039 | 002100 | 012767 | 002106 | 010552 |
| 1040 | 002106 |        |        |        |
| 1041 |        |        |        |        |
| 1042 |        |        |        |        |
| 1043 | 002106 | 005077 | 177072 |        |
| 1044 | 002112 | 105777 | 177066 |        |
| 1045 | 002116 | 100375 |        |        |
| 1046 | 002120 | 005077 | 177060 |        |
| 1047 | 002124 | 000005 |        |        |
| 1048 | 002126 | 105777 | 177052 |        |
| 1049 | 002132 | 100401 |        |        |
| 1050 | 002134 | 104000 |        |        |
| 1051 |        |        |        |        |
| 1052 |        |        |        |        |

```

;*****
;TEST 4 RESET TEST
;*****
TST4: SCOPE
      MOV #10,ICOUNT ; ITERATION COUNT
      MOV #4,ERTSTN ; SAVE TEST # FOR ERROR REPORT
      MOV #SCP4,RETURN ; SCOPE LOOP RETURN ADRS
SCP4:
;TEST THAT RESET SETS CLOCK FLAG
LK7: CLR @CLKCSR ; CLEAR CLOCK FLAG
      TSTB @CLKCSR
      BPL -4 ; WAIT FOR CLOCK TICK
      CLR @CLKCSR ; SHOULD CLEAR CLOCK TICK
      RESET
      TSTB @CLKCSR
      BMI .+4 ; BRANCH IF NO ERROR CONDITION
      ERROR ; RESET DID NOT CLEAR CLOCK FLAG

```

```

1053 ;*****
1054 ;TEST 5 LINE CLOCK REPEATIBILITY
1055 ;*****
1056 002136 104400 †TST5: SCOPE
1057 002140 012767 000010 010506 MOV #10,ICOUNT ;ITERATION COUNT
1058 002146 012767 000005 010356 MOV #5,ERTSTN ;SAVE TEST # FOR ERROR REPRRT
1059 002154 012767 002162 010476 MOV #SCPS,RETURN ;SCOPE LOOP RETURN ADRS
1060 002162
1061
1062 ;TEST LINE CLOCK REPEATABILITY
1063 ;MAKE SURE THAT OVER TWO EQUAL PERIODS OF TIME
1064 ;THE LINE CLOCK PUTS OUT THE SAME NUMBER OF PULSES
1065 002162 005000 LK8: CLR R0 ;CLEAR 1ST TIME COUNT
1066 002164 005001 CLR R1 ;CLEAR 1ST CLOCK COUNT
1067 002166 012767 000340 175602 MOV #LEVEL7,PS ;SET PRIORITY
1068 002174 005077 177004 CLR @CLKCSR
1069 002200 105777 177000 TSTB @CLKCSR
1070 002204 100375 BPL -4 ;SYNC CLOCK
1071 002206 005077 176772 CLR @CLKCSR
1072 002212 105777 176766 TSTB @CLKCSR
1073 002216 100375 BPL -4 ;SYNC CLOCK 2ND TIME TO MAKE SURE
1074 002220 005077 176760 CLR @CLKCSR
1075 002224 105777 176754 LK8A: TSTB @CLKCSR ;IS CLOCK TICK SET
1076 002230 100003 BPL LK8B ;NO
1077 002232 005201 INC R1 ;+1 TO CLOCK COUNT
1078 002234 005077 176744 CLR @CLKCSR ;CLEAR CLOCK IF SET
1079 002240 005200 LK8B: INC R0 ;+1 TO TIME COUNT
1080 002242 001370 BNE LK8A ;REPEAT UNTIL R0=0
1081 002244 005000 CLR R0 ;CLEAR 2ND TIME COUNT
1082 002246 005002 CLR R2 ;CLEAR 2ND CLOCK COUNT
1083 002250 005077 176730 CLR @CLKCSR
1084 002254 105777 176724 TSTB @CLKCSR
1085 002260 100375 BPL -4
1086 002262 005077 176716 CLR @CLKCSR
1087 002266 105777 176712 TSTB @CLKCSR
1088 002272 100375 BPL -4 ;SYNC CLOCK 2ND TIME TO MAKE SURE
1089 002274 005077 176704 CLR @CLKCSR
1090 002300 105777 176700 LK8C: TSTB @CLKCSR ;IS CLOCK TICK SET
1091 002304 100003 BPL LK8D ;NO
1092 002306 005202 INC R2 ;+1 TO CLOCK COUNT
1093 002310 005077 176670 CLR @CLKCSR ;CLEAR CLOCK IF SET
1094 002314 005200 LK8D: INC R0 ;+1 TO TIME COUNT
1095 002316 001370 BNE LK8C ;REPEAT UNTIL R0=0
1096 002320 010167 176740 MOV R1,SAVR1 ;SAVE R1
1097 002324 010267 176736 MOV R2,SAVR2 ;SAVE R2
1098 002330 020102 CMP R1,R2 ;ARE THEY EQUAL ?
1099 002332 001411 BEQ LK8E ;YES
1100 002334 062701 000001 ADD #1,R1 ;ARE THEY OFF BY 1 COUNT ?
1101 002340 020102 CMP R1,R2
1102 002342 001405 BEQ LK8E ;YES
1103 002344 162701 000002 SUB #2,R1 ;ARE THEY OFF BY 1 COUNT ?
1104 002350 020102 CMP R1,R2
1105 002352 001401 BEQ LK8E ;YES
1106 002354 104000 ERROR ;CLOCK TICK DIFF BY MORE THAN 1 COUNT
1107 ;IN EQUAL PERIODS OF TIME
1108 002356 000240 LK8E: NOP

```

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DB0000.P11 TS LINE CLOCK REPEATIBILITY

1109  
1110

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1111 ;*****
1112 ;TEST 6 LINE CLOCK REPEATABILITY WITH INTERRUPT
1113 ;*****
1114 002360 104400 †ST6: SCOPE
1115 002362 012767 000010 010264 MOV #10,ICOUNT ;ITERATION COUNT
1116 002370 012767 000006 010134 MOV #6,ERTSTN ;SAVE TEST # FOR ERROR REPORT
1117 002376 012767 002404 010254 MOV #SCP6,RETURN ;SCOPE LOOP RETURN ADRS
1118 002404 SCP6:
1119
1:20 ;TEST LINE CLOCK REPEATABILITY WITH INTERRUPT
1121 002404 016767 176672 175364 LK9: MOV LESS1,PS ;SET PROC. PRIORITY
1122 002412 005001 CLR R1 ;CLEAR 1ST CLOCK COUNT
1123 002414 012777 002500 176552 MOV #LK9B,@CLKIV
1124 002422 016777 176630 176546 MOV WDPRT,@CLKIS
1125 002430 005077 176550 CLR @CLKCSR
1126 002434 105777 176544 TSTB @CLKCSR
1127 002440 100375 BPL -4 ;SYNC CLOCK
1128 002442 005077 176536 CLR @CLKCSR
1129 002446 105777 176532 TSTB @CLKCSR
1130 002452 100375 BPL -4 ;SYNC CLOCK 2ND TIME TO MAKE SURE
1131 002454 012777 000100 176522 MOV #100,@CLKCSR ;ENABLE INTERRUPT
1132 ;WAIT FOR CLOCK INTERRUPTS
1133 002462 004567 005632 JSR RS,HOLDUP ;STALL SUFFICIENT TIME TO ALLOW
1134 002466 001262 TIMRUN ;FUNCTION TO OCCUR
1135 002470 042777 000100 176506 BIC #CLKEN,@CLKCSR ;CLEAR INTERRUPT ENABLE
1136 002476 000405 BR LK9C
1137 002500 005201 LK9B: INC R1
1138 002502 012777 000100 176474 MOV #100,@CLKCSR ;CLEAR TICK & SET ENABLE
1139 002510 000002 RTI
1140 002512 016767 176564 175256 LK9C: MOV LESS1,PS
1141 002520 005002 CLR R2 ;CLEAR 2ND CLOCK COUNT
1142 002522 012777 002606 176444 MOV #LK9E,@CLKIV
1143 002530 016777 176522 176440 MOV WDPRT,@CLKIS
1144 002536 005077 176442 CLR @CLKCSR
1145 002542 105777 176436 TSTB @CLKCSR
1146 002546 100375 BPL -4 ;SYNC CLOCK
1147 002550 005077 176430 CLR @CLKCSR
1148 002554 105777 176424 TSTB @CLKCSR
1149 002560 100375 BPL -4 ;SYNC CLOCK SECOND TIME TO MAKE SURE
1150 002562 012777 000100 176414 MOV #100,@CLKCSR ;ENABLE INTERRUPT
1151 ;WAIT FOR CLOCK INTERRUPTS
1152 002570 004567 005524 JSR RS,HOLDUP ;STALL SUFFICIENT TIME TO ALLOW
1153 002574 001262 TIMRUN ;FUNCTION TO OCCUR
1154 002576 042777 000100 176400 BIC #CLKEN,@CLKCSR ;CLEAR INTERRUPT ENABLE
1155 002604 000405 BR LK9F
1156 002606 005202 LK9E: INC R2
1157 002610 012777 000100 176366 MOV #100,@CLKCSR ;CLEAR TICK & SET ENABLE
1158 002616 000002 RTI
1159 002620 005077 176360 LK9F: CLR @CLKCSR
1160 002624 012767 000340 175144 MOV #LEVEL7,PS ;RESTORE PROC. STATUS
1161 002632 016777 176340 176334 MOV CLKIS,@CLKIV ;RESTORE CLKIV
1162 002640 012777 000000 176330 MOV #0,@CLKIS
1163 002646 010167 176412 MOV R1,SAVR1 ;SAVE
1164 002652 010267 176410 MOV R2,SAVR2 ;SAVE
1165 002656 020127 000000 CMP R1,#0
1166 002662 001001 BNE +4 ;BRANCH IF NO ERROR CONDITION

```



E03

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1184 ;*****:*****
1185 ;TEST 7 LINE CLOCK ACCURACY TEST
1186 ;*****:*****
1187 002726 104400 ST7: SCOPE
1188 002730 012767 000000 007716 MOV #0,ICOUNT ;ITERATION COUNT
1189 002736 012767 000007 007566 MOV #7,ERTSTN ;SAVE TEST # FOR ERROR REPORT
1190 002744 012767 002752 007706 MOV #SCP7,RETURN ;SCOPE LOOP RETURN ADRS
1191 002752 SCP7:
1192
1193 ;RING BELL AFTER EACH OF FIRST (5) 1 SECOND INTERVALS
1194 ;RING BELL AFTER 10 SECOND INTERVAL
1195 ;(INTERRUPT MODE)
1196 002752 016700 176340 LK10: MOV SEC1,RO
1197 002756 004767 005762 JSR PC,TIME ;BELL AFTER 1 SECOND
1198 002762 016700 176330 MOV SEC1,RO
1199 002766 004767 005752 JSR PC,TIME ;BELL AFTER 2 SEC.
1200 002772 016700 176320 MOV SEC1,RO
1201 002776 004767 005742 JSR PC,TIME ;BELL AFTER 3 SEC.
1202 003002 016700 176310 MOV SEC1,RO
1203 003006 004767 005732 JSR PC,TIME ;BELL AFTER 4 SEC.
1204 003012 016700 176300 MOV SEC1,RO
1205 003016 004767 005722 JSR PC,TIME ;BELL AFTER 5 SEC.
1206 003022 016700 176272 MOV SEC5,RO
1207 003026 004767 005712 JSR PC,TIME ;BELL AFTER 10 SEC.
1208 ;RING BELL AFTER 10 SECONDS USING CLOCK TICK (NON INTERRUPT)
1209 ;5 TIMES
1210 003032 012703 177773 MOV #5,R3
1211 003036 016700 176260 LK10B: MOV SEC10,RO
1212 003042 005077 176136 LK10A: CLR @CLKCSR ;CLEAR CLOCK TICK
1213 003046 105777 176132 TSTB @CLKCSR ;WAIT FOR CLOCK TICK
1214 003052 100375 BPL -4
1215 003054 005200 INC RO ;FINISHED 10 SECONDS?
1216 003056 001371 BNE LK10A
1217 003060 000004 012206 TYPE BELL ;RING BELL EVERY 10 SECONDS
1218 003064 005203 INC R3
1219 003066 001363 BNE LK10B ;5 BELLS
1220
1221

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# F03

.MAIN. MACY11 27(732) 15-OCT-76 11:28 PAGE 32  
 DBQAAA.P11 T10 MNCLK TEST

```

1222 :*****
1223 :TEST 10 MNCLK TEST
1224 :*****
1225 003070 104400 TST10: SCOPE
1226 003072 012767 000010 007554 MOV #10,ICOUNT ;ITERATION COUNT
1227 003100 012767 000010 007424 MOV #10,ERTSTN ;SAVE TEST # FOR ERROR REPCRT
1228 003106 012767 003114 007544 MOV #SCP10,RETURN ;SCOPE LOOP RETURN ADRS
1229 003114 SCP10:
1230
1231 :MAINTENANCE CLOCK BIT TEST--MNCLK
1232 003114 005000 LK11: CLR R0 ;CLEAR 0 STATE COUNTER
1233 003116 005001 CLR R1 ;CLEAR 1 STATE COUNTER
1234 003120 012702 000001 MOV #1,R2 ;TIME COUNTER
1235 003124 032777 000010 176060 TMNCLK: BIT #MNCLK,#WDAT ;TEST MNCLK BIT
1236 003132 001002 BNE SET
1237 003134 005200 CLEAR: INC R0 ;STORE 0 STATE
1238 003136 000401 BR .+4
1239 003140 005201 SET: INC R1 ;STORE 1 STATE
1240 003142 005202 INC R2
1241 003144 001367 BNE TMNCLK ;WAIT SUFFICIENT TIME TO STORE BOTH STATES
1242 003146 005700 TST R0
1243 003150 001001 BNE .+4 ;BRANCH IF NO ERROR CONDITION
1244 003152 104000 ERROR ;MNCLK IS NOT WORKING-CLEARED
1245 003154 005701 TST R1
1246 003156 001001 BNE .+4 ;BRANCH IF NO ERROR CONDITON
1247 003160 104000 ERROR ;MNCLK IS NOT WORKING-SET
1248
1249
  
```

G03

MAIN. MACY11 27(732) 15-OCT-76 11:28 PAGE 33  
DBQAAA.P11 T11 MNCLK ACCURACY TEST

```

1250 ;*****
1251 ;TEST 11 MNCLK ACCURACY TEST
1252 ;*****
1253 003162 104400 TST11: SCOPE
1254 003164 012767 000000 007462 MOV #0,ICOUNT ;ITERATION COUNT
1255 003172 012767 000011 007332 MOV #11,ERTSTN ;SAVE TEST # FOR ERROR REPORT
1256 003200 012767 003206 007452 MOV #SCP11,RETURN ;SCOPE LOOP RETURN ADRS
1257 003206 SCP11:
1258
1259 ;RING BELL AFTER 5 SEC INTERVAL--5 TIMES
1260 003206 012703 177773 LK12: MOV #-5,R3
1261 003212 005077 175766 CLR @CLKCSR
1262 003216 105777 175762 TSTB @CLKCSR
1263 003222 100375 BPL .-4 ;SYNC CLOCK
1264 003224 LK12A:
1265 003224 004567 005070 JSR R5,HOLDUP ;STALL SUFFICIENT TIME TO ALLOW
1266 003230 001324 MNCLKT ;FUNCTION TO OCCUR
1267 003232 000004 012206 TYPE BELL ;BELL
1268 003235 005203 INC R3
1269 003240 001371 BNE LK12A ;RING BELL 5 TIMES
1270
1271

```

# H03

.MAIN. MACY11 27(732) 15-OCT-76 11:28 PAGE 34  
 DBQAAA.P11 T12 WD1,WD2 READ/WRITE TEST

```

1272 ;*****
1273 ;TEST 12 WD1,WD2 READ/WRITE TEST
1274 ;*****
1275 003242 104400 TST12: SCOPE
1276 003244 012767 000010 007402 MOV #10,ICOUNT ; ITERATION COUNT
1277 003252 012767 000012 007252 MOV #12,ERTSTN ; SAVE TEST # FOR ERROR REPCRT
1278 003260 012767 003266 007372 MOV #SCP12,RETURN ; SCOPE LOOP RETURN ADRS
1279 003266 SCP12:
1280
1281
1282 ; THE FOLLOWING JUMPERS MUST BE INSERTED
1283 ; IF JUMPER PLUG IS USED --OPEN SWITCH--
1284 ; PIN 17 TO PIN 16 (CLOCK IN FOR WDENAB)
1285 ; PIN 15 TO PIN 14 (DATA IN FOR WDENAB)
1286 003266 005077 175716 CLR @WDCSR ; CLEAR WDCSR
1287 003272 117727 175712 MOVB @WDCSR,(PC)+
1288 003276 000000 STORE2: 0 ; PASS CONTENTS OF WDCSR INTO HERE
1289 003300 042737 000020 003276 BIC #20,@STORE2 ; CLEAR REMSEN BIT
1290 003306 122737 000000 003276 CMPB #0,@STORE2
1291 003314 001401 BEQ .+4 ; BRANCH IF NO ERROR CONDITION
1292 003316 104000 ERROR ; WDCSR NOT CLEARED
1293 003320 052777 000002 175664 BIS #WD1,@WDDAT ; SET WD1
1294 003326 032777 000002 175656 BIT #WD1,@WDDAT ; VERIFY SET
1295 003334 001001 BNE .+4 ; BRANCH IF NO ERROR CONDITION
1296 003336 104000 ERROR ; WD1 NOT SET
1297 003340 032777 000004 175644 BIT #WD2,@WDDAT ; WD1 SHOULD NOT BE CLEARED, WD2 MUST BE SET
1298 003346 001001 BNE .+4 ; BRANCH IF NO ERROR CONDITION
1299 003350 104000 ERROR ; WD2 NOT SET
1300 003352 042777 000004 175632 BIC #WD2,@WDDAT ; CLEAR WD2 ,WD2 CLEARS WD1 AND THEN WD1 SETS WD2
1301 003360 032777 000002 175624 BIT #WD1,@WDDAT
1302 003366 001401 BEQ .+4 ; BRANCH IF NO ERROR CONDITION
1303 003370 104000 ERROR ; WD1 NOT CLEARED
1304 003372 032777 000004 175612 BIT #WD2,@WDDAT
1305 003400 001001 BNE .+4 ; BRANCH IF NO ERROR CONDITION
1306 003402 104000 ERROR ; WD2 NOT SET
1307
1308
1309

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1310 ;*****
1311 ;TEST 13 TOO SOON
1312 ;*****
1313 003404 104400 †ST13: SCOPE
1314 003406 012767 000010 007240 MOV #10,ICOUNT ; ITERATION COUNT
1315 003414 012767 000013 007110 MOV #13,ERTSTM ; SAVE TEST # FOR ERROR REPCRT
1316 003422 012767 003430 007230 MOV #SCP13,RETURN ; SCOPE LOOP RETURN ADRS
1317 003430 SCP13:
1318
1319
1320 ;THE FOLLOWING JUMPERS MUST BE INSERTED
1321 ;IF JUMPER PLUG IS USED --OPEN SWITCH--
1322 ;PIN 17 TO PIN 16 (CLOCK IN FOR WDENAB)
1323 ;PIN 15 TO PIN 14 (DATA IN FOR WDENAB)
1324 003430 005077 175554 CLR #WD0CSR ; CLEAR TOOSN ETC.
1325 003434 052777 000002 175550 BIS #WD1,#WDDAT ; SET WD1, FIRST UPDATE SEQ.
1326 003442 032777 000002 175542 BIT #WD1,#WDDAT ; VERIFY SET
1327 003450 001001 BNE .+4 ; BRANCH IF NO ERROR CONDITION
1328 003452 104000 ERROR ; WD1 NOT SET
1329 003454 032777 000004 175530 BIT #WD2,#WDDAT ; WD2 SHOULD NOT BE CLEARED
1330 003462 001001 BNE .+4 ; BRANCH IF NO ERROR CONDITION
1331 003464 104000 ERROR ; WD2 NOT SET
1332 003466 042777 000004 175516 BIC #WD2,#WDDAT ; CLEAR WD2
1333 003474 032777 000002 175510 BIT #WD1,#WDDAT
1334 003502 001401 BEQ .+4 ; BRANCH IF NO ERROR CONDITION
1335 003504 104000 ERROR ; WD1 NOT CLEARED
1336 003506 032777 000004 175476 BIT #WD2,#WDDAT
1337 003514 001001 BNE .+4 ; BRANCH IF NO ERROR CONDITION
1338 003516 104000 ERROR ; WD2 NOT SET
1339
1340 003520 052777 000002 175464 BIS #WD1,#WDDAT ; SECOND UPDATE SEQ.
1341 003526 032777 000002 175456 BIT #WD1,#WDDAT ; VERIFY SET
1342 003534 001001 BNE .+4 ; BRANCH IF NO ERROR CONDITION
1343 003536 104000 ERROR ; WD1 NOT SET
1344 003540 032777 000004 175444 BIT #WD2,#WDDAT ; WD2 SHOULD NOT BE CLEARED
1345 003546 001001 BNE .+4 ; BRANCH IF NO ERROR CONDITION
1346 003550 104000 ERROR ; WD2 NOT SET
1347 003552 042777 000004 175432 BIC #WD2,#WDDAT ; CLEAR WD2
1348 003560 032777 000002 175424 BIT #WD1,#WDDAT
1349 003566 001401 BEQ .+4 ; BRANCH IF NO ERROR CONDITION
1350 003570 104000 ERROR ; WD1 NOT CLEARED
1351 003572 032777 000004 175412 BIT #WD2,#WDDAT
1352 003600 001001 BNE .+4 ; BRANCH IF NO ERROR CONDITION
1353 003602 104000 ERROR ; WD2 NOT SET
1354 003604 032777 000040 175376 BIT #TOOSN,#WD0CSR
1355 003612 001001 BNE .+4 ; BRANCH IF NO ERROR CONDITION
1356 003614 104000 ERROR ; TOO SOON DID NOT SET
1357 003616 042777 000040 175364 BIC #TOOSN,#WD0CSR
1358 003624 032777 000040 175356 BIT #TOOSN,#WD0CSR
1359 003632 001401 BEQ .+4 ; BRANCH IF NO ERROR CONDITION
1360 003634 104000 ERROR ; TOO SOON IS NOT CLEARED
1361
1362
    
```

# J03

.MAIN. MACY11 27(732) 15-OCT-76 11:28 PAGE 36  
 DBQARA.P11 T14 WDCSR READ/WRITE BIT TEST

```

1363 :*****
1364 :TEST 14 WDCSR READ/WRITE BIT TEST
1365 :*****
1366 003636 104400 †ST14: SCOPE
1367 003640 012767 000010 007006 MOV #10,ICOUNT ; ITERATION COUNT
1368 003646 012767 000014 006656 MOV #14,ERTSTN ; SAVE TEST # FOR ERROR REPCRT
1369 003654 012767 003662 006776 MOV #SCP14,RETURN ; SCOPE LOOP RETURN ADRS
1370 003662 SCP14:
1371
1372
1373 ; THE FOLLOWING JUMPERS MUST BE INSERTED
1374 ; IF JUMPER PLUG IS USED --OPEN SWITCH--
1375 ; PIN 17 TO PIN 16 (CLOCK IN FOR WENAB)
1376 ; PIN 15 TO PIN 14 (DATA IN FOR WENAB)
1377 003662 052777 000100 175320 BIS #WDIEN,@WDCSR
1378 003670 032777 000100 175312 BIT #WDIEN,@WDCSR
1379 003676 001001 BNE .+4 ; BRANCH IF NO ERROR CONDITION
1380 003700 104000 ERROR ; WD INTERRUPT ENABLE CANNOT BE SET
1381 003702 042777 000100 175300 BIC #WDIEN,@WDCSR
1382 003710 032777 000100 175272 BIT #WDIEN,@WDCSR
1383 003716 001401 BEQ .+4 ; BRANCH IF NO ERROR CONDITION
1384 003720 104000 ERROR ; WD INTERRUPT ENABLE BE CLEARED
1385
1386 003722 052777 000010 175260 BIS #EXTREQ,@WDCSR
1387 003730 032777 000010 175252 BIT #EXTREQ,@WDCSR
1388 003736 001001 BNE .+4 ; BRANCH IF NO ERROR CONDITION
1389 003740 104000 ERROR ; EXTREQ CANNOT BE SET
1390 003742 042777 000010 175240 BIC #EXTREQ,@WDCSR
1391 003750 032777 000010 175232 BIT #EXTREQ,@WDCSR
1392 003756 001401 BEQ .+4 ; BRANCH IF NO ERROR CONDITION
1393 003760 104000 ERROR ; EXTREQ CANNOT BE CLEARED
1394 ; WD ENABLE OPTIONAL JUMPER MUST BE INSTALLED
1395 003762 052777 000004 175220 BIS #WDENAB,@WDCSR
1396 003770 032777 000004 175212 BIT #WDENAB,@WDCSR
1397 003776 001001 BNE .+4 ; BRANCH IF NO ERROR CONDITION
1398 004000 104000 ERROR ; WD ENABLE CANNOT BE SET,CHECK JUMPER
1399 004002 042777 000004 175200 BIC #WDENAB,@WDCSR
1400 004010 032777 000004 175172 BIT #WDENAB,@WDCSR
1401 004016 001401 BEQ .+4 ; BRANCH IF NO ERROR CONDITION
1402 004020 104000 ERROR ; WD ENABLE CANNOT BE CLEARED
1403
1404
  
```

# K03

.MAIN. MACY11 27(732) 15-OCT-76 11:28 PAGE 37  
 DBQAAA.P11 T15 INTERRUPT ENABLE TEST

```

1405 ;*****
1406 ;TEST 15 INTERRUPT ENABLE TEST
1407 ;*****
1408 004022 104400 ST15: SCOPE
1409 004024 012767 000010 006622 MOV #10,ICOUNT ;ITERATION COUNT
1410 004032 012767 000015 006472 MOV #15,ERTSTN ;SAVE TEST # FOR ERROR REPCRT
1411 004040 012767 004046 006612 MOV #SCP15,RETURN ;SCOPE LOOP RETURN ADRS
1412 004046 SCP15:
1413
1414
1415 ;THE FOLLOWING JUMPERS MUST BE INSERTED
1416 ;IF JUMPER PLUG IS USED --OPEN SWITCH--
1417 ;PIN 17 TO PIN 16 (CLOCK IN FOR WDENAB)
1418 ;PIN 15 TO PIN 14 (DATA IN FOR WDENAB)
1419 004046 005077 175136 CLR #WDCSR
1420 004052 100001 BPL .+4 ;BRANCH IF NO ERROR CONDITION
1421 004054 104000 ERROR ;TOO SOON IS NOT CLEARED
1422 004056 016777 175174 175116 MOV WDPRT,#WDIS
1423 004064 012777 004162 175106 MOV #INTTST,#WDIV
1424 004072 016767 175204 173676 MOV LESS1,PS
1425 004100 032777 000002 175102 BIT #WORLY,#WDCSR
1426 004106 001401 BEQ .+4 ;BRANCH IF NO ERROR CONDITION
1427 004110 104000 ERROR ;WD RELAY SHOULD NOT BE SET
1428 004112 052777 000100 175070 BIS #WDIEN,#WDCSR
1429 004120 052777 000002 175064 BIS #WD1,#WDDAT ;UPDATE SEQ.
1430 004126 042777 000004 175056 BIC #WD2,#WDDAT
1431 004134 052777 000002 175050 BIS #WD1,#WDDAT ;THIS SECOND UPDATE SEQUENCE SHOULD
1432 ;SET TOO SOON AND SET FLAG
1433 004142 042777 000004 175042 BIC #WD2,#WDDAT
1434
1435 004150 005000 CLR RO
1436 004152 005200 DELAY: INC RO ;WAIT UNTIL INTERRUPT
1437 004154 001376 BNE DELAY
1438 004156 104000 ERROR ;INTERRUPT DID NOT OCCUR
1439 004160 000435 BR CONTI
1440 004162 016777 175014 175010 INTTST: MOV WDIS,#WDIV ;RESTORE WDIV
1441 004170 012777 000000 175004 MOV #0,#WDIS
1442 004176 105777 175006 TSTB #WDCSR
1443 004202 100401 BMI .+4 ;TEST FLAG
1444 004204 104000 ERROR ;BRANCH IF NO ERROR CONDITION
1445 004206 032777 000040 174774 BIT #TOOSN,#WDCSR ;ERROR ,INTERRUPT NOT CAUSED BY FLAG
1446 004214 001001 BNE .+4 ;BRANCH IF NO ERROR CONDITION
1447 004216 104000 ERROR ;TOO SOON DID NOT GET SET
1448 004220 042777 000040 174762 BIC #TOOSN,#WDCSR
1449 004226 032777 000040 174754 BIT #TOOSN,#WDCSR
1450 004234 001401 BEQ .+4 ;BRANCH IF NO ERROR CONDITION
1451 004236 104000 ERROR ;TOO SOON DID NOT CLEAR
1452 004240 012716 004254 MOV #CONTI,(SP) ;LOAD RETURN ADDRESS
1453 004244 012767 000340 173524 MOV #LEVEL7,PS ;RESTORE PROC STATUS
1454 004252 000002 RTI
1455
1456 004254 042777 000004 174726 CONTI: BIC #WDENAB,#WDCSR ;CLEAR WDENAB--THIS DROPS WORLY
1457 004262 005027 CLR (PC)+ ;WAITING SO THAT WD RELAY
1458 ;CLEARS BEFORE PROCEEDING
1459 004264 000000 15: 0
1460 004266 005367 177772 25: DEC 15
  
```

L03

.MAIN. MACY11 27(732) 15-OCT-76 11:28 PAGE 38  
DBQAAA.P11 T15 INTERRUPT ENABLE TEST

1461 004272 001375 BNE 25  
1462  
1463

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1464 ;*****
1465 ;TEST 16 REVERSE UPDATE SEQUENCE TEST
1466 ;*****
1467 004274 104400 †ST16: SCOPE
1468 004276 012767 000010 006350 MOV #10,ICOUNT ; ITERATION COUNT
1469 004304 012767 000016 006220 MOV #16,ERTSTN ; SAVE TEST # FOR ERROR REPCRT
1470 004312 012767 004320 006340 MOV #SCP16,RETURN ; SCOPE LOOP RETURN ADRS
1471 004320 SCP16:
1472
1473 ; THE FOLLOWING JUMPERS MUST BE INSERTED
1474 ; IF JUMPER PLUG IS USED --OPEN SWITCH--
1475 ; PIN 17 TO PIN 16 (CLOCK IN FOR WDENAB)
1476 ; PIN 15 TO PIN 14 (DATA IN FOR WDENAB)
1477 004320 005077 174664 CLR @WDCSR
1478 004324 005077 174662 CLR @WDDAT ; WD2 WILL ALWAYS BE "SEEN" SET
1479 004330 032777 000002 174654 BIT #WD1,@WDDAT
1480 004336 001401 BEQ .+4 ; BRANCH IF NO ERROR CONDITION
1481 004340 104000 ERROR ; WD1 IS NOT CLEARED
1482 004342 032777 000004 174642 BIT #WD2,@WDDAT
1483 004350 001001 BNE .+4 ; BRANCH IF NO ERROR CONDITION
1484 004352 104000 ERROR ; WD2 IS NOT SET
1485 004354 012777 000002 174630 MOV #2,@WDDAT ; SET WD1 & TRY TO CLEAR WD2 SIMULTANEOUSLY
1486 004362 032777 000002 174622 BIT #WD1,@WDDAT
1487 004370 001001 BNE .+4 ; BRANCH IF NO ERROR CONDITION
1488 004372 104000 ERROR ; WD1 IS NOT SET
1489 004374 032777 000004 174610 BIT #WD2,@WDDAT
1490 004402 001001 BNE .+4 ; BRANCH IF NO ERROR CONDITION
1491 004404 104000 ERROR ; WD2 IS NOT SET
1492 004406 012777 000002 174576 MOV #2,@WDDAT ; SET WD1 & TRY TO CLEAR WD2 SIMULTANEOUSLY
1493 004414 032777 000002 174570 BIT #WD1,@WDDAT
1494 004422 001401 BEQ .+4 ; BRANCH IF NO ERROR CONDITION
1495 004424 104000 ERROR ; WD1 IS NOT CLEARED
1496 004426 032777 000004 174556 BIT #WD2,@WDDAT
1497 004434 001001 BNE .+4 ; BRANCH IF NO ERROR CONDITION
1498 004436 104000 ERROR ; WD2 IS NOT SET
1499 ; WAIT UNTIL LOOP CLEARS
1500 004440 005027 CLR (PC)+
1501 004442 000000 2$: 0
1502 004444 005367 177772 3$: DEC 2$
1503 004450 001375 BNE 3$
1504
1505
    
```

```

1506 :*****
1507 ;TEST 17 RELAY PICK TEST
1508 :*****
1509 004452 104400 †ST17: SCOPE
1510 004454 012767 000010 006172 MOV #10,ICOUNT ;ITERATION COUNT
1511 004462 012767 000017 006042 MOV #17,ERTSTN ;SAVE TEST # FOR ERROR REPRCT
1512 004470 012767 004476 006162 MOV #SCP17,RETURN ;SCOPE LOOP RETURN ADRS
1513 004476 SCP17:
1514
1515 ;THE FOLLOWING JUMPERS MUST BE INSERTED
1516 ;IF JUMPER PLUG IS USED --OPEN SWITCH--
1517 ;PIN 17 TO PIN 16 (CLOCK IN FOR WDENAB)
1518 ;PIN 15 TO PIN 14 (DATA IN FOR WDENAB)
1519 004476 005077 174506 CLR @WDCSR
1520 004502 032777 000002 174500 BIT #WDRLY,@WDCSR
1521 004510 001401 BEQ .+4 ;BRANCH IF NO ERROR CONDITION
1522 004512 104000 ERROR ;WD RELAY SHOULD NOT BE PICKED
1523 004514 052777 000004 174466 BIS #WDENAB,@WDCSR ;ENABLE RELAY
1524 004522 052777 000002 174462 BIS #WD1,@WDDAT ;UPDATE SEQ.
1525 004530 042777 000004 174454 BIC #WD2,@WDDAT
1526 004536 004567 003556 JSR RS,HOLDUP ;STALL SUFFICIENT TIME TO ALLOW
1527 004542 001254 RLYPT ;FUNCTION TO OCCUR
1528 004544 032777 000002 174436 BIT #WDRLY,@WDCSR
1529 004552 001001 BNE .+4 ;BRANCH IF NO ERROR CONDITION
1530 004554 104000 ERROR ;WD RELAY DID NOT PICK
1531 004556 042777 000004 174424 BIC #WDENAB,@WDCSR ;CLEAR ENABLE
1532 004564 004567 003530 JSR RS,HOLDUP ;STALL SUFFICIENT TIME TO ALLOW
1533 004570 001254 RLYPT ;FUNCTION TO OCCUR
1534 004572 032777 000002 174410 BIT #WDRLY,@WDCSR
1535 004600 001401 BEQ .+4 ;BRANCH IF NO ERROR CONDITION
1536 004602 104000 ERROR ;CLEARING WDENAB DID NOT CLEAR ENABLE RELAY
1537 ;WAIT UNTIL TRIGGER O.S. FALLS
1538 004604 004567 003510 JSR RS,HOLDUP ;STALL SUFFICIENT TIME TO ALLOW
1539 004610 001272 TRIGER ;FUNCTION TO OCCUR
1540 ;WAIT AGAIN TO MAKE SURE
1541 004612 004567 003502 JSR RS,HOLDUP ;STALL SUFFICIENT TIME TO ALLOW
1542 004616 001272 TRIGER ;FUNCTION TO OCCUR
1543 004620 052777 000004 174362 BIS #WDENAB,@WDCSR ;ENABLE RELAY
1544 004626 052777 000002 174356 BIS #WD1,@WDDAT ;UP DATE SEQ.
1545 004634 042777 000004 174350 BIC #WD2,@WDDAT
1546 004642 004567 003452 JSR RS,HOLDUP ;STALL SUFFICIENT TIME TO ALLOW
1547 004646 001270 TIMOUT ;FUNCTION TO OCCUR
1548 004650 032777 000002 174332 BIT #WDRLY,@WDCSR
1549 004656 001401 BEQ .+4 ;BRANCH IF NO ERRGR CONDITION
1550 004660 104000 ERROR ;TIMOUT VALUE TOO LOW
1551 ;WAIT UNTIL LOOP CLEARS
1552 004662 005027 CLR (PC)+
1553 004664 000000 25: 0
1554 004666 005367 177772 35: DEC 25
1555 004672 001375 BNE 35
1556
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1558
1559

```

```

1560
1561
1562
1563 004674 104400
1564 004676 012767 003010 005750
1565 004704 012767 003020 005620
1566 004712 012767 004720 005740
1567 004720
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1569
1570
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1572
1573 004720 005077 174264
1574 004724 032777 000040 174256
1575 004732 001401
1576 004734 104000
1577 004736 052777 000002 174246
1578 004744 042777 000004 174240
1579 004752 004567 003342
1580 004756 001272
1581 004760 052777 000002 174224
1582 004766 042777 000004 174216
1583 004774 032777 000040 174206
1584 005002 001401
1585 005004 104000
1586
1587 005006 004567 003306
1588 005012 001270
1589
1590

```

```

:*****
:TEST 20 TRIGER VALUE TEST--TOO SOON
:*****
TST20: SCOPE
MOV #10,ICOUNT ;ITERATION COUNT
MOV #20,ERTSTN ;SAVE TEST # FOR ERROR REPCRT
MOV #SCP20,RETURN ;SCOPE LOOP RETURN ADRS
SCP20:
;THE FOLLOWING JUMPERS MUST BE INSERTED
;IF JUMPER PLUG IS USED --OPEN SWITCH--
;PIN 17 TO PIN 16 (CLOCK IN FOR WENAB)
;PIN 15 TO PIN 14 (DATA IN FOR WENAB)
CLR #WDCSR
BIT #TOOSN,#WDCSR
BEQ .+4 ;BRANCH IF NO ERROR CONDITION
ERROR ;TOOSN SHOULD NOT BE SET
BIS #W01,#W0DAT ;UP DATE SEQ.
BIC #W02,#W0DAT
JSR R5,HOLDUP ;STALL SUFFICIENT TIME TO ALLOW
TRIGER ;FUNCTION TO OCCUR
BIS #W01,#W0DAT ;SECOND UP DATE SEQ.
BIC #W02,#W0DAT
BIT #TOOSN,#WDCSR
BEQ .+4 ;BRANCH IF NO ERROR CONDITION
ERROR ;TRIGER VALUE TOO LOW
;WAIT TO AVOID TOOSN
JSR R5,HOLDUP ;STALL SUFFICIENT TIME TO ALLOW
TIMOUT ;FUNCTION TO OCCUR

```

C04

1591  
1592  
1593  
1594 005014 104400  
1595 005016 012767 000010 005630  
1596 005024 012767 000021 005500  
1597 005032 012767 005040 005620  
1598 005040  
1599  
1600  
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1614 005040 005077 174144  
1615 005044 032777 000002 174136  
1616 005052 001401  
1617 005054 104000  
1618 005056 127727 174126 000000  
1619 005064 001401  
1620 005066 104000  
1621 005070 052777 000004 174112  
1622 005076 032777 000004 174104  
1623 005104 001001  
1624 005106 104000  
1625 005110 005077 174076  
1626 005114 017727 174072  
1627 005120 000000  
1628 005122 042737 000370 005120  
1629 005130 126727 177764 000004  
1630 005136 001401  
1631 005140 104000  
1632 005142 052777 000002 174042  
1633 005150 032777 000002 174034  
1634 005156 001001  
1635 005160 104000  
1636 005162 042777 000004 174022  
1637 005170 032777 000002 174014  
1638 005176 001401  
1639 005200 104000  
1640  
1641 005202 004567 003112  
1642 005206 001252  
1643 005210 004567 003104  
1644 005214 001272  
1645 005216 017727 173766  
1646 005222 000000

\*\*\*\*\*  
:TEST 21 FEED BACK LOOP TEST  
\*\*\*\*\*  
↑ST21: SCOPE  
MOV #10,ICOUNT ; ITERATION COUNT  
MOV #21,ERTSTN ; SAVE TEST # FOR ERROR REPORT  
MOV #SCP21,RETURN ; SCOPE LOOP RETURN ADRS  
SCP21:

:THE FOLLOWING JUMPERS MUST BE INSERTED--OR USE JUMPER PLUG  
:PIN 8 TO PIN 2 (-15V TO C OF RELAY)  
:PIN 5 TO PIN 7 (COLLECTOR TO REMSEN)  
:PIN 6 TO PIN 3 (EMITER TO N.O. OF RELAY)  
:PIN 10 TO PIN 3 (INTR.S.T. TO N.O. OF RELAY)  
:PIN 11 TO PIN 1 THRU A SWITCH (RESTART S.T. TO N.C. OF RELAY)  
:PIN 9 TO PIN 1 (START S.T. TO N.C. OF RELAY)  
:PIN 17 TO PIN 16 (CLOCK IN FOR WDENAB)  
:PIN 15 TO PIN 14 (DATA IN FOR WDENAB)  
:THIS ROUTINE CHECKS REMOTE SENSE LOGIC, EXTREQ(IN  
:NON-INTERRUPT MODE), START LOGIC.

\*\*\*\*\*  
: OPEN SWITCH  
\*\*\*\*\*

CLR #WDCSR  
BIT #WDRLY, #WDCSR  
BEQ .+4 ; BRANCH IF NO ERROR CONDITION  
ERROR ; WD RELAY SHOULD NOT BE PICKED  
CMPB #WDCSR, #0  
BEQ .+4 ; BRANCH IF NO ERROR CONDITION  
ERROR ; WDCSR SHOULD BE CLEARED  
BIS #WDENAB, #WDCSR ; ENABLE RELAY  
BIT #WDENAB, #WDCSR  
BNE .+4 ; BRANCH IF NO ERROR CONDITION  
ERRCR ; CHECK JUMPERS, WDENAB NOT SET  
CLR #WDDAT  
MOV #WDDAT, (PC)+  
STORE: 0 ; PASS CONTENTS OF WDDAT HERE  
BIC #370, #STORE ; CLEAR MNCLK  
CMPB STORE, #4 ; IS WD2 SET ?  
BEQ .+4 ; BRANCH IF NO ERROR CONDITION  
ERROR ; WD2 NOT SET  
BIS #WD1, #WDDAT ; UP DATE SEQ.  
BIT #WD1, #WDDAT  
BNE .+4 ; BRANCH IF NO ERROR CONDITION  
ERROR ; WD1 NOT SET  
BIC #WD2, #WDDAT  
BIT #WD1, #WDDAT  
BEQ .+4 ; BRANCH IF NO ERROR CONDITION  
ERROR ; WD1 NOT CLEARED  
; WHEN RELAY PICKS (APPROX. 1 MSEC) IT SETS EXTREQ & REMSEN (20 MSEC LATER)  
JSR R5, HOLDUP ; STALL SUFFICIENT TIME TO ALLOW  
FEEDBK ; FUNCTION TO OCCUR  
JSR R5, HOLDUP ; STALL SUFFICIENT TIME TO ALLOW  
TRIGER ; FUNCTION TO OCCUR  
MOV #WDCSR, (PC)+  
STORE1: 0 ; PASS CONTENTS OF WDCSR HERE

|      |        |        |        |        |       |              |   |
|------|--------|--------|--------|--------|-------|--------------|---|
| 1647 | 005224 | 126727 | 177772 | 000236 | CMPB  | STORE1, #236 |   |
| 1648 | 005232 | 001401 |        |        | BEQ   | .+4          | ; BRANCH IF NO ERROR CONDITION                              |
| 1649 | 005234 | 104000 |        |        | ERROR |              | ; BITS 1,2,3,4,7 NOT SET                                    |
| 1650 |        |        |        |        |       |              | ; FLAG & EXTREQ ARE SET BY INTERRUPT LOGIC                  |
| 1651 |        |        |        |        |       |              | ; REMSEN SET WHEN RELAY OPENS(SETS)                         |
| 1652 | 005236 | 032777 | 000002 | 173744 | 1\$:  | BIT          | #WDRLY, #WDCSR ; WAIT UNTIL RELAY CLEARS(DROPS)             |
| 1653 | 005244 | 001374 |        |        |       | BNE          | 1\$   |
| 1654 | 005246 | 032777 | 000004 | 173734 |       | BIT          | #WDENAB, #WDCSR   |
| 1655 | 005254 | 001401 |        |        |       | BEQ          | .+4 ; BRANCH IF NO ERROR CONDITION                          |
| 1656 | 005256 | 104000 |        |        |       | ERROR        | ; WDENAB NOT CLEARED  |
| 1657 |        |        |        |        |       |              | ; WHEN RELAY DROPS (APPROX. 1 MSEC) IT CLEARS WDENAB        |
| 1658 |        |        |        |        |       |              | ; AND APPROX. 20 MSEC LATER WDENAB SETS AGAIN               |
| 1659 | 005260 | 004567 | 003034 |        |       | JSR          | R5, HOLDUP ; STALL SUFFICIENT TIME TO ALLOW                 |
| 1660 | 005264 | 001252 |        |        |       | FEEDBK       | ; FUNCTION TO OCCUR   |
| 1661 | 005266 | 032777 | 000004 | 173714 |       | BIT          | #WDENAB, #WDCSR   |
| 1662 | 005274 | 001001 |        |        |       | BNE          | .+4 ; BRANCH IF NO ERROR CONDITION                          |
| 1663 | 005276 | 104000 |        |        |       | ERROR        | ; WDENAB NOT SET  |
| 1664 |        |        |        |        |       |              | ; WDENAB SET BY START LOGIC, BUT SHOULD NOT SET WDRLY AGAIN |
| 1665 | 005300 | 032777 | 000002 | 173702 |       | BIT          | #WDRLY, #WDCSR  |
| 1666 | 005306 | 001401 |        |        |       | BEQ          | .+4 ; BRANCH IF NO ERROR CONDITION                          |
| 1667 | 005310 | 104000 |        |        |       | ERROR        | ; WDRLY SHOULD NOT BE SET AGAIN                             |
| 1668 | 005312 | 042777 | 000004 | 173670 |       | BIC          | #WDENAB, #WDCSR ; FORCE CLEAR WDRLY                         |
| 1669 | 005320 | 005027 |        |        |       | CLR          | (PC)+ ; WAIT UNTIL LOOP CLEARS                              |
| 1670 | 005322 | 000000 |        |        | 2\$:  | D            |   |
| 1671 | 005324 | 005367 | 177772 |        | 3\$:  | DEC          | 2\$   |
| 1672 | 005330 | 001375 |        |        |       | BNE          | 3\$   |
| 1673 |        |        |        |        |       |              |   |
| 1674 |        |        |        |        |       |              |   |

# E04

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 DBQAAA.P11 T22 EXTREQ WITH INTERRUPT TEST--FEED BACK LOOP

```

1675 ;*****
1676 ;TEST 22 EXTREQ WITH INTERRUPT TEST--FEED BACK LOOP
1677 ;*****
1678 005332 104400 †ST22: SCOPE
1679 005334 012767 000010 005312 MOV #10,ICGUNT ;ITERATION COUNT
1680 005342 012767 000022 005162 MOV #22,ERTSTN ;SAVE TEST # FOR ERROR REPRCT
1681 005350 012767 005356 005302 MOV #SCP22,RETURN ;SCOPE LOOP RETURN ADRS
1682 005356
1683
1684 ;THE FOLLOWING JUMPERS MUST BE INSERTED--OR USE JUMPER PLUG
1685 ;PIN 8 TO PIN 2 (-15V TO C OF RELAY)
1686 ;PIN 5 TO PIN 7 (COLLECTOR TO REMSEN)
1687 ;PIN 6 TO PIN 3 (EMITER TO N.O. OF RELAY)
1688 ;PIN 10 TO PIN 3 (INTR.S.T. TO N.O. OF RELAY)
1689 ;PIN 11 TO PIN 1, THRU A SWITCH (RESTART S.T. TO N.C. OF RELAY)
1690 ;PIN 9 TO PIN 1 (START S.T. TO N.C. OF RELAY)
1691 ;PIN 17 TO PIN 16 (CLOCK IN FOR WDENAB)
1692 ;PIN 15 TO PIN 14 (DATA IN FOR WDENAB)
1693 ;*****
1694 ; OPEN SWITCH
1695 ;*****
1696 005356 005077 173626 CLR #WDCSR
1697 005362 016777 173670 173612 MOV #WOPRT,#WDIS
1698 005370 012777 005460 173602 MOV #EXTINT,#WDIV
1699 005376 016767 173700 172372 MOV #LESS1,#PS
1700 005404 032777 000002 173576 BIT #WDRLY,#WDCSR
1701 005412 001401 BEQ .+4 ;BRANCH IF NO ERROR CONDITION
1702 005414 104000 ERROR ;WD RELAY SHOULD NOT BE PICKED
1703 005416 052777 000004 173564 BIS #WDENAB,#WDCSR
1704 005424 052777 000100 173556 BIS #WDIEN,#WDCSR
1705 005432 052777 000002 173552 BIS #WD1,#WDDAT ;UP DATE SEQ.
1706 005440 042777 000004 173544 BIC #WD2,#WDDAT
1707 ;STALL UNTIL INTERRUPT OCCURS
1708 005446 005000 CLR RO
1709 005450 005200 DELAY1: INC RO ;WAIT UNTIL INTERRUPT
1710 005452 001376 BNE DELAY1
1711 005454 104000 ERROR ;INTERRUPT DID NOT OCCUR
1712 005456 000425 BR CONTU
1713 005460 016777 173516 173512 EXTINT: MOV #WDIS,#WDIV ;RESTORE WDIV
1714 005466 012777 000000 173506 MOV #0,#WDIS
1715 005474 105777 1735!0 TSTB #WDCSR
1716 005500 100401 BMI .+4 ;TEST FLAG
1717 005502 104000 ERROR ;BRANCH IF NO ERROR CONDITION
1718 005504 032777 000010 173476 BIT #EXTREQ,#WDCSR ;ERROR, INTERRUPT NOT CAUSED BY FLAG
1719 005512 001001 BNE .+4 ;BRANCH IF NO ERROR CONDITION
1720 005514 104000 ERROR ;EXTREQ DID NOT GET SET
1721 005516 012716 005532 MOV #CONTU,(SP) ;LOAD RETURN ADDRESS
1722 005522 012767 000340 172246 MOV #LEVEL7,#PS ;RESTORE PROC. STATUS
1723 005530 000002 RTI
1724 005532 042777 000004 173450 CONTU: BIC #WDENAB,#WDCSR ;FORCE CLEAR WDRLY
1725 005540 005027 CLR (PC)+ ;WAIT UNTIL LOOP CLEARS
1726 005542 000000 2$: 0
1727 005544 005367 177772 3$: DEC 2$
1728 005550 001375 BNE 3$
1729
1730

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# F04

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 DBQAAA.P11 T23 WD TRIGGER O.S. TRANSISTOR TEST

```

1731 :*****
1732 :TEST 23 WD TRIGGER O.S. TRANSISTOR TEST
1733 :*****
1734 005552 104400 TST23: SCOPE
1735 005554 012767 000010 005072 MOV #10,ICOUNT ;ITERATION COUNT
1736 005562 012767 000023 004742 MOV #23,ERTSTN ;SAVE TEST # FOR ERROR REPORT
1737 005570 012767 005576 005062 MOV #SCP23,RETURN ;SCOPE LOOP RETURN ADRS
1738 005576 SCP23:
1739
1740 ;THE FOLLOWING JUMPERS MUST BE INSERTED--OR USE JUMPER PLL'S
1741 ;PIN 8 TO PIN 2 (-15V TO C OF RELAY)
1742 ;PIN 5 TO PIN 7 (COLLECTOR TO REMSEN)
1743 ;PIN 6 TO PIN 3 (EMITER TO N.O. OF RELAY)
1744 ;PIN 10 TO PIN 3 (INTR.S.T. TO N.O. OF RELAY)
1745 ;PIN 11 TO PIN 1, THRU A SWITCH (RESTART S.T. TO N.C. OF RELAY)
1746 ;PIN 9 TO PIN 1 (START S.T. TO N.C. OF RELAY)
1747 ;PIN 17 TO PIN 16 (CLOCK IN FOR W DENAB)
1748 ;PIN 15 TO PIN 14 (DATA IN FOR W DENAB)
1749 :*****
1750 : OPEN SWITCH
1751 :*****
1752 005576 005077 173406 CLR #WDCSR
1753 005602 032777 000002 173400 BIT #WDRLY,#WDCSR
1754 005610 001401 BEQ .+4 ;BRANCH IF NO ERROR CONDITION
1755 005612 104000 ERROR ;WDRLY NOT CLEARED--DROPPED
1756 005614 052777 000004 173366 BIS #WDENAB,#WDCSR
1757 005622 052777 000002 173362 BIS #WD1,#WDAT ;UPDATE SEQ.
1758 005630 042777 000004 173354 BIC #WD2,#WDAT
1759 ;WAIT UNTIL REMSEN SETS
1760 005636 004567 002456 JSR RS,HOLDUP ;STALL SUFFICIENT TIME TO ALLOW
1761 005642 001252 FEEDBK ;FUNCTION TO OCCUR
1762 005644 004567 002450 JSR RS,HOLDUP ;STALL SUFFICIENT TIME TO ALLOW
1763 005650 001272 TRIGER ;FUNCTION TO OCCUR
1764 005652 032777 000020 173330 BIT #REMSEN,#WDCSR
1765 005660 001001 BNE .+4 ;BRANCH IF NO ERROR CONDITION
1766 005662 104000 ERROR ;TRANSISTOR IS OPEN
1767 005664 042777 000004 173316 BIC #WDENAB,#WDCSR ;FORCE CLEAR WDRLY
1768 005672 004567 002422 JSR RS,HOLDUP ;STALL SUFFICIENT TIME TO ALLOW
1769 005676 001270 TIMEOUT ;FUNCTION TO OCCUR
1770 005700 004567 002414 JSR RS,HOLDUP ;STALL SUFFICIENT TIME TO ALLOW
1771 005704 001252 FEEDBK ;FUNCTION TO OCCUR
1772 005706 005077 173276 CLR #WDCSR
1773 005712 032777 000002 173270 BIT #WDRLY,#WDCSR
1774 005720 001401 BEQ .+4 ;BRANCH IF NO ERROR CONDITION
1775 005722 104000 ERROR ;WDRLY NOT CLEARED--DROPPED
1776 005724 052777 000004 173256 BIS #WDENAB,#WDCSR
1777 005732 012737 010726 000014 MOV #88,#14
1778 005740 012737 000340 000016 MOV #LEVEL7,#16
1779 005746 012746 000360 MOV #360,-(SP) ;SET "T" BIT
1780 005752 012746 005760 MOV #15,-(SP)
1781 005756 000002 RTI ;1ST FALSE RETURN INTERRUPT
1782 ;UP DATE SEQ. FOR 22 MSEC TO OPEN TRANSISTOR, PREVENTING
1783 ;REMSEN SETTING
1784 005760 004567 002334 JSR RS,HOLDUP ;STALL SUFFICIENT TIME TO ALLOW
1785 005760 001314 TRANST ;FUNCTION TO OCCUR
1786 005764 001314

```

# G04

.MAIN. MACY11 27.732) 15-OCT-76 11:28 PAGE 46  
 DB0000.P11 T23 WD TRIGGER O.S. TRANSISTOR TEST

|      |        |        |        |        |        |       |                 |   |
|------|--------|--------|--------|--------|--------|-------|-----------------|---|
| 1787 | 005766 | 012746 | 000340 |        |        | MOV   | #340, -(SP)     | ;RESTORE STACK                                      |
| 1788 | 005772 | 012745 | 006000 |        |        | MOV   | #CONTT, -(SP)   |   |
| 1789 | 005776 | 000002 |        |        |        | RTI   |                 | ;2ND FALSE RTI STOP UP DATE SEQ                     |
| 1790 | 006000 | 012737 | 000016 | 000014 | CONTT: | MOV   | #16, @#14       | ;RESTORE TRAP CATCHER                               |
| 1791 | 006006 | 012737 | 000000 | 000016 |        | MOV   | #0, @#16        |   |
| 1792 | 006014 | 032777 | 000020 | 173166 |        | BIT   | #REMSEN, @WDCSR |   |
| 1793 | 006022 | 001401 |        |        |        | BEQ   | .+4             | ;BRANCH IF NO ERROR CONDITION                       |
| 1794 | 006024 | 104000 |        |        |        | ERROR |                 | ;TRANSISTOR DID NOT OPEN                            |
| 1795 |        |        |        |        |        |       |                 | ;TRANSISTOR SHOULD BE OPEN PEVENTING REMSEN SETTING |
| 1796 | 006026 | 047.77 | 000004 | 173154 |        | BIC   | #WDENAB, @WDCSR | ;FORCE CLEAR WDRLY                                  |
| 1797 | 006034 | 75027  |        |        |        | CLR   | (PC)+           | ;WAIT UNTIL LOOP CLEARS                             |
| 1798 | 006036 | 000000 |        |        | 25:    | 0     |                 |   |
| 1799 | 006040 | 005367 | 177772 |        | 35:    | DEC   | 25              |   |
| 1800 | 006044 | 001275 |        |        |        | BNE   | 35              |   |
| 1801 |        |        |        |        |        |       |                 |   |
| 1802 |        |        |        |        |        |       |                 |   |

# H04

MAIN. MACY11 27(732) 15-OCT-76 11:28 PAGE 47  
DB0AAA.P11 T24 END FEED BACK LOOP TEST

```
1803 ;*****
1804 ;TEST 24 END FEED BACK LOOP TEST
1805 ;*****
1806 006046 104400 †ST24: SCOPE
1807 006050 012767 000001 004576 MOV #1,ICOUNT ;ITERATION COUNT
1808 006056 012767 000024 004446 MOV #24,ERTSTN ;SAVE TEST # FOR ERROR REPCRT
1809 006064 012767 006072 004566 MOV #SCP24,RETURN ;SCOPE LOOP RETURN ADRS
1810 006072 SCP24:
1811
1812 006072 000004 012210 TYPE NEXTST
1813 006076 000137 007276 JMP #MON12
1814
1815
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1816
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1819 006102 104400
1820 006104 012767 000001 004542
1821 006112 012767 000025 004412
1822 006120 012767 006126 004532
1823 006126
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1837 006126 005077 173056
1838 006132 032777 000002 173050
1839 006140 001401
1840 006142 104000
1841 006144 052777 000004 173036
1842 006152 005037 001312
1843 006156 012737 006240 000004
1844 006164 012737 000340 000006
1845 006172 052777 000002 173012
1846 006200 042777 000004 173004
1847 006206 004567 002106
1848 006212 001252
1849 006214 042777 000004 172766
1850 006222 005027
1851 006224 000000
1852 006226 005367 177772
1853 006232 001375
1854 006234 104000
1855 006236 000420
1856 006240 011667 173046
1857 006244 023737 001332 001312
1858 006252 001401
1859 006254 104000
1860 006256 012737 000006 000004
1861 006264 012737 000003 000006
1862 006272 012716 006300
1863 006276 000002
1864 006300 005027
1865 006302 000000
1866 006304 005367 177772
1867 006310 001375
1868
1869

```

```

;*****
;TEST 25 RESTART TEST
;*****
TST25: SCOPE
        MOV #1,ICOUNT ;ITERATION COUNT
        MOV #25,ERTSTN ;SAVE TEST # FOR ERROR REPCRT
        MOV #SCP25,RETURN ;SCOPE LOOP RETURN ADRS

SCP25:

;THE FOLLOWING JUMPERS MUST BE INSERTED--OR USE JUMPER PLUG
;PIN 8 TO PIN 2 (-15V TO C OF RELAY)
;PIN 5 TO PIN 7 (COLLECTOR TO REMSEN)
;PIN 6 TO PIN 3 (EMMITER TO N.O. OF RELAY)
;PIN 10 TO PIN 3 (INTR.S.T. TO N.O. OF RELAY)
;PIN 11 TO PIN 1, THRU A SWITCH (RESTART S.T. TO N.C. OF RELAY)
;PIN 9 TO PIN 1 (START S.T. TO N.C. OF RELAY)
;PIN 17 TO PIN 16 (CLOCK IN FOR WDENAB)
;PIN 15 TO PIN 14 (DATA IN FOR WDENAB)
;*****
;CLOSE SWITCH
;*****
        CLR #WDCSR
        BIT #WDRLY,#WDCSR
        BEQ .+4 ;BRANCH IF NO ERROR CONDITION
        ERROR ;WDRLY NOT CLEARED--DROPPED
        BIS #WDENAB,#WDCSR ;ENABLE RELAY
        CLR #LOCTRP ;CLEAR TRAP LOCATION FOR RESTART ADDR.
        MOV #CRUNCH,#4 ;SET UP SERVICE ROUTINE
        MOV #LEVEL7,#6
        BIS #WD1,#WDAT ;UPDATE SEQ.
        BIC #WD2,#WDAT
        JSR RS,HOLDUP ;STALL SUFFICIENT TIME TO ALLOW
        FEEDBK ;FUNCTION TO OCCUR
        BIC #WDENAB,#WDCSR ;FORCE CLEAR WDRLY
        CLR (PC)+ ;WAIT UNTIL "CRUNCH" OCCURS

25: 0
35: DEC 25
    BNE 35
    ERROR ;RESTART DID NOT OCCUR
    BR RTNST

CRUNCH: MOV (SP),LOCTRP
        CMP #ROMADD,#LOCTRP
        BEQ .+4 ;BRANCH IF NO ERROR CONDITION
        ERROR ;WRONG RESTART ADDRESS
        MOV #6,#4 ;RESTORE TRAPCATCHER
        MOV #0,#6
        MOV #RTNST,(SP)

RTNST: CLR (PC)+ ;WAIT UNTIL LOOP CLEARS

45: 0
55: DEC 45
    BNE 55

```

# J04

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 DBQAAA.P11 T26 END RESTART TEST

```

1870 ;*****
1871 ;TEST 26 END RESTART TEST
1872 ;*****
1873 006312 104400 †ST26: SCOPE
1874 006314 012767 000001 004332 MOV #1,ICOUNT ;ITERATION COUNT
1875 006322 012767 000026 004202 MOV #26,ERTSTN ;SAVE TEST # FOR ERROR REPORT
1876 006330 012767 006336 004322 MOV #SCP26,RETURN ;SCOPE LOOP RETURN ADRS
1877 006336
1878
1879 006336 000004 012246 TYPE ENDTST
1880 006342 000137 007276 JMP @MONI2
1881
1882
1883 .SBTTL MONITOR
1884
1885 ;*****
1886 006346 MONITOR:
1887 ;*****
1888
1889
1890
1891 006346 000005 RESET
1892 006350 012706 001100 MOV #BEGIN,SP ;SET UP STACK POINTER
1893 006354 012767 000340 171414 MOV #LEVEL7,PS ;MONITOR AT LEVEL 7
1894 006362 000004 012203 TYPE ,HOME ;HOME UP AND ERASE SCREEN
1895
1896 006366 000004 011054 H: TYPE ,HEADER
1897 006372 012737 006476 006370 MOV #RELOD,@H+2 ;HEADER TEXT GETS WIPED BY NPR'S
1898 006400 004737 007340 JSR PC,@DEFAULT ;SET UP DEFAULT PARAMETERS
1899
1900 MONI.0:
1901 006404 012706 001100 MOV #BEGIN,SP ;SET UP STACK POINTER
1902 006410 000004 011630 TYPE ,FSTART
1903 006414 104004 KEY.TO.R0
1904 006416 122700 000104 CMPB #'D,R0 ;D = DEFAULT PARAMETERS
1905 006422 001003 BNE 1$
1906 006424 004737 007340 JSR PC,@DEFAULT ;SET UP DEFAULT PARAMETERS
1907 006430 000403 BR 2$
1908 006432 122700 000120 1$: CMPB #'P,R0 ;P = PREVIOUSLY SELECTED PARAMETERS
1909 006436 001002 BNE 3$
1910 006440 000137 007252 2$: JMP @MONI0
1911 006444 122700 000123 3$: CMPB #'S,R0 ;S = GO THROUGH AND SELECT PARAMETERS
1912 006450 001426 BEQ MONI
1913 006452 122700 000116 CMPB #'N,R0 ;N = START AT THIS TEST #
1914 006456 001352 BNE MONI.0
1915 006460 000004 011645 TYPE ,MSG0
1916 006464 104003 ACCEPT0
1917 006466 016767 004412 172564 MOV OCTNUM,FIRST.TST
1918 006474 000761 BR 2$
1919
1920 006476 051137 046105 040517 RELOD: .ASCIZ "+RELOAD FOR HEADER TEXT"
1921 006504 020104 047506 020122
1922 006512 042510 042101 051105
1923 006520 052040 054105 000124
1924
1925 .EVEN
;SET UP TEST PARAMETERS

```

# K04

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 DBGAAA.P11 MONITOR

|      |        |        |        |        |         |         |                   |                                    |
|------|--------|--------|--------|--------|---------|---------|-------------------|------------------------------------|
| 1926 |        |        |        |        |         |         |                   |                                    |
| 1927 | 006526 | 004737 | 007340 |        | MON1:   | JSR     | PC, 2#DEFAULT     | ;SET UP DEFAULT PARAMETERS         |
| 1928 | 006532 | 000004 | 011645 |        |         | TYPE    | ,MSG0             | ;FIRST TEST #                      |
| 1929 |        |        |        |        |         |         |                   |                                    |
| 1930 | 006536 | 104003 |        |        |         | ACCEPTO |                   | ;ACCEPT TEST NUMBER FROM KEYBOARD  |
| 1931 |        |        |        |        |         |         |                   |                                    |
| 1932 |        |        |        |        |         |         |                   |                                    |
| 1933 | 006540 | 005767 | 004340 |        |         | TST     | OCTNUM            | ;TEST FOR DEFAULT                  |
| 1934 | 006544 | 001403 |        |        |         | BEQ     | MON3              | ;BRANCH ON DEFAULT                 |
| 1935 | 006546 | 016767 | 004332 | 172504 |         | MOV     | OCTNUM, FIRST.TST | ;LOAD FIRST TEST #                 |
| 1936 |        |        |        |        |         |         |                   |                                    |
| 1937 | 006554 | 000004 | 011664 |        | MON3:   | TYPE    | ,MSG1             | ;BASE ADDRESS:                     |
| 1938 |        |        |        |        |         |         |                   |                                    |
| 1939 |        |        |        |        |         |         |                   |                                    |
| 1940 | 006560 | 104003 |        |        |         | ACCEPTO |                   | ;ACCEPT BASE ADDRESS FROM KEYBOARD |
| 1941 |        |        |        |        |         |         |                   |                                    |
| 1942 | 006562 | 005767 | 004316 |        |         | TST     | OCTNUM            |                                    |
| 1943 | 006566 | 001405 |        |        |         | BEQ     | MON4              |                                    |
| 1944 | 006570 | 016767 | 004310 | 172510 |         | MOV     | OCTNUM, WDBASE    |                                    |
| 1945 | 006576 | 004767 | 001774 |        |         | JSR     | PC, WDBASE        |                                    |
| 1946 |        |        |        |        |         |         |                   |                                    |
| 1947 | 006602 | 000004 | 011704 |        | MON4:   | TYPE    | ,MSG2             | ;ACCEPT INTERRUPT VECTOR           |
| 1948 | 006606 | 104003 |        |        |         | ACCEPTO |                   |                                    |
| 1949 | 006610 | 005767 | 004270 |        |         | TST     | OCTNUM            |                                    |
| 1950 | 006614 | 001405 |        |        |         | BEQ     | MON4.1            |                                    |
| 1951 | 006616 | 016767 | 004262 | 172464 |         | MOV     | OCTNUM, WDBAS     |                                    |
| 1952 | 006624 | 004767 | 002022 |        |         | JSR     | PC, WDBAS         |                                    |
| 1953 |        |        |        |        |         |         |                   |                                    |
| 1954 |        |        |        |        |         |         |                   |                                    |
| 1955 | 006630 | 000004 | 011730 |        | MON4.1: | TYPE    | ,MSG3             | ;PRIORITY                          |
| 1956 | 006634 | 104003 |        |        |         | ACCEPTO |                   | ;ACCEPT WD PRIORITY LEVEL          |
| 1957 | 006636 | 005767 | 004242 |        |         | TST     | OCTNUM            | ;TEST FOR DEFAULT                  |
| 1958 | 006642 | 001425 |        |        |         | BEQ     | MON5              | ;BRANCH ON DEFAULT                 |
| 1959 | 006644 | 006367 | 004234 |        |         | ASL     | OCTNUM            |                                    |
| 1960 | 006650 | 006367 | 004230 |        |         | ASL     | OCTNUM            |                                    |
| 1961 | 006654 | 006367 | 004224 |        |         | ASL     | OCTNUM            |                                    |
| 1962 | 006660 | 006367 | 004220 |        |         | ASL     | OCTNUM            |                                    |
| 1963 | 006654 | 006367 | 004214 |        |         | ASL     | OCTNUM            |                                    |
| 1964 | 006670 | 016767 | 004210 | 172360 |         | MOV     | OCTNUM, WDPRT     | ;LOAD PRIORITY                     |
| 1965 | 006676 | 005367 | 004202 |        |         | DEC     | OCTNUM            |                                    |
| 1966 | 006702 | 042737 | 000037 | 013104 |         | BIC     | #37, 2#OCTNUM     | ;CLEAR TNZVC                       |
| 1967 | 006710 | 016767 | 004170 | 172364 |         | MOV     | OCTNUM, LESS1     | ;PRIORITY TO ALLOW WD INTERRUPTS   |
| 1968 |        |        |        |        |         |         |                   |                                    |
| 1969 |        |        |        |        |         |         |                   |                                    |
| 1970 |        |        |        |        |         |         |                   |                                    |
| 1971 | 006716 | 000004 | 011773 |        | MON5:   | TYPE    | ,MSG5             | ;TIME OUT VALUE                    |
| 1972 | 006722 | 004767 | 001226 |        |         | JSR     | PC, DACCEPT       | ;ACCEPT DECIMAL # FROM TTY         |
| 1973 | 006726 | 005767 | 172344 |        |         | TST     | DECNUM            |                                    |
| 1974 | 006732 | 001403 |        |        |         | BEQ     | MON5.1            | ;BRANCH ON DEFAULT                 |
| 1975 | 006734 | 016767 | 172336 | 172326 |         | MOV     | DECNUM, TIMEOUT   | ;PUT IN NEW VALUE                  |
| 1976 | 006742 | 000004 | 012043 |        | MON5.1: | TYPE    | ,MSG6             | ;TRIGGER VALUE                     |
| 1977 | 006746 | 004767 | 001202 |        |         | JSR     | PC, DACCEPT       | ;ACCEPT DECIMAL # FROM TTY         |
| 1978 | 006752 | 005767 | 172320 |        |         | TST     | DECNUM            |                                    |
| 1979 | 006756 | 001403 |        |        |         | BEQ     | MON6              | ;BRANCH ON DEFAULT                 |
| 1980 | 006760 | 016767 | 172312 | 172304 |         | MOV     | DECNUM, TRIGER    | ;PUT IN NEW VALUE                  |
| 1981 | 006766 | 000004 | 012123 |        | MON6:   | TYPE    | ,MSG7             | ;CLOCKF                            |

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1982 006772 004767 001156 JSR PC,DACCEP ;ACCEPT DECIMAL # FROM TTY
1983 006776 005767 172274 TST DECNUM
1984 007002 001512 BEQ MON7 ;BRANCH ON DEFAULT
1985 007004 022767 001750 172264 CYC1K: CMP #1000.,DECNUM
1986 007012 001012 BNE CYC200
1987 007014 012767 176030 172274 MOV #-1000.,SEC1 ;SET UP 1000 HZ CONSTANTS
1988 007022 012767 166170 172270 MOV #-5000.,SECS ;
1989 007030 012767 154360 172264 MOV #-10000.,SEC10 ;
1990 007036 000471 BR OUTDEC
1991 007040 022767 000310 172230 CYC200: CMP #200.,DECNUM
1992 007046 001012 BNE CYC100
1993 007050 012767 177470 172240 MOV #-200.,SEC1 ;SET UP 200 HZ CONSTANTS
1994 007056 012767 176030 172234 MOV #-1000.,SECS ;
1995 007064 012767 174060 172230 MOV #-2000.,SEC10 ;
1996 007072 000453 BR OUTDEC
1997 007074 022767 000144 172174 CYC100: CMP #100.,DECNUM
1998 007102 001012 BNE CYC50
1999 007104 012767 177634 172204 MOV #-100.,SEC1 ;SET UP 100 HZ CONSTANTS
2000 007112 012767 177014 172200 MOV #-500.,SECS ;
2001 007120 012767 176030 172174 MOV #-1000.,SEC10 ;
2002 007126 000435 BR OUTDEC
2003 007130 022767 000062 172140 CYC50: CMP #50.,DECNUM
2004 007136 001012 BNE CYC60
2005 007140 012767 177716 172150 MOV #-50.,SEC1 ;SET UP 50 HZ CONSTANTS
2006 007146 012767 177406 172144 MOV #-250.,SECS ;
2007 007154 012767 177014 172140 MOV #-500.,SEC10 ;
2008 007162 000417 BR OUTDEC
2009 007164 022767 000074 172104 CYC60: CMP #60.,DECNUM
2010 007172 001401 BEQ .+4 ;BRANCH IF NO ERROR CONDITION
2011 007174 104000 ERROR ;UNASSIGNED CLOCK FREQ.
2012 007176 012767 177704 172112 MOV #-60.,SEC1 ;SET UP 60 HZ CONSTANTS
2013 007204 012767 177324 172106 MOV #-300.,SECS ;
2014 007212 012767 176650 172102 MOV #-600.,SEC10 ;
2015 007220 000400 BR OUTDEC
2016 007222 016767 172050 172044 OUTDEC: MOV DECNUM,CLOCKF ;PUT IN NEW VALUE
2017 007230 000004 012146 MON7: TYPE ,MSG8 ;RESTART ADDRESS
2018 007234 104003 ACCEPTO ;ACCEPT RESTART ADDRESS
2019 007236 005767 003642 TST OCTNUM ;TEST FOR DEFAULT
2020 007242 001403 BEQ MON10 ;BRANCH ON DEFAULT
2021 007244 016767 003634 172060 MOV OCTNUM,ROMADD ;PUT IN NEW VALUE
2022 ;ASK FOR DYNAMIC SWITCH SETTINGS ON CONSOL SWITCHES
2023
2024 007252 005067 003252 MON10: CLR ERRCNT
2025 007256 000004 011755 TYPE ,MSG4 ;SET DYNAMIC SWITCHES
2026 007262 104004 KEY.TO.RO ;TYPE ANYTHING
2027 007264 122700 000003 CMPB #3,RO ;TEST FOR CONTROL C
2028 007270 001002 BNE MON12
2029 007272 000167 171106 JMP MON1.0 ;RETURN TO MONITOR IF ↑C
2030
2031
2032
2033 007276 016767 171756 MON12: MOV FIRST.TST,RO ;TEST FOR DEFAULT
2034 007302 001002 BNE MON13 ;BRANCH IF NOT DEFAULT
2035 007304 005267 171750 INC FIRST.TST ;DEFAULT TEST NUMBER IS ONE
2036 007310 016767 171744 003214 MON13: MOV FIRST.TST,ERTST;
2037 007316 006300 ASL RO
  
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2038 007320 016037 012660 012660      MOV      TSTABLE-2(RO),@#RETURN
2039 007326 062737 000024 012660      ADC      #24,@#RETURN
2040 007334 000170 012660      MON14:  JMP      @TSTABLE-2(RO) ;JUMP TO SELECTED TEST
2041
2042
2043
2044 007340 012767 000300 171710  DEFAULT:;UTILITIES
2045 007346 012767 000240 171726      MOV      #LEVEL6,WDPRT
2046 007354 012700 001224      MOV      #DFLTAD,RO
2047 007360 004767 000056      JSR      PC,LODAD
2048 007364 012700 001214      MOV      #DFLTIV,RO
2049 007370 004767 000012      JSR      PC,LODIV
2050 007374 012700 001234      MOV      #DFLMSC,RO
2051 007400 004767 000060      JSR      PC,LODMSC
2052 007404 000207      RTS      PC ;SET UP DEFAULT PARAMETERS
2053 007406 012067 171562  LODIV:  MOV      (RO)+,CLKIV
2054 007412 012067 171560      MOV      (RO)+,CLKIS
2055 007416 012067 171556      MOV      (RO)+,WDIV
2056 007422 012067 171554      MOV      (RO)+,WDIS
2057 007426 000207      RTS      PC
2058 007430 012700 001306  FREI:  MOV      #WDBASE,RO
2059 007434 004767 000002      JSR      PC,LODAD
2060 007440 000207      RTS      PC
2061 007442 012067 171536  LODAD:  MOV      (RO)+,CLKCSR
2062 007446 012067 171534      MOV      (RO)+,VOID
2063 007452 012067 171532      MOV      (RO)+,WDCSR
2064 007456 012067 171530      MOV      (RO)+,WDDAT
2065 007460 000207      RTS      PC
2066 007464 012067 171600  LODMSC: MOV      (RO)+,TIMOUT
2067 007470 012067 171576      MOV      (RO)+,TRIGER
2068 007474 012067 171574      MOV      (RO)+,CLOCKF
2069 007500 012067 171626      MOV      (RO)+,ROMADD
2070 007504 012067 171606      MOV      (RO)+,SECI
2071 007510 012067 171604      MOV      (RO)+,SECS
2072 007514 012067 171602      MOV      (RO)+,SECIO
2073 007520 000207      RTS      PC
2074
2075 007522 013527      TIMEUP:;UTILITIES
2076 007524 000000      TCNT:  MOV      @ (R5)+,(PC)+ ;FETCH TIMEUP COUNT
2077 007526 004567 000026      JSR      R5,SCALE ;SCALE TO CLOCKF
2078 007532 032777 000200 171444  T.1:  BIT      #FLAG,@CLKCSR
2079 007540 100374      BPL      T.1 ;WAIT FOR TICK
2080 007542 042777 000200 171434      BIC      #FLAG,@CLKCSR ;CLEAR DONE
2081 007550 005367 177750      DEC      TCNT ;KEEP TIME
2082 007554 001366      BNE      T.1 ;BRANCH IF NO TIMEOUT
2083 007556 000205      RTS      R5
2084 007560 022767 001750 171506  SCALE: CMP      #1000.,CLOCKF ;IS CLOCK @ 1KC
2085 007566 001001      BNE      HZ200 ;NO TRY 200 HZ
2086 007570 000541      BR      EXIT ;NO SCALING, EXIT
2087 007572 022767 000310 171474  HZ200: CMP      #200.,CLOCKF ;IS CLOCK @ 200 HZ
2088 007600 001024      BNE      HZ100 ;NO TRY 100 HZ
2089 007602 005067 171476      CLR      XCNT ;CLEAR SCALE LOCATION
2090 007606 026727 177712 000005      CMP      TCNT,#5 ;CAN YOU DIVIDE BY 5
2091 007614 002001      BGE      .+4 ;BRANCH IF NO ERROR CONDITION
2092 007616 104000      ERROR ;TRY HIGHER CLOCK FREQ
2093 007620 005267 171460  DIV5:  INC      XCNT ;INCR SCALE LOCATION

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2094 007624 162767 000005 177672 SUB #5,TCNT ;DIV. BY 5, SUCCESSIVE SUBTRACTION
2095 007632 005767 177666 TST TCNT ;CAN IT BE SUBTRACTED AGAIN
2096 007636 001401 BEQ OUT1 ;IS IT ZERO
2097 007640 100367 BPL DIV5 ;IS IT POSITIVE
2098 007642 016767 171436 177654 OUT1: MOV XCNT,TCNT ;MOV SCALED VALUE TO TCNT
2099 ;VALUE HAS BEEN SCALED ( 1/5)
2100 007650 000511 BR EXIT
2101 007652 022767 000144 171414 HZ100: CMP #100.,CLOCKF ;IS CLOCK @ 100 HZ
2102 007660 001024 BNE HZ50 ;NO, TRY 50 HZ
2103 007662 005067 171416 CLR XCNT ;CLEAR SCALE LOCATION
2104 007666 026727 177632 000012 CMP TCNT,#12 ;CAN YOU DIVIDE BY 10?
2105 007674 002001 BGE .+4 ;BRANCH IF NO ERROR CONDITION
2106 007676 104000 ERROR ;TRY HIGHER CLOCK FREQ
2107 007700 005267 171400 DIV10: INC XCNT ;INCR SCALE LOCATION
2108 007704 162767 000012 177612 SUB #12,TCNT ;DIVIDE BY 10, SUCCESSIVE SUBTRACTION
2109 007712 005767 177606 TST TCNT ;CAN IT BE SUBTRACTED AGAIN
2110 007716 001401 BEQ OUT2 ;IS IT ZERO
2111 007720 100367 BPL DIV10 ;IS IT POSITIVE
2112 007722 016767 171356 177574 OUT2: MOV XCNT,TCNT ;MOV SCALED VALUE TO TCNT
2113 ;VALUE HAS BEEN SCALED ( 1/10)
2114 007730 000461 BR EXIT
2115 007732 022767 000062 171334 HZ50: CMP #50.,CLOCKF ;IS CLOCK @ 50 HZ
2116 007740 001024 BNE HZ60 ;NO TRY 60 HZ
2117 007742 005067 171336 CLR XCNT ;CLEAR SCALE LOCATION
2118 007746 026727 177552 000024 CMP TCNT,#24 ;CAN YOU DIVIDE BY 20?
2119 007754 002001 BGE .+4 ;BRANCH IF NO ERROR CONDITION
2120 007756 104000 ERROR ;TRY HIGHER CLOCK FREQ
2121 007760 005267 171320 DIV20: INC XCNT ;INCR SCALE LOCATION
2122 007764 162767 000024 177532 SUB #24,TCNT ;DIVIDE BY 20, SUCCESSIVE SUBTRACTION
2123 007772 005767 177526 TST TCNT ;CAN IT BE SUBTRACTED AGAIN
2124 007776 001401 BEQ OUT3 ;IS IT ZERO
2125 010000 100367 BPL DIV20 ;IS IT POSITIVE
2126 010002 016767 171276 177514 OUT3: MOV XCNT,TCNT ;MOV SCALED VALUE TO TCNT
2127 ;VALUE HAS BEEN SCALED ( 1/20)
2128 010010 000431 BR EXIT
2129 010012 022767 000074 171254 HZ60: CMP #60.,CLOCKF ;IS CLOCK @ 60 HZ
2130 010020 001401 BEQ .+4 ;BRANCH IF NO ERROR CONDITION
2131 010022 104000 ERROR ;CLOCKF HAS BEEN ASSIGNED AN UNASSIGNED VALUE
2132 010024 005067 171254 CLR XCNT ;CLEAR SCALE LOCATION
2133 010030 026727 177470 000020 CMP TCNT,#20 ;CAN YOU DIVIDE BY 16?
2134 010036 002001 BGE .+4 ;BRANCH IF NO ERROR CONDITION
2135 010040 104000 ERROR ;TRY HIGHER CLOCK FREQ.
2136 010042 005267 171236 DIV16: INC XCNT ;INCR SCALE LOCATION
2137 010046 162767 000020 177450 SUB #20,TCNT ;DIVIDE BY 16, SUCCESSIVE SUBTRACTION
2138 010054 005767 177444 TST TCNT ;CAN IT BE SUBTRACTED AGAIN
2139 010060 001401 BEQ OUT4 ;IS IT ZERO
2140 010062 100367 BPL DIV16 ;IS IT POSITIVE
2141 010064 016767 171214 177432 OUT4: MOV XCNT,TCNT ;MOV SCALED VALUE TO TCNT
2142 ;VALUE HAS BEEN SCALED ( 1/16)
2143 010072 000400 BR EXIT
2144 010074 000205 EXIT: RTS RS
2145
2146 ;THIS UTILITY CALCULATES TRIGGER (ONE 20TH OF TIMEOUT)
2147 010076 016767 171166 171174 CTRIG: MOV TIMEOUT,TTRIG ;START CALCULATION OF TRIGER
2148 010104 005067 171174 CLR XCNT
2149 010110 026727 171164 000000 CMP TTRIG,#0 ;CHECK FOR VALID TIMEOUT
  
```

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2150 010116 001001 BNE .+4 ;BRANCH IF NO ERROR CONDITION
2151 010120 104000 ERROR ;TIMOUT CANNOT BE ZERO
2152 010122 005267 171156 ONE20TH: INC XCNT
2153 010126 162767 000024 171144 SUB #24,TRIG ;DIVIDE BY 20, SUCCESSIVE SUBTRACTION
2154 010134 005767 171140 TST TRIG ;CAN IT BE SUBTRACTED AGAIN
2155 010140 001401 BEQ OUTS ;IS IT ZERO
2156 010142 100367 SPL ONE20TH ;IS IT POSITIVE
2157 010144 016767 171134 171120 OUTS: MOV XCNT,TRIG ;TRIGER IS NOW ONE 20TH OF TIMOUT
2158 010152 000207 RTS PC

;ACCEPT DECIMAL NUMBER FROM TTY, UP TO 10000.
2161 010154 000240 ACCEP: NOP
2162 010156 005067 171114 CLR DECNUM ;CLEAR DECIMAL NUMBER LOCATION
2163 010162 010146 MOV R1,-(SP) ;SAVE R1
2164 010164 010046 MOV R0,-(SP) ;SAVE R0
2165 010166 005001 ACPTD: CLR R1
2166 010170 ACPTD.1:
2167 010170 104004 KEY.TO.R0 ;FETCH AN ASCII CHAR FROM KEYBOARD
2168 010172 120027 000003 CMPB R0,#3 ;CONTROL C?
2169 010176 001002 BNE AD.2
2170 010200 000137 006404 JMP #MONI.0
2171 010204 122700 000177 AD.2: CMPB #177,R0 ;TEST FOR RUBOUT
2172 010210 001433 BEQ RUBOUD
2173 010212 122700 000015 CMPB #15,R0 ;TEST FOR <CR>
2174 010216 001433 BEQ CARGO
2175 010220 120027 000040 CMPB R0,#40 ;EXIT IF SPACE
2176 010224 001430 BEQ CARGO
2177 010226 120027 000000 CMPB R0,#0 ;TEST FOR VALID DECIMAL NUMBER
2178 010232 002422 [LT RUBOUD
2179 010234 120027 000071 CMPB R0,#9
2180 010240 003017 BGT RUBOUD
2181 010242 042700 177760 BIC #177760,R0 ;CONVERT ASCII TO DECIMAL
2182 010246 006301 ASL R1
2183 010250 010167 171022 MOV R1,DECNUM
2184 010254 006301 ASL R1
2185 010256 006301 ASL R1
2186 010260 066701 171012 ADD DECNUM,R1
2187 010264 060001 ADD R0,R1 ;CHALK'M UP
2188 010266 022701 023420 CMP #10000.,R1
2189 010272 100001 BPL .+4 ;BRANCH IF NO ERROR CONDITION
2190 010274 104000 ERROR ;NUMBER EXCEEDS 10000
2191 010276 000734 BR ACPTD.1 ;FETCH NEXT CHAR
2192 010300 000004 012304 RUBOUD: TYPE .QUES ;TYPE?
2193 010304 000730 BR ACPTD
2194 010306 010167 170764 CARGO: MOV R1,DECNUM ;PLACE DECIMAL NUMBER HERE
2195 010312 012600 MOV (SP)+,R0 ;RESTORE R0
2196 010314 012601 MOV (SP)+,R1 ;RESTORE R1
2197 010316 000207 RTS PC

;STALL FOR "X" MILLISECS.
2201 010320 013527 HOLDUP: MOV #1,(R5)+,(PC)+
2202 010322 000000 HOLDIT: 0 ;MOVE PASSED ARG. INTO HERE
2203 010324 004767 000200 JSR PC,SCALE
2204 010330 062767 000001 177764 ADD #1,HOLDIT
  
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2206 010336 032777 000010 170646 BIT #MNCLK, @WDDAT
2207 010344 001014 PNE SVCHH ;START COUNTING @ 1 TRANSITIONS
2208 010346 032777 000010 170636 SVCLL: BIT #MNCLK, @WDDAT ;CHECK FOR 1 STATE
2209 010354 001374 BNE SVCLL ;LOOP UNTIL MNCLK=0
2210 010356 005367 177740 DEC HOLDIT ;@ EVERY 0 TRANSITION
2211 010362 001421 BEQ OUTMN
2212 010364 032777 000010 170620 SVCHL: BIT #MNCLK, @WDDAT ;CHECK FOR 0 STATE
2213 010372 001774 BEQ SVCHL ;LOOP UNTIL MNCLK=1
2214 010374 000764 BR SVCLL
2215 010376 032777 000010 170606 SVCHH: BIT #MNCLK, @WDDAT ;CHECK FOR 0 STATE
2216 010404 001774 BEQ SVCHH ;LOOP UNTIL MNCLK=1
2217 010406 005367 177710 DEC HOLDIT ;@ EVERY 1 TRANSITION
2218 010412 001405 BEQ OUTMN
2219 010414 032777 000010 170570 SVCLH: BIT #MNCLK, @WDDAT ;CHECK FOR 1 STATE
2220 010422 001374 BNE SVCLH ;LOOP UNTIL MNCLK=0
2221 010424 000764 BR SVCHH
2222 010426 000205 OUTMN: RTS
2223
2224 ;THIS UTILITY SCALES HOLDIT BY 4/5
2225 010430 022767 000074 170636 SCALEN: CMP #60.,CLOCKF ;IS IT 60 HZ?
2226 010436 001036 BNE OUT6
2227 010440 005067 170640 CLR XCNT
2228 010444 026727 177652 000000 CMP HOLDIT, #0 ;CHECK FOR VALID NUMBER
2229 010452 001001 BNE .+4 ;BRANCH IF NO ERROR CONDITION
2230 010454 104000 ERROR ;HOLDIT CANNOT BE ZERO
2231 010456 026727 177640 000005 CMP HOLDIT, #5. ;IS IT LESS THAN 5?
2232 010464 100420 BMI OUT6 ;YES, LEAVE HOLDIT AS IS
2233 010466 006367 177630 MULT4: ASL HOLDIT ;MULTIPLY BY 2
2234 010472 006367 177624 ASL HOLDIT ;MULTIPLY BY 2
2235 010476 005267 170602 ONE5TH: INC XCNT
2236 010502 162767 000005 177612 SUB #5.,HOLDIT ;DIVIDE BY 5, SUCCESSIVE SUBTRACTION
2237 010510 005767 177606 TST HOLDIT ;CAN IT BE SUBTRACTED AGAIN?
2238 010514 001401 BEQ OUT6.1 ;NO
2239 010516 100367 BPL ONE5TH ;YES
2240 010520 016767 170560 177574 OUT6.1: MOV XCNT,HOLDIT ;HOLDIT IS NOW APPROX. 4/5 OF ORIGINAL
2241 010526 000207 OUT6: RTS PC
2242
2243 ;THIS UTILITY SCALES HOLDIT BY 5/4
2244 010530 022767 000074 170536 SCALEF: CMP #60.,CLOCKF ;IS IT 60 HZ ?
2245 010536 001016 BNE OUT7 ;NO
2246 010540 016767 177556 170536 MOV HOLDIT,XCNT ;SAVE HOLDIT
2247 010546 006367 177550 MULT5: ASL HOLDIT
2248 010552 006367 177544 ASL HOLDIT
2249 010556 066767 170522 177536 ADD XCNT,HOLDIT
2250 010564 006267 177532 ONE4TH: ASR HOLDIT
2251 010570 006267 177526 ASR HOLDIT
2252 010574 000207 OUT7: RTS PC
2253
2254
2255 ;NEW WATCH DOG ADDRESSES
2256 010576 016767 170504 170400 WDOADR: MOV WDBASE,CLKCSR
2257 010604 062737 000002 001306 ADD #2,@WDBASE
2258 010612 013767 001306 170366 MOV @WDBASE,VOID
2259 010620 062737 000002 001306 ADD #2,@WDBASE
2260 010626 013767 001306 170354 MOV @WDBASE,WDCSR
2261 010634 062737 000002 001306 ADD #2,@WDBASE

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2262 010642 013767 001306 170342      MOV      @#WDBASE,WDDAT
2263 010650 000207                      RTS PC
2264
2265
2266
2267 010652 016767 170432 170314  MOVEC:  :NEW WATCH DOG VECTORS
2268 010660 062737 000002 001310      MOV      WDIBAS,CLKIV
2269 010666 013767 001310 170302      ADD      #2,@#WDIBAS
2270 010674 062737 000002 001310      MOV      @#WDIBAS,CLKIS
2271 010702 013767 001310 170270      ADD      #2,@#WDIBAS
2272 010710 062737 000002 001310      MOV      @#WDIBAS,WDIV
2273 010716 013767 001310 170256      ADD      #2,@#WDIBAS
2274 010724 000207                      MOV      @#WDIBAS,WDIS
2275 010726 052777 000002 170256  BB:     RTS      PC
2276 010734 042777 000004 170250      BIS      #WD1,@WDDAT
2277 010742 000006                      BIC      #WD2,@WDDAT
2278
2279 010744 012777 010776 170222  :THIS ROUTINE RINGS BELL AT INTERVAL DETERMINED BY RO
2280 010752 016767 170324 167016  TIME:   MOV      #TIME2,@CLKIV ;SET UP VECTOR RETURN
2281 010760 016777 170272 170210      MOV      LESS1,PS ;SET PROC. PRIORITY
2282 010766 052777 000100 170210  TIME1: MOV      WDPRT,@CLKIS
2283 010774 000777                      BIS      #100,@CLKCSR ;ENABLE INTERRUPT
2284 010776 005200                      BR        ;WAIT,,AFTER SERVICING INTERRUPT "RETURN HERE"
2285 011000 001020  TIME2:  INC      RO
2286 011002 042777 000100 170174      BNE      TIME3
2287 011010 000004 012206                      BIC      #CLKEN,@CLKCSR ;CLEAR INTERRUPT ENABLE
2288 011014 012716 011052                      TYPE     BELL ;RING BELL
2289 011020 012766 000340 000002      MOV      #TIME4,(SP) ;CLEAR OUT "RETURN HERE"
2290 011026 016777 170144 170140      MOV      #LEVEL-2(SP)
2291 011034 012777 000000 170134      MOV      CLKIS,@CLKIV ;RESTORE TRAPCATCHER
2292 011042 042777 000200 170134  TIME3: MOV      #0,@CLKIS
2293 011050 000002                      BIC      #TICK,@CLKCSR ;CLEAR TICK
2294 011052 000207                      RTI
2295
2296
2297
2298 011054 057537 040515 047111  TIME4:  RTS      PC ;RETURN TO PROGRAM
2299 011062 042504 026503 030461  .SBTTL  MESSAGES
2300 011070 042055 050502 040501  LF=12
2301 011076 040455 042055                      CR=15
2302
2303 011102 057537 054504 040516  HEADER: .ASCII  "++MAINDEC-11-DBQAA-A-D"
2304 011110 044515 020103 053523
2305 011116 052111 044103 051440
2306 011124 052105 044524 043516
2307 011132 173
2308 011133 137 020040 020040  .ASCII  "+ SR 15 HALT ON ERROR"
2309 011140 020040 051440 020122
2310 011146 032461 020040 020040
2311 011154 040510 052114 047440
2312 011162 020116 051105 047522
2313 011170 122
2314 011171 137 020040 020040  .ASCII  "+ SR 14 SCOPE LOOP"
2315 011176 020040 051440 020122
2316 011204 032061 020040 020040
2317 011212 041523 050117 020105

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# E05

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|      |        |        |        |        |         |  |
|------|--------|--------|--------|--------|---------|--|
| 2318 | 011220 | 047514 | 050117 |        |         |  |
| 2319 | 011224 | 020137 | 020040 | 020040 | .ASCII  | "< SR 13 INHIBIT ERROR PRINTOUT"         |
| 2320 | 011232 | 020040 | 051123 | 030440 |         |  |
| 2321 | 011240 | 020063 | 020040 | 044440 |         |  |
| 2322 | 011246 | 044116 | 041111 | 052111 |         |  |
| 2323 | 011254 | 042440 | 051122 | 051117 |         |  |
| 2324 | 011262 | 050040 | 044522 | 052116 |         |  |
| 2325 | 011270 | 052517 | 124    |        |         |  |
| 2326 | 011273 | 137    | 020040 | 020040 | .ASCII  | "< SR 12 SHORT ERROR REPORT"             |
| 2327 | 011308 | 020040 | 051440 | 020122 |         |  |
| 2328 | 011306 | 031061 | 020040 | 020040 |         |  |
| 2329 | 011314 | 044123 | 051117 | 020124 |         |  |
| 2330 | 011322 | 051105 | 047522 | 020122 |         |  |
| 2331 | 011330 | 042522 | 047520 | 052122 |         |  |
| 2332 | 011336 | 020137 | 020040 | 020040 | .ASCII  | "< SR 11 INHIBIT ITERATIONS"             |
| 2333 | 011344 | 020040 | 051123 | 030440 |         |  |
| 2334 | 011352 | 020061 | 020040 | 044440 |         |  |
| 2335 | 011360 | 044116 | 041111 | 052111 |         |  |
| 2336 | 011366 | 044440 | 042524 | 040522 |         |  |
| 2337 | 011374 | 044524 | 047117 | 123    |         |  |
| 2338 | 011401 | 137    | 052137 | 050131 | .ASCII  | "< TYPE: <D>, FOR DEFAULT PARAMETERS"    |
| 2339 | 011406 | 035105 | 020040 | 036040 |         |  |
| 2340 | 011414 | 037104 | 043054 | 051117 |         |  |
| 2341 | 011422 | 042040 | 043105 | 052501 |         |  |
| 2342 | 011430 | 052114 | 050040 | 051101 |         |  |
| 2343 | 011436 | 046501 | 052105 | 051105 |         |  |
| 2344 | 011444 | 123    |        |        |         |  |
| 2345 | 011445 | 137    | 020040 | 020040 | .ASCII  | "< <P>, FOR PREVIOUS PARAMETERS"         |
| 2346 | 011452 | 020040 | 020040 | 050074 |         |  |
| 2347 | 011460 | 026076 | 047506 | 020122 |         |  |
| 2348 | 011466 | 051120 | 053105 | 047511 |         |  |
| 2349 | 011474 | 051525 | 050040 | 051101 |         |  |
| 2350 | 011502 | 046501 | 052105 | 051105 |         |  |
| 2351 | 011510 | 123    |        |        |         |  |
| 2352 | 011511 | 137    | 020040 | 020040 | .ASCII  | "< <S>, FOR SELECT PARAMETERS"           |
| 2353 | 011516 | 020040 | 020040 | 051474 |         |  |
| 2354 | 011524 | 026076 | 047506 | 020122 |         |  |
| 2355 | 011532 | 042523 | 042514 | 052103 |         |  |
| 2356 | 011540 | 050040 | 051101 | 046501 |         |  |
| 2357 | 011546 | 052105 | 051105 | 123    |         |  |
| 2358 | 011553 | 137    | 020040 | 020040 | .ASCIZ  | "< <N>, FOR START WITH THIS TEST NUMBER" |
| 2359 | 011560 | 020040 | 020040 | 047074 |         |  |
| 2360 | 011566 | 026076 | 047506 | 020122 |         |  |
| 2361 | 011574 | 052123 | 051101 | 020124 |         |  |
| 2362 | 011602 | 044117 | 044124 | 052040 |         |  |
| 2363 | 011610 | 044510 | 020123 | 042524 |         |  |
| 2364 | 011616 | 052123 | 047040 | 046525 |         |  |
| 2365 | 011624 | 042502 | 000122 |        |         |  |
| 2366 | 011630 | 057537 | 026104 | 026120 | FSTART: | .ASCIZ "< <D,P,S,N,> "                   |
| 2367 | 011636 | 026123 | 026116 | 020077 |         |  |
| 2368 | 011644 | 000    |        |        |         |  |
| 2369 | 011645 | 137    | 042524 | 052123 | MSG0:   | .ASCIZ "< TEST NUMBER: "                 |
| 2370 | 011652 | 047040 | 046525 | 042502 |         |  |
| 2371 | 011660 | 035122 | 000040 |        |         |  |
| 2372 | 011664 | 041137 | 051501 | 020105 | MSG1:   | .ASCIZ "< BASE ADDRESS: "                |
| 2373 | 011672 | 042101 | 051104 | 051505 |         |  |

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|      |        |        |        |        |                |   |
|------|--------|--------|--------|--------|----------------|---|
| 2374 | 011700 | 035123 | 000040 |        |                |   |
| 2375 | 011704 | 044537 | 052116 | 051105 | MSG2: .ASCIZ   | "*INTERRUPT VECTOR:"                              |
| 2376 | 011712 | 052522 | 052120 | 053040 |                |   |
| 2377 | 011720 | 041505 | 047524 | 035122 |                |   |
| 2378 | 011726 | 000040 |        |        |                |   |
| 2379 | 011730 | 053537 | 020104 | 051120 | MSG3: .ASCIZ   | "*WD PRIORITY LEVEL:"                             |
| 2380 | 011736 | 047511 | 044522 | 054524 |                |   |
| 2381 | 011744 | 046040 | 053105 | 046105 |                |   |
| 2382 | 011752 | 020072 | 000    |        |                |   |
| 2383 | 011755 | 137    | 042523 | 020124 | MSG4: .ASCIZ   | "*SET SWITCHES"                                   |
| 2384 | 011762 | 053523 | 052111 | 044103 |                |   |
| 2385 | 011770 | 051505 | 000    |        |                |   |
| 2386 | 011773 | 137    | 044524 | 042515 | MSG5: .ASCIZ   | "*TIME OUT VALUE IN MILLISECS+TOLERANCE:"         |
| 2387 | 012000 | 047440 | 052125 | 053040 |                |   |
| 2388 | 012006 | 046101 | 042525 | 044440 |                |   |
| 2389 | 012014 | 020116 | 044515 | 046114 |                |   |
| 2390 | 012022 | 051511 | 041505 | 025523 |                |   |
| 2391 | 012030 | 047524 | 047514 | 040522 |                |   |
| 2392 | 012036 | 041516 | 035105 | 000    |                |   |
| 2393 | 012043 | 137    | 051124 | 043511 | MSG6: .ASCIZ   | "*TRIGER VALUE IN MILLISECS(5% OF TIMOUT VALUE):" |
| 2394 | 012050 | 051105 | 053040 | 046101 |                |   |
| 2395 | 012056 | 042525 | 044440 | 020116 |                |   |
| 2396 | 012064 | 044515 | 046114 | 051511 |                |   |
| 2397 | 012072 | 041505 | 024122 | 022465 |                |   |
| 2398 | 012100 | 047440 | 020106 | 044524 |                |   |
| 2399 | 012106 | 047515 | 052125 | 053040 |                |   |
| 2400 | 012114 | 046101 | 042525 | 035051 |                |   |
| 2401 | 012122 | 000    |        |        |                |   |
| 2402 | 012123 | 137    | 046103 | 041517 | MSG7: .ASCIZ   | "*CLOCK FREQ IN HZ:"                              |
| 2403 | 012130 | 020113 | 051106 | 050505 |                |   |
| 2404 | 012136 | 044440 | 020116 | 055110 |                |   |
| 2405 | 012144 | 000072 |        |        |                |   |
| 2406 | 012146 | 051137 | 051505 | 040524 | MSG8: .ASCIZ   | "*RESTART ADDRESS:"                               |
| 2407 | 012154 | 052122 | 040440 | 042104 |                |   |
| 2408 | 012162 | 042522 | 051523 | 000072 |                |   |
| 2409 | 012170 | 052537 | 051122 | 051117 | ERPC: .ASCIZ   | "*ERROR PC "                                      |
| 2410 | 012176 | 050040 | 020103 | 000    |                |   |
| 2411 | 012203 | 035    | 000037 |        | HOME: .ASCIZ   | <35><37>  |
| 2412 | 012206 | 000207 |        |        | BELL: .ASCIZ   | <207>   |
| 2413 | 012210 | 042137 | 020117 | 042522 | NEXTST: .ASCIZ | "*DO RESTART TEST,CLOSE SWITCH"                   |
| 2414 | 012216 | 052123 | 051101 | 020124 |                |   |
| 2415 | 012224 | 042524 | 052123 | 041454 |                |   |
| 2416 | 012232 | 047514 | 042523 | 051440 |                |   |
| 2417 | 012240 | 044527 | 041524 | 000110 |                |   |
| 2418 | 012246 | 042537 | 042116 | 052040 | ENDTST: .ASCIZ | "*END TEST"                                       |
| 2419 | 012254 | 051505 | 000124 |        |                |   |
| 2420 | 012260 | 020137 | 051105 | 047522 | ECM: .ASCIZ    | "* ERRORS DETECTED: "                             |
| 2421 | 012266 | 031522 | 042040 | 052105 |                |   |
| 2422 | 012274 | 041505 | 042524 | 035104 |                |   |
| 2423 | 012302 | 000040 |        |        |                |   |
| 2424 | 012304 | 006477 | 000012 |        | .QUES: .ASCIZ  | "?"<CR><LF>                                       |
| 2425 | 012310 | 020040 | 020040 | 000    | SPAC4: .ASCIZ  | <40><40><40><40>                                  |
| 2426 | 012315 | 040    | 000    |        | SPACE: .ASCIZ  | <40>  |
| 2427 | 012317 | 015    | 000012 |        | CRLF: .ASCIZ   | <CR><LF>  |
| 2428 |        |        |        |        | .EVEN          |   |
| 2429 |        |        |        |        | .SBTTL         | MONITOR FILES                                     |

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2430
2431
2432
2433 012322
2434 012322 011646
2435 012324 162716 000002
2436 012330 017616 000000
2437 012334 121627 000024
2438 012340 101401
2439 012342 104000
2440 012344 006116
2441 012346 042716 177001
2442 012352 062716 012364
2443 012356 017616 000000
2444 012362 000136
2445
2446 012364
2447
2448 012364 000024
2449
2450 100000
2451 040000
2452 012434
2453 012434 000004 012170
2454 012440 011627
2455 012442 000000
2456 012444 162767 000002 177770
2457 012452 010546
2458 012454 013705 012442
2459 012460 004767 000624
2460 012464 012605
2461 012466 032767 100000 165074
2462 012474 001401
2463 012476 000000
2464 012500
2465 012500 032767 040000 165062
2466 012506 001407
2467 012510 012706 001100
2468 012514 016767 166562 165254
2469 012522 000177 000132
2470 012526 000002
2471 012530 000000
2472 012532 000000
2473 012534 000000
2474
2475
2476 012536 105777 165642
2477 012542 100014
2478 012544 017727 165636
2479 012550 000000
2480 012552 042767 000200 177770
2481 012560 126727 177764 000003
2482 012566 001002
2483 012570 000137 006404
2484 012574 032767 040000 164766
2485 012602 001012

;EMULATOR DECODER ROUTINE
EMTDECODER:
  MOV @R6, -(R6) ; DUPLICATE PC ON STACK
  SUB #2, @R6 ; POINT PC TO EMT INST.
  MOV @R6, @R6 ; MOV EMT INST ONTO STACK
  CMPB @R6, #20. ; TEST THAT CALL IS WITHIN LIMITS
  BLOS EMTOK ; BRANCH IF WITHIN LIMITS
  ERROR
EMTOK:
  ROL @R6 ; EMT ARGUMENT X 2.
  BIC #177001, @R6 ; CLEAR HIGH BYTE
  ADD #EMTAG, @R6 ; FORM ADRS OF ROUTINE ADRS
  MOV @R6, @R6 ; PUT ROUTINE ADRS ON STACK
  JMP @R6 ; JUMP TO ROUTINE
  TAGS FOR EMT CALL
  BEGINNING OF EMT TABLE
EMTAG:
  .BLKW 20. ; RESERVE 16. WORDS FOR ADRS LIST
  HLT SW=BIT15
  LOP SW=BIT14
  T.ERROR:
  TYPE @R6
  MOV @R6, (PC)+ ; SAVE ERROR PC +2
  ETMPO:
  SUB #2, ETMPO ; HERE
  MOV TTY, -(SP) ; CORRECT PC
  MOV @ETMPO, TTY ; SAVE TTY
  JSR PC, PRINTR ; TYPE IN OCTAL
  MOV (SP)+, TTY ; TYPR LEADING ZERO'S
  BIT #HLT SW, SR ; RESTORE TTY
  BEQ ERRLOP ; TEST FOR HALT ON ERROR
  HALT ; BRANCH IF NO HALT
  ; HALT ON ERROR
  ERRLOP:
  BIT #LOPSW, SR ; TEST FOR SCOPE LOOP
  BEQ EXTR1
  MOV #BEGIN, %6 ; REINIT STACK POINTER
  MOV LESS1, %5 ; WD PRIORITY MINUS ONE
  JMP @RETURN
  EXTR1:
  RTI
  ERRCNT: 0
  ERTSTN: 0
  ERFLG: 0 ; ERROR CONTROL FLAG -1=MAP ERROR
;SCOPE LOOP AND CONTROL SUBROUTINE
SCOPEC:
  TSTB @TKS
  BPL SCOPEH
  MOV @TKB, (PC)+
  DTMP:
  BIC #200, DTMP
  CMPB DTMP, #3
  BNE SCOPEH
  JMP @MON1.0
SCOPEH:
  BIT #BIT14, SR ; TEST FOR SCOPE
  BNE SCOPEB ; BRANCH IF SCOPE SELECTED
  
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|      |        |        |        |        |              |                      |                                       |
|------|--------|--------|--------|--------|--------------|----------------------|---------------------------------------|
| 2486 | 012604 | 032767 | 004000 | 164756 | BIT          | #BIT11,SF            | ;TEST FOR ITERATIONS                  |
| 2487 | 012612 | 001015 |        |        | BNE          | SCOPEA               | ;EXIT IF ITERATIONS INHIBITED         |
| 2488 |        |        |        |        |              |                      |                                       |
| 2489 |        |        |        |        |              |                      |                                       |
| 2490 |        |        |        |        |              |                      |                                       |
| 2491 |        |        |        |        |              |                      |                                       |
| 2492 | 012614 | 026767 | 000036 | 000032 | CMP          | SCOPEF,ICOUNT        | ;TEST FOR COMPLETION OF ITERATIONS    |
| 2493 | 012622 | 001407 |        |        | BEQ          | SCOPEG               | ;BRANCH IF COMPLETE                   |
| 2494 | 012624 | 005267 | 000026 |        | INC          | SCOPEF               | ;INCREMENT ITERATION COUNT            |
| 2495 | 012630 | 005726 |        |        | SCOPEB: TST  | (SP)+ ;POP RETURN PC |                                       |
| 2496 | 012632 | 012667 | 165140 |        | MOV          | (SP)+,PS             | ;RESTOR PROCESSOR STATUS              |
| 2497 | 012636 | 000177 | 000016 |        | JMP          | RETURN               |                                       |
| 2498 | 012642 | 011667 | 000012 |        | SCOPEG: MOV  | SP,RETURN            | ;SET UP SCOPE RETURN ADRS             |
| 2499 | 012646 | 005067 | 000004 |        | SCOPEA: CLR  | SCOPEF               | ;CLEAR ITERATION COUNT                |
| 2500 | 012652 | 000002 |        |        | RTI          |                      |                                       |
| 2501 |        |        |        |        |              |                      |                                       |
| 2502 |        |        |        |        |              |                      |                                       |
| 2503 | 012654 | 000001 |        |        | ICOUNT: 1    |                      | ;NUMBER OF REQUESTED ITERATIONS       |
| 2504 | 012656 | 000000 |        |        | SCOPEF: 0    |                      | ;ITERATION COUNT                      |
| 2505 | 012660 | 001334 |        |        | RETURN: TST1 |                      | ;DEFAULT RETURN                       |
| 2506 | 012662 |        |        |        | TSTABLE:     |                      | ;BEGINNING OF TABLE OF TEST ADDRESSES |
| 2507 |        | 012762 |        |        | .=.+100      |                      | ;TEST ADDRESS LIST                    |
| 2508 |        |        |        |        |              |                      |                                       |
| 2509 |        |        |        |        |              |                      |                                       |
| 2510 | 012762 |        |        |        |              |                      | ;ACCEPT OCTAL NUMBER FROM TTY         |
| 2511 | 012762 | 005067 | 000116 |        | T.ACCEPT:    |                      |                                       |
| 2512 | 012766 | 010146 |        |        | CLR          | OCTNUM               | ;CLEAR OCTAL NUMBER LOCATION          |
| 2513 | 012770 | 010046 |        |        | MOV          | R1,-(SP)             | ;SAVE R1                              |
| 2514 | 012772 | 005001 |        |        | MOV          | RO,-(SP)             | ;SAVE RO                              |
| 2515 | 012774 | 104004 |        |        | ACPTO: CLR   | R1                   |                                       |
| 2516 | 012776 | 120027 | 000003 |        | ACPTO.1:     | KEY.TO.RO            | ;FETCH AN ASCII CHAR FROM KEYBOARD    |
| 2517 | 013002 | 001002 |        |        | CMPB         | RO,#3                | ;CONTROL C?                           |
| 2518 | 013004 | 000137 | 006404 |        | BNE          | AO.2                 |                                       |
| 2519 | 013010 | 122700 | 000177 |        | JMP          | MONI.0               |                                       |
| 2520 | 013014 | 001423 |        |        | AO.2: CMPB   | #177,RO              | ;TEST FOR RUBOUT                      |
| 2521 | 013016 | 122700 | 000015 |        | BEQ          | RUBOUT               |                                       |
| 2522 | 013022 | 001423 |        |        | CMPB         | #15,RO               | ;TEST FOR <CR>                        |
| 2523 | 013024 | 120027 | 000040 |        | BEQ          | CARG                 |                                       |
| 2524 | 013030 | 001420 |        |        | CMPB         | RO,#40               | ;EXIT IF SPACE                        |
| 2525 | 013032 | 120027 | 000000 |        | BEQ          | CARG                 |                                       |
| 2526 | 013036 | 002412 |        |        | CMPB         | RO,#0                | ;TEST FOR VALID OCTAL NUMBER          |
| 2527 | 013040 | 120027 | 000067 |        | BLT          | RUBOUT               |                                       |
| 2528 | 013044 | 003007 |        |        | CMPB         | RO,#7                |                                       |
| 2529 | 013046 | 042700 | 177770 |        | BGT          | RUBOUT               |                                       |
| 2530 | 013052 | 006301 |        |        | BIC          | #177770,RO           | ;CONVERT ASCII TO OCTAL               |
| 2531 | 013054 | 006301 |        |        | ASL          | R1                   |                                       |
| 2532 | 013056 | 006301 |        |        | ASL          | R1                   |                                       |
| 2533 | 013060 | 050001 |        |        | ASL          | R1                   |                                       |
| 2534 | 013062 | 000744 |        |        | BIS          | RO,R1                | ;CHALK'M UP                           |
| 2535 |        |        |        |        | BR           | ACPTO.1              | ;FETCH NEXT CHAR                      |
| 2536 | 013064 | 000004 | 012304 |        | RUBOUT: TYPE | .QUES                | ;TYPE?                                |
| 2537 | 013070 | 000740 |        |        | BR           | ACPTO                |                                       |
| 2538 | 013072 | 010167 | 000006 |        | CARG: MOV    | R1,OCTNUM            | ;PLACE OCTAL NUMBER HERE              |
| 2539 | 013076 | 012600 |        |        | MOV          | (SP)+,RO             | ;RESTORE RO                           |
| 2540 | 013100 | 012601 |        |        | MOV          | (SP)+,R1             | ;RESTOR R1                            |
| 2541 | 013102 | 000002 |        |        | RTI          |                      | ;RETURN                               |

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2542 013104 000000 OCTNUM: 0
2543 ;FETCH AN ASCII CHARACTER FROM KEYBOARD
2544
2545 013106 T.KEY.TO.RD:
2546 013106 105777 165272 TSTB @TKS ;TEST FOR DONE
2547 013112 100375 BPL -4 ;WAIT FOR KEYBOARD
2548 013114 117700 165266 MOV @TKB,RO ;FETCH CHAR
2549 013120 117777 165262 165264 MOV @TKB,@TPB ;ECHO
2550 013126 004767 000006 JSR PC,TTYFLG ;WAIT FOR DONE
2551 013132 042700 177600 BIC #177600,RO ;7 BIT ASCII
2552 013136 000002 RTI
2553 ;TEST FOR TRANSMITTER DONE
2554
2555 013140 TTYFLG:
2556 013140 105777 165244 TSTB @TPS
2557 013144 100375 BPL TTYFLG
2558 013146 700207 RTS PC
2559
2560 013150 010567 000112 .IOT: MOV TTY, SAV ;SAVE TTY
2561 013154 032767 020C00 164406 BIT #BIT13,SR ;TEST FOR INHIBIT PRINT
2562 013162 001032 BNE .TERM
2563 013164 017605 000000 MOV @6, TTY ;GET ADDRESS TO BE TYPED
2564 013170 122715 000044 .MORE: CMPB #'$', TTY ;TERMINATOR?
2565 013174 001425 BEQ .TERM
2566 013176 105715 TSTB (TTY) ;TERMINATOR?
2567 013200 001423 BEQ .TERM
2568 013202 122715 000001 CMPB #1, (TTY) ;RESTORE OLD SEQUENCE
2569 013206 001416 BEQ .REST
2570 013210 122715 000137 CMPB #'+', (TTY) ;SET UP CR LF
2571 013214 0C1406 BEQ .CRLF
2572 013216 105777 165166 TSTB @TPS
2573 013222 100375 BPL -4
2574 013224 112577 165162 MOV @((TTY)+, @TPB
2575 013230 000757 BR .MORE
2576 013232 005205 .CRLF: INC TTY
2577 013234 010546 MOV TTY, -(6)
2578 013236 012705 013270 MOV #.CAR, TTY
2579 013242 000752 BR .MORE
2580 013244 012605 .REST: MOV (6)+, TTY
2581 013246 000750 BR .MORE
2582 013250 062716 000002 .TERM: ADD #2, (6)
2583 013254 016705 000006 MOV SAV, TTY
2584 013260 004767 177654 .IOTE: JSR PC, TTYFLG ;WAIT FOR DONE
2585 013264 000002 RTI
2586
2587 013266 000000 .SAV: 0
2588 013270 005015 001 .CAR: .ASCII <CR><LF><1>
2589 013274 000000 .EVEN
2590 013274 000000 .TYPE: 0
2591
2592 013276 000000 000000 000000 PRINT2: .WORD 0,0,0,0
2593 013304 000000 PRINT3: .BYTE 0,0
2594 013306 000 000
2595
2596 013310 112767 000001 177770 PRINTR: MOVB #1, PRINT3 ;SET ZERO FILL SWITCH
2597 013316 000402 BR .+6
  
```

|      |        |        |        |        |                                  |              |  |                                   |
|------|--------|--------|--------|--------|----------------------------------|--------------|--|-----------------------------------|
| 2598 | 013320 | 005067 | 177762 |        | PRINTS: CLR                      | PRINT3       |  | ;SUPRESS LEADING ZERO'S           |
| 2599 | 013324 | 112767 | 177772 | 177755 | MOV                              | #-6,PRINT3+1 |  | ;SET COUNT                        |
| 2600 | 013332 | 032767 | 020000 | 164230 | BIT                              | #BIT13,SR    |  |                                   |
| 2601 | 013340 | 001041 |        |        | BNE                              | PRTE         |  |                                   |
| 2602 | 013342 | 010446 |        |        | MOV                              | %4,-(6)      |  | ;SAVE R4                          |
| 2603 | 013344 | 012704 | 013276 |        | MOV                              | #PRINT2,%4   |  | ;SET POINTER TO FIRST ASCII CHAR. |
| 2604 | 013350 | 105014 |        |        | CLRB                             | (4)          |  | ;CLEAR FIRST BYTE                 |
| 2605 | 013352 | 000405 |        |        | BR                               | PRINTF       |  | ;ROTATE FORST BIT                 |
| 2606 | 013354 | 105014 |        |        | PRINTL: CLRB                     | (4)          |  | ;CLEAR BYTE OF CHARACTER          |
| 2607 | 013356 | 006105 |        |        | ROL                              | TTY          |  | ;ROTATE BIT INTO C                |
| 2608 | 013360 | 106114 |        |        | ROLB                             | (4)          |  | ;PACK IT                          |
| 2609 | 013362 | 006105 |        |        | ROL                              | TTY          |  | ;ROTATE BIT INTO C                |
| 2610 | 013364 | 106114 |        |        | ROLB                             | (4)          |  | ;PACK IT                          |
| 2611 | 013366 | 006105 |        |        | PRINTF: ROL                      | TTY          |  | ;ROTATE BIT INTO C                |
| 2612 | 013370 | 106114 |        |        | ROLB                             | (4)          |  | ;PACK IT                          |
| 2613 | 013372 | 105714 |        |        | TSTB                             | (4)          |  |                                   |
| 2614 | 013374 | 001402 |        |        | BEQ                              | +.6          |  |                                   |
| 2615 | 013376 | 105267 | 177704 |        | INCB                             | PRINT3       |  |                                   |
| 2616 | 013402 | 105767 | 177700 |        | TSTB                             | PRINT3       |  | ;CHECK FILL SWITCH                |
| 2617 | 013406 | 001402 |        |        | BEQ                              | +.6          |  |                                   |
| 2618 | 013410 | 152724 | 000060 |        | BISB                             | #'0,(4)+     |  | ;MAKE INTO ASCII CHAR             |
| 2619 | 013414 | 105267 | 177667 |        | INCB                             | PRINT3+1     |  |                                   |
| 2620 | 013420 | 001355 |        |        | BNE                              | PRINTL       |  | ;REPEAT                           |
| 2621 | 013422 | 022704 | 013276 |        | CMP                              | #PRINT2,%4   |  |                                   |
| 2622 | 013426 | 001002 |        |        | BNE                              | +.6          |  |                                   |
| 2623 | 013430 | 112724 | 000060 |        | MOV                              | #'0,(4)+     |  |                                   |
| 2624 | 013434 | 105014 |        |        | CLRB                             | (4)          |  |                                   |
| 2625 | 013436 | 000004 | 013276 |        | TYPE                             | PRINT2       |  | ;TYPE IT                          |
| 2626 | 013442 | 012604 |        |        | MOV                              | (6)+,%4      |  | ;RESTORE R5                       |
| 2627 | 013444 | 000207 |        |        | PRTE: RTS                        | %7           |  |                                   |
| 2628 |        |        |        |        | ;SAVE REGS 0 TO 4 SUBROUTINE,    |              |  |                                   |
| 2629 | 013446 | 012667 | 000032 |        | ↑.SAVRG: MOV                     | (6)+,SVRPC   |  | ;SAVE PC AND PSW.                 |
| 2630 | 013452 | 012667 | 000030 |        | MOV                              | (6)+,SVRPSW  |  |                                   |
| 2631 | 013456 | 010546 |        |        | MOV                              | %5,-(6)      |  |                                   |
| 2632 | 013460 | 010446 |        |        | MOV                              | %4,-(6)      |  | ;SAVE REGS 0 - 4                  |
| 2633 | 013462 | 010346 |        |        | MOV                              | %3,-(6)      |  | ;IN STACK.                        |
| 2634 | 013464 | 010246 |        |        | MOV                              | %2,-(6)      |  |                                   |
| 2635 | 013466 | 010146 |        |        | MOV                              | %1,-(6)      |  |                                   |
| 2636 | 013470 | 010046 |        |        | MOV                              | %0,-(6)      |  |                                   |
| 2637 | 013472 | 016746 | 000010 |        | MOV                              | SVRPSW,-(6)  |  | ;RESTORE PC AND PSW.              |
| 2638 | 013476 | 016746 | 000002 |        | MOV                              | SVRPC,-(6)   |  |                                   |
| 2639 | 013502 | 000002 |        |        | RTI                              |              |  | ;EXIT.                            |
| 2640 | 013504 | 000000 |        |        | SVRPC: 0                         |              |  |                                   |
| 2641 | 013506 | 000000 |        |        | SVRPSW: 0                        |              |  |                                   |
| 2642 |        |        |        |        | ;RESTORE REGS 0 TO 4 SUBROUTINE. |              |  |                                   |
| 2643 | 013510 | 012667 | 000032 |        | ↑.RSTRG: MOV                     | (6)+,RSTPC   |  | ;SAVE PC AND PSW.                 |
| 2644 | 013514 | 012667 | 000030 |        | MOV                              | (6)+,RSTPSW  |  |                                   |
| 2645 | 013520 | 012600 |        |        | MOV                              | (6)+,%0      |  | ;RESTORE REGS 0 - 4               |
| 2646 | 013522 | 012601 |        |        | MOV                              | (6)+,%1      |  | ;FROM STACK.                      |
| 2647 | 013524 | 012602 |        |        | MOV                              | (6)+,%2      |  |                                   |
| 2648 | 013526 | 012603 |        |        | MOV                              | (6)+,%3      |  |                                   |
| 2649 | 013530 | 012604 |        |        | MOV                              | (6)+,%4      |  |                                   |
| 2650 | 013532 | 012605 |        |        | MOV                              | (6)+,%5      |  |                                   |
| 2651 |        |        |        |        |                                  |              |  |                                   |
| 2652 | 013534 | 016746 | 000010 |        | MOV                              | RSTPSW,-(6)  |  | ;RESTORE PC AND PSW.              |
| 2653 | 013540 | 016746 | 000002 |        | MOV                              | RSTPC,-(6)   |  |                                   |

# K05

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 DBQAAA.P11 MONITOR FILES

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2654
2655 013544 000002          RTI          ;EXIT
2656 013546 000000          RSTPC:  0
2657 013550 000000          RSTPSW: 0
2658
2659          ;POWER FAIL ROUTINE
2660          ;IF SELECTED VERIFY STATUS-IN IS UP
2661          ;AND CE AND DE ARE PRESENTED AS STATUS
2662
2663 013552 104001          PFAIL:  SAVRG
2664 013554 010667 000054          MOV      R6,SAVR6
2665 013560 012767 013570 164236          MOV      #PWRUP,24
2666 013556 000000          HALT
2667          ;POWER UP ROUTINE
2668 013570 000240          PWRUP:  NOP          ;PATCH ANYONE?
2669 013572 016706 000036          MOV      SAVR6,R6
2670 013576 104002          RSTRG
2671 013600 012767 013552 164216          MOV      #PFAIL,24 ;RESTORE POWER FAIL VECTOR
2672 013606 005027          CLP      (PC)+
2673 013610 000000          0
2674 013612 005367 177772          DEC      .-2
2675 013616 001375          BNE      .-4
2676 013620 000004 013636          TYPE      PFLD
2677 013624 012667 164146          MOV      (SP)+,PS
2678 013630 000177 177024          JMP      @RETURN
2679 013634 000000          SAVRE . 0
2680 013636 050137 053517 051105          PFLD:  .ASCIZ  "+POWER FAILED+"
2681 013644 043040 044501 042514
2682 013652 057504 000
2683          .EVEN
2684
2685          .END
000001
  
```





# N05

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 DBQAAA.P11 CROSS REFERENCE TABLE -- USER SYMBOLS

|          |        |       |       |       |       |       |       |       |       |       |       |       |       |       |
|----------|--------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| H2200    | 007572 | 2085  | 2087* |       |       |       |       |       |       |       |       |       |       |       |
| H250     | 007732 | 2102  | 2115* |       |       |       |       |       |       |       |       |       |       |       |
| H260     | 010012 | 2116  | 2129* |       |       |       |       |       |       |       |       |       |       |       |
| ICOUNT   | 012654 | 921*  | 968*  | 1001* | 1037* | 1057* | 1115* | 1188* | 1226* | 1254* | 1276* | 1314* | 1367* | 1409* |
|          |        | 1468* | 1510* | 1564* | 1595* | 1679* | 1735* | 1807* | 1820* | 1874* | 2493  | 2503* |       |       |
| INTTST   | 004162 | 1423  | 1440* |       |       |       |       |       |       |       |       |       |       |       |
| KEY.T0=  | 104004 | 803*  | 1903  | 2026  | 2168  | 2515  |       |       |       |       |       |       |       |       |
| LESS1    | 001302 | 901*  | 975   | 1012  | 1025  | 1121  | 1140  | 1424  | 1699  | 1967* | 2045* | 2280  | 2468  |       |
| LEVEL0=  | 000000 | 777*  |       |       |       |       |       |       |       |       |       |       |       |       |
| LEVEL1=  | 000040 | 778*  |       |       |       |       |       |       |       |       |       |       |       |       |
| LEVEL2=  | 000100 | 779*  |       |       |       |       |       |       |       |       |       |       |       |       |
| LEVEL3=  | 000140 | 780*  |       |       |       |       |       |       |       |       |       |       |       |       |
| LEVEL4=  | 000200 | 781*  |       |       |       |       |       |       |       |       |       |       |       |       |
| LEVEL5=  | 000240 | 782*  | 2045  |       |       |       |       |       |       |       |       |       |       |       |
| LEVEL6=  | 000300 | 783*  | 891   | 2044  |       |       |       |       |       |       |       |       |       |       |
| LEVEL7=  | 000340 | 784*  | 809   | 812   | 815   | 818   | 826   | 838   | 946   | 992   | 1018  | 1067  | 1160  | 1453  |
|          |        | 1722  | 1778  | 1844  | 1893  | 2289  |       |       |       |       |       |       |       |       |
| LF =     | 000012 | 795*  | 2296* | 2424  | 2427  | 2588  |       |       |       |       |       |       |       |       |
| LKTEST   | 001360 | 927*  |       |       |       |       |       |       |       |       |       |       |       |       |
| LK1      | 001372 | 931*  |       |       |       |       |       |       |       |       |       |       |       |       |
| LK10     | 002752 | 1196* |       |       |       |       |       |       |       |       |       |       |       |       |
| LK10A    | 003042 | 1212* | 1216  |       |       |       |       |       |       |       |       |       |       |       |
| LK10B    | 003036 | 1211* | 1219  |       |       |       |       |       |       |       |       |       |       |       |
| LK11     | 003114 | 1232* |       |       |       |       |       |       |       |       |       |       |       |       |
| LK12     | 003206 | 1260* |       |       |       |       |       |       |       |       |       |       |       |       |
| LK12A    | 003224 | 1264* | 1269  |       |       |       |       |       |       |       |       |       |       |       |
| LK2      | 001402 | 935*  |       |       |       |       |       |       |       |       |       |       |       |       |
| LK2A     | 001410 | 937*  | 940   |       |       |       |       |       |       |       |       |       |       |       |
| LK3      | 001424 | 938*  | 943*  |       |       |       |       |       |       |       |       |       |       |       |
| LK4      | 001464 | 952*  |       |       |       |       |       |       |       |       |       |       |       |       |
| LK5      | 001554 | 974*  |       |       |       |       |       |       |       |       |       |       |       |       |
| LK5A     | 001620 | 982*  | 983   |       |       |       |       |       |       |       |       |       |       |       |
| LK5B     | 001630 | 976*  | 986*  |       |       |       |       |       |       |       |       |       |       |       |
| LK5.1    | 001670 | 991*  | 994*  |       |       |       |       |       |       |       |       |       |       |       |
| LK6      | 001716 | 985*  | 1007* |       |       |       |       |       |       |       |       |       |       |       |
| LK6A     | 001764 | 1011  | 1016* | 1021  |       |       |       |       |       |       |       |       |       |       |
| LK6.1    | 002060 | 1028  | 1030* |       |       |       |       |       |       |       |       |       |       |       |
| LK7      | 002106 | 1043* |       |       |       |       |       |       |       |       |       |       |       |       |
| LK8      | 002162 | 1065* |       |       |       |       |       |       |       |       |       |       |       |       |
| LK8A     | 002224 | 1075* | 1080  |       |       |       |       |       |       |       |       |       |       |       |
| LK8B     | 002240 | 1076* | 1079* |       |       |       |       |       |       |       |       |       |       |       |
| LK8C     | 002300 | 1090* | 1095  |       |       |       |       |       |       |       |       |       |       |       |
| LK8D     | 002314 | 1091* | 1094* |       |       |       |       |       |       |       |       |       |       |       |
| LK8E     | 002356 | 1099  | 1102  | 1105  | 1108* |       |       |       |       |       |       |       |       |       |
| LK9      | 002404 | 1121* |       |       |       |       |       |       |       |       |       |       |       |       |
| LK9B     | 002500 | 1123  | 1137* |       |       |       |       |       |       |       |       |       |       |       |
| LK9C     | 002512 | 1136  | 1140* |       |       |       |       |       |       |       |       |       |       |       |
| LK9E     | 002606 | 1142  | 1156* |       |       |       |       |       |       |       |       |       |       |       |
| LK9F     | 002620 | 1155  | 1159* |       |       |       |       |       |       |       |       |       |       |       |
| LK9G     | 002724 | 1172  | 1175  | 1178  | 1181* |       |       |       |       |       |       |       |       |       |
| LOCTRP   | 001312 | 905*  | 1842* | 1856* | 1857  |       |       |       |       |       |       |       |       |       |
| LODAD    | 007442 | 2047  | 2059  | 2061* |       |       |       |       |       |       |       |       |       |       |
| LODIV    | 007406 | 2049  | 2053* |       |       |       |       |       |       |       |       |       |       |       |
| LODMSC   | 007464 | 2051  | 2066* |       |       |       |       |       |       |       |       |       |       |       |
| LOPSW =  | 040000 | 2451* | 2465  |       |       |       |       |       |       |       |       |       |       |       |
| MINCLK = | 000010 | 855*  | 1235  | 2206  | 2208  | 2212  | 2215  | 2219  |       |       |       |       |       |       |







# E06

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 DBQAAA.P11 CROSS REFERENCE TABLE -- USER SYMBOLS

|         |        |       |       |       |       |       |       |       |       |       |       |       |       |       |  |
|---------|--------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|--|
| TIMOUT  | 001270 | 896#  | 1547  | 1588  | 1769  | 1975* | 2066* | 2147  |       |       |       |       |       |       |  |
| TIMRUN  | 001262 | 893#  | 1134  | 1153  |       |       |       |       |       |       |       |       |       |       |  |
| TKB     | 000406 | 789#  | 2478  | 2548  | 2549  |       |       |       |       |       |       |       |       |       |  |
| TKS     | 000404 | 788#  | 2476  | 2546  |       |       |       |       |       |       |       |       |       |       |  |
| THINCLK | 003124 | 1235# | 1241  |       |       |       |       |       |       |       |       |       |       |       |  |
| T00SN = | 000040 | 848#  | 1354  | 1357  | 1358  | 1445  | 1448  | 1449  | 1574  | 1583  |       |       |       |       |  |
| TPB     | 000412 | 791#  | 2549* | 2574* |       |       |       |       |       |       |       |       |       |       |  |
| TPS     | 000410 | 790#  | 2556  | 2572  |       |       |       |       |       |       |       |       |       |       |  |
| TRANST  | 001314 | 906#  | 1786  |       |       |       |       |       |       |       |       |       |       |       |  |
| TRIGGER | 001272 | 897#  | 1539  | 1542  | 1580  | 1644  | 1763  | 1980* | 2067* | 2157* |       |       |       |       |  |
| TSTABL  | 012662 | 914   | 2038  | 2040  | 2506# |       |       |       |       |       |       |       |       |       |  |
| TST1    | 001334 | 920#  | 925   | 2505  |       |       |       |       |       |       |       |       |       |       |  |
| TST10   | 003070 | 1225# | 1230  |       |       |       |       |       |       |       |       |       |       |       |  |
| TST11   | 003162 | 1253# | 1258  |       |       |       |       |       |       |       |       |       |       |       |  |
| TST12   | 003242 | 1275# | 1280  |       |       |       |       |       |       |       |       |       |       |       |  |
| TST13   | 003404 | 1313# | 1318  |       |       |       |       |       |       |       |       |       |       |       |  |
| TST14   | 003636 | 1366# | 1371  |       |       |       |       |       |       |       |       |       |       |       |  |
| TST15   | 004022 | 1408# | 1413  |       |       |       |       |       |       |       |       |       |       |       |  |
| TST16   | 004274 | 1467# | 1472  |       |       |       |       |       |       |       |       |       |       |       |  |
| TST17   | 004452 | 1509# | 1514  |       |       |       |       |       |       |       |       |       |       |       |  |
| TST2    | 001530 | 967#  | 972   |       |       |       |       |       |       |       |       |       |       |       |  |
| TST20   | 004674 | 1563# | 1568  |       |       |       |       |       |       |       |       |       |       |       |  |
| TST21   | 005014 | 1594# | 1599  |       |       |       |       |       |       |       |       |       |       |       |  |
| TST22   | 005332 | 1678# | 1683  |       |       |       |       |       |       |       |       |       |       |       |  |
| TST23   | 005552 | 1734# | 1739  |       |       |       |       |       |       |       |       |       |       |       |  |
| TST24   | 006046 | 1806# | 1811  |       |       |       |       |       |       |       |       |       |       |       |  |
| TST25   | 006102 | 1819# | 1824  |       |       |       |       |       |       |       |       |       |       |       |  |
| TST26   | 006312 | 1873# | 1878  |       |       |       |       |       |       |       |       |       |       |       |  |
| TST3    | 001672 | 1000# | 1005  |       |       |       |       |       |       |       |       |       |       |       |  |
| TST4    | 002062 | 1036# | 1041  |       |       |       |       |       |       |       |       |       |       |       |  |
| TST5    | 002136 | 1056# | 1061  |       |       |       |       |       |       |       |       |       |       |       |  |
| TST6    | 002360 | 1114# | 1119  |       |       |       |       |       |       |       |       |       |       |       |  |
| TST7    | 002726 | 1187# | 1192  |       |       |       |       |       |       |       |       |       |       |       |  |
| TTRIG   | 001300 | 900#  | 2147* | 2149  | 2153* | 2154  |       |       |       |       |       |       |       |       |  |
| TTY =   | 000005 | 766#  | 2457  | 2458* | 2460* | 2560  | 2563* | 2564  | 2566  | 2568  | 2570  | 2574  | 2576* | 2577  |  |
| TTYFLG  | 013140 | 2578# | 2580* | 2583* | 2607* | 2609* | 26.1* |       |       |       |       |       |       |       |  |
| TYPE =  | 000004 | 2550  | 2555# | 2557  | 2584  |       |       |       |       |       |       |       |       |       |  |
|         |        | 771#  | 1217  | 1267  | 1812  | 1879  | 1894  | 1896  | 1902  | 1915  | 1928  | 1937  | 1947  | 1955  |  |
|         |        | 1971  | 1976  | 1981  | 2017  | 2025  | 2193  | 2287  | 2453  | 2536  | 2625  | 2676  |       |       |  |
| T.ACCE  | 012762 | 802   | 2510# |       |       |       |       |       |       |       |       |       |       |       |  |
| T.ERR0  | 012434 | 799   | 2452# |       |       |       |       |       |       |       |       |       |       |       |  |
| T.KEY.  | 013106 | 803   | 2545# |       |       |       |       |       |       |       |       |       |       |       |  |
| T.RSTR  | 013510 | 801   | 2643# |       |       |       |       |       |       |       |       |       |       |       |  |
| T.SAVR  | 013446 | 800   | 2629# |       |       |       |       |       |       |       |       |       |       |       |  |
| T.I     | 007532 | 2078# | 2079  | 2082  |       |       |       |       |       |       |       |       |       |       |  |
| VOID    | 001206 | 866#  | 2062* | 2258* |       |       |       |       |       |       |       |       |       |       |  |
| WDAD0R  | 010576 | 1945  | 2256# |       |       |       |       |       |       |       |       |       |       |       |  |
| WDBASE  | 001306 | 903#  | 1944* | 2058  | 2256  | 2257* | 2258  | 2259* | 2260  | 2261* | 2262  |       |       |       |  |
| WDCSR   | 001210 | 867#  | 1286# | 1287  | 1324* | 1354  | 1357* | 1358  | 1377* | 1378  | 1381* | 1382  | 1386* | 1387  |  |
|         |        | 1390* | 1391  | 1395* | 1396  | 1399* | 1400  | 1419* | 1425  | 1428* | 1442  | 1445  | 1448* | 1449  |  |
|         |        | 1456* | 1477* | 1519* | 1520  | 1523* | 1528  | 1531* | 1534  | 1543* | 1548  | 1573* | 1574  | 1583  |  |
|         |        | 1614* | 1615  | 1618  | 1621* | 1622  | 1645  | 1652  | 1654  | 1661  | 1665  | 1668* | 1696* | 1700  |  |
|         |        | 1703* | 1704* | 1715  | 1718  | 1724* | 1752* | 1753  | 1756* | 1764  | 1767* | 1772* | 1773  | 1776* |  |
|         |        | 1792  | 1796* | 1837* | 1838  | 1841* | 1849* | 2063* | 2260* |       |       |       |       |       |  |
| WDDAT   | 001212 | 868#  | 1235  | 1293* | 1294  | 1297  | 1300* | 1301  | 1304  | 1325* | 1326  | 1329  | 1332* | 1333  |  |
|         |        | 1336  | 1340* | 1341  | 1344  | 1347* | 1348  | 1351  | 1429* | 1430* | 1431* | 1433* | 1478* | 1479  |  |







|      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |
|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|
| ADD  | 1100 | 1173 | 2039 | 2187 | 2188 | 2205 | 2249 | 2257 | 2259 | 2261 | 2268 | 2270 | 2272 | 2442 | 2582 |
| ASL  | 1959 | 1960 | 1961 | 1962 | 1963 | 2037 | 2183 | 2185 | 2186 | 2233 | 2234 | 2247 | 2248 | 2530 | 2531 |
| ASR  | 2532 |      |      |      |      |      |      |      |      |      |      |      |      |      |      |
| BEQ  | 2250 | 2251 |      |      |      |      |      |      |      |      |      |      |      |      |      |
|      | 828  | 835  | 928  | 958  | 1022 | 1026 | 1099 | 1102 | 1105 | 1172 | 1175 | 1178 | 1291 | 1302 | 1334 |
|      | 1349 | 1359 | 1383 | 1392 | 1401 | 1426 | 1450 | 1480 | 1494 | 1521 | 1535 | 1549 | 1575 | 1584 | 1616 |
|      | 1619 | 1630 | 1638 | 1648 | 1655 | 1666 | 1701 | 1754 | 1774 | 1793 | 1839 | 1858 | 1912 | 1934 | 1943 |
|      | 1950 | 1958 | 1974 | 1979 | 1984 | 2010 | 2020 | 2096 | 2110 | 2124 | 2130 | 2139 | 2155 | 2173 | 2175 |
|      | 2177 | 2211 | 2213 | 2216 | 2218 | 2238 | 2252 | 2466 | 2494 | 2520 | 2522 | 2524 | 2565 | 2567 | 2569 |
| BGE  | 2571 | 2614 | 2617 |      |      |      |      |      |      |      |      |      |      |      |      |
| BGT  | 2091 | 2105 | 2114 | 2134 |      |      |      |      |      |      |      |      |      |      |      |
| BIC  | 2181 | 2528 |      |      |      |      |      |      |      |      |      |      |      |      |      |
|      | 1135 | 1154 | 1209 | 1300 | 1332 | 1347 | 1357 | 1381 | 1390 | 1399 | 1430 | 1433 | 1448 | 1456 | 1525 |
|      | 1531 | 1545 | 1578 | 1582 | 1628 | 1636 | 1668 | 1706 | 1724 | 1758 | 1767 | 1796 | 1846 | 1849 | 1966 |
|      | 2080 | 2182 | 2276 | 2286 | 2292 | 2441 | 2480 | 2529 | 2551 |      |      |      |      |      |      |
| BIS  | 1293 | 1325 | 1340 | 1377 | 1386 | 1395 | 1428 | 1429 | 1431 | 1523 | 1524 | 1543 | 1544 | 1577 | 1581 |
|      | 1621 | 1632 | 1703 | 1704 | 1705 | 1756 | 1757 | 1776 | 1841 | 1845 | 2275 | 2282 | 2533 |      |      |
| BISB | 2618 |      |      |      |      |      |      |      |      |      |      |      |      |      |      |
| BIT  | 834  | 927  | 948  | 957  | 1235 | 1294 | 1297 | 1301 | 1304 | 1326 | 1329 | 1333 | 1336 | 1341 | 1344 |
|      | 1348 | 1351 | 1354 | 1358 | 1378 | 1382 | 1387 | 1391 | 1396 | 1400 | 1425 | 1445 | 1449 | 1479 | 1482 |
|      | 1486 | 1489 | 1493 | 1496 | 1520 | 1528 | 1534 | 1548 | 1574 | 1583 | 1615 | 1622 | 1633 | 1637 | 1652 |
|      | 1654 | 1661 | 1665 | 1700 | 1718 | 1753 | 1764 | 1773 | 1792 | 1838 | 2078 | 2206 | 2208 | 2212 | 2215 |
|      | 2219 | 2461 | 2465 | 2484 | 2486 | 2561 | 2600 |      |      |      |      |      |      |      |      |
| BLOS | 2438 |      |      |      |      |      |      |      |      |      |      |      |      |      |      |
| BLT  | 2179 | 2526 |      |      |      |      |      |      |      |      |      |      |      |      |      |
| BMI  | 932  | 938  | 989  | 1049 | 1443 | 1716 | 2232 |      |      |      |      |      |      |      |      |
| BNE  | 832  | 940  | 949  | 983  | 1080 | 1095 | 1166 | 1169 | 1216 | 1219 | 1236 | 1241 | 1243 | 1246 | 1269 |
|      | 1295 | 1298 | 1305 | 1327 | 1330 | 1337 | 1342 | 1345 | 1352 | 1355 | 1379 | 1388 | 1397 | 1437 | 1446 |
|      | 1461 | 1483 | 1487 | 1490 | 1497 | 1503 | 1529 | 1555 | 1623 | 1634 | 1653 | 1662 | 1672 | 1710 | 1719 |
|      | 1728 | 1765 | 1800 | 1853 | 1867 | 1905 | 1909 | 1914 | 1986 | 1992 | 1998 | 2004 | 2028 | 2034 | 2062 |
|      | 2085 | 2088 | 2102 | 2116 | 2150 | 2170 | 2207 | 2209 | 2220 | 2226 | 2229 | 2245 | 2285 | 2482 | 2485 |
|      | 2487 | 2517 | 2562 | 2601 | 2620 | 2622 | 2675 |      |      |      |      |      |      |      |      |
| BPL  | 945  | 954  | 961  | 979  | 1010 | 1045 | 1070 | 1073 | 1076 | 1085 | 1088 | 1091 | 1127 | 1130 | 1146 |
|      | 1149 | 1214 | 1263 | 1420 | 2079 | 2097 | 2111 | 2125 | 2140 | 2156 | 2190 | 2239 | 2477 | 2547 | 2557 |
|      | 2573 |      |      |      |      |      |      |      |      |      |      |      |      |      |      |
| BR   | 985  | 1136 | 1155 | 1238 | 1439 | 1712 | 1855 | 1907 | 1918 | 1990 | 1996 | 2002 | 2008 | 2015 | 2086 |
|      | 2130 | 2114 | 2128 | 2143 | 2192 | 2194 | 2214 | 2221 | 2283 | 2534 | 2537 | 2575 | 2579 | 2581 | 2597 |
|      | 2605 |      |      |      |      |      |      |      |      |      |      |      |      |      |      |
| CLR  | 935  | 936  | 943  | 952  | 956  | 977  | 981  | 1008 | 1043 | 1046 | 1065 | 1066 | 1068 | 1071 | 1074 |
|      | 1078 | 1081 | 1082 | 1083 | 1086 | 1089 | 1093 | 1122 | 1125 | 1128 | 1141 | 1144 | 1147 | 1159 | 1212 |
|      | 1232 | 1233 | 1261 | 1286 | 1324 | 1419 | 1435 | 1457 | 1477 | 1478 | 1500 | 1519 | 1552 | 1573 | 1614 |
|      | 1625 | 1669 | 1696 | 1708 | 1725 | 1752 | 1772 | 1797 | 1837 | 1842 | 1850 | 1864 | 2024 | 2089 | 2103 |
|      | 2117 | 2132 | 2148 | 2163 | 2166 | 2227 | 2500 | 2511 | 2514 | 2598 | 2672 |      |      |      |      |
| CLRB | 2604 | 2606 | 2624 |      |      |      |      |      |      |      |      |      |      |      |      |
| CMP  | 1021 | 1025 | 1098 | 1101 | 1104 | 1165 | 1168 | 1171 | 1174 | 1177 | 1857 | 1985 | 1991 | 1997 | 2003 |
|      | 2009 | 2084 | 2087 | 2090 | 2101 | 2104 | 2115 | 2118 | 2129 | 2133 | 2149 | 2189 | 2225 | 2228 | 2231 |
|      | 2244 | 2493 | 2621 |      |      |      |      |      |      |      |      |      |      |      |      |
| CMPB | 1290 | 1618 | 1629 | 1647 | 1904 | 1908 | 1911 | 1913 | 2027 | 2169 | 2172 | 2174 | 2176 | 2178 | 2180 |
|      | 2437 | 2481 | 2516 | 2519 | 2521 | 2523 | 2525 | 2527 | 2564 | 2568 | 2570 |      |      |      |      |
| DEC  | 831  | 1460 | 1502 | 1554 | 1671 | 1727 | 1799 | 1852 | 1866 | 1965 | 2081 | 2210 | 2217 | 2674 |      |
| EMT  | 799  | 800  | 801  | 802  | 803  |      |      |      |      |      |      |      |      |      |      |
| HALT | 608  | 609  | 611  | 613  | 615  | 617  | 619  | 621  | 623  | 625  | 627  | 629  | 631  | 633  | 635  |
|      | 637  | 639  | 641  | 643  | 645  | 647  | 649  | 651  | 653  | 655  | 657  | 659  | 661  | 663  | 665  |
|      | 667  | 669  | 671  | 673  | 675  | 677  | 679  | 681  | 683  | 685  | 687  | 689  | 691  | 693  | 695  |
|      | 697  | 699  | 701  | 703  | 705  | 707  | 709  | 711  | 713  | 715  | 717  | 719  | 721  | 723  | 725  |
|      | 727  | 729  | 731  | 733  | 735  | 737  | 2463 | 2666 |      |      |      |      |      |      |      |



|        |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |
|--------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|
| .EVEN  | 1924 | 2428 | 2589 | 2683 |      |      |      |      |      |      |      |      |      |      |      |
| .LIST  | 1    | 562  | 597  | 796  | 799  | 800  | 801  | 802  | 803  | 914  | 917  | 925  | 964  | 972  | 997  |
|        | 1005 | 1033 | 1041 | 1053 | 1061 | 1111 | 1119 | 1184 | 1192 | 1222 | 1230 | 1250 | 1258 | 1272 | 1280 |
|        | 1310 | 1318 | 1363 | 1371 | 1405 | 1413 | 1464 | 1472 | 1506 | 1514 | 1560 | 1568 | 1591 | 1599 | 1675 |
| .MACRO | 1623 | 1731 | 1739 | 1803 | 1811 | 1816 | 1824 | 1870 | 1878 |      |      |      |      |      |      |
|        | 1    | 563  | 564  | 565  | 566  | 568  | 571  | 573  | 575  | 578  | 579  | 591  | 583  | 584  | 585  |
| .MLIST | 587  | 588  | 589  | 593  | 594  | 595  | 597  |      |      |      |      |      |      |      |      |
|        | 1    | 562  | 597  | 796  | 799  | 800  | 801  | 802  | 803  | 914  | 917  | 925  | 964  | 972  | 997  |
|        | 1005 | 1033 | 1041 | 1053 | 1061 | 1111 | 1119 | 1184 | 1192 | 1222 | 1230 | 1250 | 1258 | 1272 | 1280 |
|        | 1310 | 1318 | 1363 | 1371 | 1405 | 1413 | 1464 | 1472 | 1506 | 1514 | 1560 | 1568 | 1591 | 1599 | 1675 |
| .PAGE  | 1683 | 1731 | 1739 | 1803 | 1811 | 1816 | 1824 | 1870 | 1878 |      |      |      |      |      |      |
|        | 917  | 964  | 997  | 1033 | 1053 | 1111 | 1184 | 1222 | 1250 | 1272 | 1310 | 1363 | 1405 | 1464 | 1506 |
|        | 1560 | 1591 | 1675 | 1731 | 1803 | 1816 | 1870 |      |      |      |      |      |      |      |      |
| .REM   | 1    | 599  |      |      |      |      |      |      |      |      |      |      |      |      |      |
| .REPT  | 610  |      |      |      |      |      |      |      |      |      |      |      |      |      |      |
| .SBTTL | 917  | 964  | 997  | 1033 | 1053 | 1111 | 1184 | 1222 | 1250 | 1272 | 1310 | 1363 | 1405 | 1464 | 1506 |
|        | 1560 | 1591 | 1675 | 1731 | 1803 | 1816 | 1870 | 1883 | 2295 | 2429 |      |      |      |      |      |
| .WORD  | 2592 |      |      |      |      |      |      |      |      |      |      |      |      |      |      |

ERRORS DETECTED: 0  
 DEFAULT GLOBALS GENERATED: 0

\*.DBQAAA.SEG/SOL/CRF/NL:TOC/PAGNUM/DS:ERFZ=SYSMAC.CO,DBQAAA.P11  
 RUN-TIME: 32 41 4 SECONDS  
 RUN-TIME RATIO: 187/78=2.3  
 CORE USED: 41K (81 PAGES)

