IDENTIFICATION

MEMDATA

Product Code:	MAINDEC-12-DIEA-D
Product Name:	FLOAT 1'S & Ø'S THROUGH MEMORY
Date Created:	September 23, 1969
Maintainer:	Diagnostic Group
Author:	James Kelly

1. ABSTRACT

This memory exerciser floats a word with a single bit set followed by a word with a single bit cleared thru each memory address. In bank Ø all memory locations not reserved for the program itself i.e., from address Ø24Ø to 7777 are tested. In extended memory all addresses ØØØØ to 7777 inclusive are tested. In general the algorithm for testing is as follows: Set the accumulator to 4ØØØ;rotate the number right 4Ø96 times. At the conclusion, test to see if the accumulator is 4ØØØ. This test ascertains that each core in all tested locations can store a one, and that relatively rapid access to each memory location does not disturb its contents.

The second major test is to set the accumulator 3777 I.E., all but one bit set to ones, and then rotating this number thru each memory location 4Ø96 times prior to testing - any detected errors will be indicated by either a message type out or an error halt.

2. MACHINE REQUIREMENTS

a. A standard PDP-5, 8 8/S, 8I, 8L, 12 or Linc-8.
b. An ASR-33 teletype or equivalent.
c. If the PDP-5 being tested has extended memory, the CIF and CDF instructions must be compatible with the PDP-8.

2.2 Preliminary Programs

All basic instruction and memory diagnostics must have been successfully run prior to attempting to run (FLOAT 1's & Ø's TEST)

3. LOADING PROCEDURES

3.1 Method

This program must be loaded with the binary loader. If you are unfamiliar with the proper binary loading procedures, refer to the User Handbook for your computer, or appendix " A " of this write up.

a. Set the teletype reader switch to FREE.
b. Open the teletype reader andinsert the program tape so that the arrows on the tape are visible to, and pointing toward the operator.
c. Close the reader and set the reader switch to START.
d. Set the teletype from panel switch to ON-LINE.
e. Set the LEFT switches to 7777.
f. Set the RIGHT switches to 4000.
g. Set the MODE switch to 8 mode.
h. Depress I/O preset.
i. Depress START LS.
j. When the program tape has been read in, the computer will halt.
k. The ACCUMULATOR must be equal to 0000; if it is not, an error has occurred and one might try reloading the binary loader.

4 STARTING PROCEDURE

a. Remove the paper tape from the teletype reader.
b. Set the three right most switches SR9, 10, 11 to the number of the memory bank you wish to test. In a basic machine with no extended memory, this would be 000.
c. Set the MODE switch to 8 mode.
d. Depress I/O preset.
e. Depress START 20.
f. The program, when properly running, will cause the AC to flicker, and the MA to count up. One pass will take approximately 1Ø min.

4.1 Switch Settings

In general, switches 0, 1, 2 allow the test engineer to select the mode of error indication, I.E.,type out or error halt. The normal mode with switches 0, 1, 2 on a zero is an error halt. To modify these circumstances procede as follows:

SR00 = 1 Suppress halt
SR01 = 1 Suppress typing
SR02 = 1 Scope Loop on error

These designated switches have an order of precedence associated with them, which is designed for maximum flexibility.

In the event of an error, the first switch to be tested is switch 0; if it is 0 the computer will halt at address 0063. Depress continue to check switch 1 and obtain printout. If it is a 1, I.E., suppress halt, we test switch 1. If switch 1 is 0 the following "typical" error message will ensue:

FLOAT I/O
ADDR DATA
Ø241 6ØØØ

This message is interpreted as follows:

1) The "ADDR" address of the memory location under test. Indicates which memory address was being tested when the failure was detected.

2) "DATA" indicate the data in this memory location the correct data for the Float 1 test is 4ØØØ the correct data for Float Ø test is 3777.

APPENDIX A

PDP-8 MODE PERFORATED-TAPE LOADER

READIN MODE LOADER

The readin mode (RIM) loader is a minimum length, basic, perforated-tape program for the 33 ASR. It is initially stored in memory by manual use of the operator console keys and switches. The loader is permanently stored in 18 locations of page 37.

The RIM loader can only be used in conjuction with the 33ASR reader (not the high-speed perforated-tape reader). Because a tape in RIM format is, in effect, twice as long as it need be, it is suggested that the RIM loader be used only to read the binary loader when using the 33 ASR. (NOTE: Some PDP-12 diagnostic program tapes are in RIM format).

The complete PDP-12 RIM loader (SA=7756 is as follows:

Absolute Address	Octal Content	Tag	Instruction I Z	Comments
7756	6032	BEG,	KCC	/CLEAR AC AND FLAG
7757	6031		KSF	/SKIP IF FLAG=1
7760	5357		JMP-1	/LOOKING FOR CHARACT
7761,	6036		KRB	/READ BUFFER
7762,	7106		CLL RTL	
7763,	7006		RTL	/CHANNEL 8 IN AC0
7764,	7510		SPA	/CHECKING FOR LEADER
7765,	5357		JMP BEG+1	/FOUND LEADER
7766,	7006		RTL	/OK, CHANNEL 7 IN LINK
7767,	6031		KSF	
7770,	5367		JMP-1	
7771,	6034		KRS	/READ, DO NOT CLEAR
7772,	7420		SNL	/CHECKING FOR ADDRESS
7773,	3776		DCA 1 TEMP	/STORE CONTENT
7774,	3376		DCA TEMP	/STORE ADDRESS
7775,	5356		JMP BEG	/NEXT WORD
7776,	0	TEMP,	0	/TEMP STORAGE
7777,	5XXX		JMP X	/JMP START OF BIN LOADER

Placing the RIM loader in core memory by way of the operator console keys ans switches is accomplished as follows:

a. Set the starting address 7756 in the LEFT switches.
b. Set the first instruction (6032) in the RIGHT swtiches.
c. Press the FILL switch.
d. Set the next instruction (6031) in the RIGHT switches.
e. Press the FILL STEP switch.
f. Repeat steps d and e until all 16 instructions have been deposited.

To lead a tape in RIM format, place the tape in the reader, set the LEFT switches to the starting address 7756 of the RIM loader (not of the program being read), press the START LS key, and start the Teletype reader.

sam

Maindec-D1EA


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                    /FLOAT 1'S AND 0'S
                    /COPYRIGHT 1969, DIGITAL EQUIPMENT CORP., MAYNARD, MASS.

                    /THIS CORE MEMORY EXERCISER IS FULLY COMPATIBLE WITH A FAMILY
                    /OF 8 COMPUTERS INCLUDING  PDP-5, 8, 8I, 8L, 8S, 12 AND LINC-8

                    /SR00=1 INHIBIT ERROR HALT
                    /SR01=1 INHIBIT TYPEOUT
                    /SR02=1 SCOPE LOOP ON ERROR

                    /THIS MEMORY EXERCISER EVALUATES THE ENTIRE CORE MEMORY
                    /FROM ADDRESS 0240 TO 7777 IN BANK0 AND ALL ADDRESSES IN
                    /EXTENDED MEMORY FOR THE TENDENCY TO PICK UP OR DROP BITS
                    /THE TEST FOR DROPPING BITS IS PERFORMED BY ROTATING A
                    /SINGLE 1 BIT THRU EACH MEMORY ADDRESS 4096 TIMES AND
                    /TESTING THE RESULT.  THE TEST FOR PICKING UP BITS IS PERFORMED
                    /BY FLOATING A SINGLE 0 BIT THRU EACH MEMORY ADDRESS
                    /4096 TIMES AND TESTING THE RESULT.
                    /
                    /TO ENSURE MAXIMUM TEST TIME AND MINIMUM BIT FIDDLING
                    /TIME THE DATA IS ONLY TESTED AT THE CONCLUSION OF
                    /THE TEST FOR EACH ADDRESS RATHER THAN AFTER EACH ROTATE.

                    /TO TEST ANY OR ALL EXTENDED MEMORY SET SWITCHES 9, 10, 11
                    /TO THE EXTENDED BANK NUMBER.

                    /       SR09=EXTENDED MEMORY
                    /       SR10=EXTENDED MEMORY
                    /       SR11=EXTENDED MEMORY

          0001      *1
0001      0070      K0070,  0070                    /EXTENDED MEMORY MASK
0002      0000      REGA,   0000                    /GENERAL STORAGE REGISTER
0003      6201      K6201,  6201                    /CHANGE DATA FIELDS
0004      0240      K0240,  0240                    /BOTTOM OF TEST
0005      0000      TALLY,  0000
0006      7774      K7774,  7774
0007      1026      K1026,  1026

          0010      *10

0010      0000      AUTO10, 0000
0011      0000      DONYET, 0000
0012      0157      MESSA,  K215-1
0013      0000      REGB,   0000
0014      4000      M4000,  -4000
0015      0000      TEMP,   2000
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                *20
0020  7604  START, LAS                 /READ SWITCHES SR9, 10, 11
0021  7430        CLL RTL             /MOVE 9, 10, 11 INTO 6, 7, 8
0022  7414        CLL RAL             /MOVE
0023  4201        AND     K0070       /SAVE EXTENDED MEMORY BITS
0024  3002        DCA     MEGA        /STORE EXTENDED MEMORY DATA
0025  1002        TAD     MEGA        /GET SELECTED EXTENDED BANK
0026  1203        TAD     K6201       /ADD CHANGE DATA FIELD (CDF)
0027  3039        DCA     BEGIN0      /STORE AS FIRST INSTRUCTION IN DATA HANDLER
                /
                /SET UP LOWER TEST ADDRESS 2230 FOR BANK 0 AND 0004 FOR ALL OTHERS
                /
0030  1002        TAD     MEGA        /GET EXTENDED MEMORY DATA
0031  7650        SNA CLA             /TEST FOR EXTENDED MEMORY
0032  1004        TAD     K0240       /BANK 0
0033  3005        DCA     TALLY       /SET TALLY
0034  3011        DCA     DONYET      /CLEAR DONYET
                /
                /FLOAT A SINGLE 1 BIT
                /
0035  0001  BEGIN, K0001               /SET DATA FIELD
0036  7320        CLA CLL CML         /SET L=1 AC=0000
0037  7010        RAR                 /MOVE L=0 AC=4000
0040  3405        DCA I   TALLY       /STORE IN TEST ADDRESS
0041  1405        TAD I   TALLY       /FETCH IT
0042  2011        ISZ     DONYET      /DONE 4096 TIMES YET NO
0043  5037        JMP     .-4         /DO MORE
0044  1014        TAD     M4000       /AC=4000
0045  7640        SZA CLA             /TEST OKAY
0046  5063        JMP     GOOF        /TEST FAILED TELL OPERATOR
                /
                /FLOAT A SINGLE 0 BIT
                /
0047  7340        CLL CLA CMA         /SET L=0 AC=7777
0050  7010        RAR                 /SET L=1 AC=3777
0051  3405        DCA I   TALLY       /STORE IN TEST ADDRESS
0052  1405        TAD I   TALLY       /FETCH IT
0053  2011        ISZ     DONYET      /DONE 4096 TIMES YET
0054  5050        JMP     .-4         /NOPE
0055  7040        CMA
0056  7700        SMA CLA
0057  5063        JMP     GOOF        /TEST FAILED TELL OPERATOR
0060  2005  PNTA,  ISZ     TALLY       /UPDATE ADDRESS
0061  5035        JMP     BEGIN0      /TEST NEW ADDRESS
0062  5020        JMP     START       /EXIT
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```
                    /
                    /ERROR HANDLER
                    /
0063  7604  GOOF,   LAS                 /READ SWITCHES
0064  7500          SMA                 /SR00=?
0065  7402          HLT                 /ERROR HALT
0066  7004          RAL                 /MOVE SR01 TO AC?
0067  7500          SMA                 /SR01=?
0070  5075          JMP     TALK        /TYPE
0071  7004          RAL                 /MOVE SR02 TO AC.
0072  7700  PNTB,   SMA CLA             /SR00=?
0073  5060          JMP     PNTA        /GO
0074  5061          JMP     PNTA+1      /SCOPE LOOP
                    /
                    /TYPE OUT ROUTINE
                    /
0075  7300  TALK,   CLA CLL             /CLEAR ACL
0076  6201          6201                /RESTORE DATA FIELD
0077  1010          TAD     AUTO10      /GET AUTO1?=0000 NEVER TYPED
0100  7640          SZA CLA             /=0?
0101  5111          JMP     DATA        /NO TYPE NUMERICS
0102  1012          TAD     MESSA       /GET POINTER
0103  3010          DCA     AUTO10      /STORE IN AUTO10
0104  1410          TAD I   AUTO10      /FETCH A CHARACTER
0105  7450          SNA                 /DONE YET
0106  5111          JMP     .+3         /YES
0107  4152          JMS     TYPE        /TYPE IT
0110  5104          JMP     .-4         /NO
                    /
                    /DATA TYPE OUT
                    /
0111  1005  DATA,   TAD     TALLY       /GET ADDRESS
0112  4127          JMS     OCTYP       /TYPE
0113  1035          TAD     BEGIN0      /GET DATA FIELD
0114  3115          DCA     .+1         /STORE IT
0115  0000          0000                /SET DATA FIELD
0116  1405          TAD I   TALLY
0117  4127          JMS     OCTYP
0120  1160          TAD     K215
0121  4152          JMS     TYPE
0122  1161          TAD     K212
0123  4152          JMS     TYPE
0124  7604          LAS
0125  7006          RTL
0126  5072          JMP     PNTB
0127  0000  OCTYP,  0
0130  3015          DCA     TEMP
0131  1006          TAD     K7774
0132  3013          DCA     REGB
0133  1007  HERE,   TAD     K1026
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```
0134  3010  REDO,  DCA     AUTO10
0135  1015         TAD     TEMP
0136  7004         RAL
0137  3015         DCA     TEMP
0140  1010         TAD     AUTO10
0141  7004         RAL
0142  7420         SNL
0143  5134         JMP     REDO
0144  4152         JMS     TYPE
0145  2013         ISZ     REGB
0146  5133         JMP     HERE
0147  1004         TAD     K0240
0150  4152         JMS     TYPE
0151  5527         JMP I   OCTYP
0152  0000  TYPE,  0
0153  6046         TLS                     /TYPE
0154  6041         TSF                     /WAIT FOR FLAG
0155  5154         JMP     .-1             /WAIT
0156  7300         CLA CLL                 /CLEAR AC, L
0157  5552         JMP I   TYPE            /EXIT
0160  0215  K215,  0215                    /FLOAT 1/2
0161  0212  K212,  0212                    /ADDR DATA
0162  0306         0306                    /0000 0000
0163  0314         0314
0164  0317         0317
0165  0301         0301
0166  0324         0324
0167  0240         0240
0170  0261         0261
0171  0257         0257
0172  0260         0260
0173  0215         0215
0174  0212         0212
0175  0301         0301
0176  0304         0304
0177  0304         0304
0200  0322         0322
0201  0240         0240
0202  0304         0304
0203  0301         0301
0204  0324         0324
0205  0301         0301
0206  0215         0215
0207  0212         0212
0210  0000         0000

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