

RSW 9-11 back to be test  
8 MODE  
START 20

RSW checked only at begin.  
ing of test  
(every 6 minutes)

wipes out RIM & BIN

### IDENTIFICATION

Product Code: MAINDEC -12-D1BA  
Product Name: JMP SELF  
Date Created: September 12, 1969  
Maintainer: Diagnostic Group  
Author: James Kelly

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## 1. ABSTRACT

The JMP Self test is a worst case test of the core memory Read/Write gates. The program loads all of core memory from address 0240 to 7777 inclusive in bank 0 and the entire memory bank for extended memories to (JMP Self).

The program types a blank character on the teletype, turns on program interrupt and jumps to the memory location to be tested in either memory bank 0 or the selected extended memory. When the program interrupt occurs, a test is made to be sure that we interrupted from the correct memory location. Any errors will be indicated by an error halt and a message typeout, depending on the switch settings.

## 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 (JMP Self).

## 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.

- a. Set the teletype reader switch to FREE.
- b. Open the teletype reader and insert 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 front 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 PROGRAM COUNTER and MEMORY ADDRESS register to appear to be counting up, and the ION indicator will light.
- g. NOTE: Attempting to test extended memory in a 4K machine will over-write the diagnostic and destroy the program.

##### 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; depress continue for printout or loop
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. 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:

```
JMP.  
GOOD  BAD  ADDR  
0377   0357  5357
```

This message is interpreted as follows:

- 1) The "GOOD" address from which the program interrupt should have occurred. In other words, the address of the (JMP.) we were supposed to be performing.
- 2) The "BAD" address from which the program interrupt actually occurred.
- 3) The "ADDR" number refers to the contents of the "good" or memory location under test. In this case it can be seen that bit 07 of the (JMP.) instruction was dropped causing the computer to Jump Not to itself in 0377, but rather to 0357.
- 4) In some cases the number under BAD will be the address GOOD +1. This usually indicates that bit 02 was dropped changing the JMP self to JMS self and inserting the current address +1 into the current location.

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

- a. Set the starting address 7756 in the LEFT switches.
- b. Set the first instruction (6032) in the RIGHT switches.
- c. Press the FILL switch, then press FILL STEP.
- 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 load 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.

#### BINARY FORMAT PERFORATED TAPE LOADER

Once the RIM loader is in core, place the binary loader program tape on the teletype reader and turn the reader on. Set the LEFT switches to 7756, depress I/O preset with the mode switch in 8 mode, then depress START LS. The binary tape will read into core. The reader must be turned off manually as the tape reaches the end, since RIM does not stop.

# 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 conjunction 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 CHARACTER
7761,	6036		KRB	/READ BUFFER
7762,	7106		CLL RTL	
7763,	7006		RTL	/CHANNEL 8 IN ACO
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	TEMP,	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		0	/TEMP STORAGE
7777	5XXX		JMP X	/JMP START OF BIN LOADER

/JMP SELF POP-12  
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/AUTHOR: JAMES KELLY  
/  
/SR00=1 INHIBIT ERROR HALT  
/SR01=1 INHIBIT ERROR TYPE OUT  
/SR02=1 SCOPE LOOP ON ERROR  
  
/THIS TEST IS DESIGNED TO TEST THE ABILITY  
/OF THE MEMORY ADDRESS SELECT GATES TO  
/SWITCH RAPIDLY BETWEEN READ CURRENT AND  
/WRITE CURRENT I.E. REVERSE DIRECTION.  
  
/MEMORY LOCATIONS 0240 THRU 7777 IN MEMORY  
/BANK 0 AND ALL MEMORY LOCATIONS IN THE EXTENDED  
/MEMORY BANKS ARE LOADED TO A {JMP,} CONDITION.  
/THE TELETYPE PRINTER FLAG IS CLEARED AND A BLANK  
/CHARACTER IS TYPED OUT. IMMEDIATELY THE INTERRUPT  
/IS TURNED ON AND A JUMP TO THE {JMP,} LOCATION  
/IS EXECUTED. UPON COMPLETION OF THE TELEPRINTER  
/OPERATION THE COMPUTER INTERRUPTS AND A TEST  
/IS MADE TO BE SURE WE INTERRUPTED FROM THE  
/CORRECT MEMORY ADDRESS. IF NO ERRORS OCCURRED  
/THE PROGRAM PROCEEDS TO TEST EACH MEMORY  
/LOCATION IN THE SELECTED BANK.  
  
/TO TEST ANY AMOUNT OF EXTENDED MEMORY  
/SET SWITCHES 9,10,11 TO THE BANK TO BE TESTED  
/AND START THE PROGRAM AT THE BEGINNING.  
  
/SR09=EXTENDED MEMORY  
/SR10=EXTENDED MEMORY  
/SR11=EXTENDED MEMORY  
/ATTEMPTING TO TEST NON-EXISTANT MEMORY WILL  
/RESULT IN FALSE ERROR PRINTOUTS OR PROGRAM DESTRUCTION

```

/
/ THE FOLLOWING INTERRUPT ROUTINES WORKS ON PDP-5/12
/
*1
0021 0000 INTDTA, 0000 /PDP-5 INTERRUPT
0022 0001 TAD /GET PDP-5 INTERRUPT
0023 0002 SNA /IF AC=0 WERE IN AN 8 OR 12
0024 0003 TAD /GET PDP-8 INTERRUPT
0025 0004 DCA /STORE FOR TYPING
0026 0005 JMP /EXIT TO TEST ROUTINE
0027 0006 INTSTO, 0000 /INTERRUPT STORAGE DATA
0028 0007
0029 0008
*10
0030 0009 AUTO10, 0000 /TYPE OUT POINTER
0031 0010 K0070, 0070
0032 0011 TEMP, 0000
0033 0012 K6202, 6202
0034 0013 K0177, 0177
0035 0014 K5200, 5200
0036 0015 K0240, 0240
0037 0016 K7774, 7774
0038 0017
/
/ DETERMINE MEMORY FIELD
/
*20
0039 0020 START, LAS
0040 0021 7604 RTL
0041 0022 7004 RAL
0042 0023 2011 AND
0043 0024 3007 DCA
0044 0025 1007 TAD
0045 0026 1076 TAD
0046 0027 3037 DCA
0047 0028 1007 TAD
0048 0029 1013 TAD
0049 0030 3053 DCA
0050 0031
0051 0032
/
/ DETERMINE LOWER LIMIT OF TEST
/
0052 0033 1007 TAD INTSTO
0053 0034 7650 SNA CLA
0054 0035 1016 TAD K0240
0055 0036 3012 DCA TEMP
0056 0037
/
/ LOAD SELECTED MEMORY BANK WITH (JMP DOT)
/
0057 0038 0000 BEGIN, 0000
0058 0039 1012 TAD TEMP
0059 0040
/
/ CHANGE DATA FIELD
/ GET LOWER LIMIT

```

/JMP SELF PDP-12

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2041 3152  
2042 1152

DCA TALLY  
TAD TALLY

/SET TALLY  
/GET IT



```

2243 0014      AND      K0177      /SAVE RELATIVE ADDRESS
2244 1015      TAD      K5200      /ADD BASIC JMP.
2245 3552      DCA I      /STORE IT
2246 2152      ISZ      TALLY      /UPDATE POINTER
2247 5042      JMP      BEGIN+3    /DO SOME MORE
2250 1012      TAD      TEMP      /GET POINT#
2251 3152      DCA      TALLY      /RESET TALLY
      /GO TO TEST LOCATION
      /
      CIFLOC, TLS
2252 6046      0000
2253 0000      KCC
2254 6032      ION
2255 6001      JMP I      TALLY
2256 5552
      /TEST ROUTINE
      /
      PNTA,
0057 6031      KSF
0060 5062      JMP
0061 5053      ,+2
0062 1007      CIFLOC+1
0063 7041      INTSTO
0064 1152      TAD      TALLY
0065 7640      SZA CLA
0066 5555      JMP I      GOOF
0067 2152      ISZ      TALLY
0070 5052      JMP      CIFLOC
0071 5020      JMP      START

```

```

/HIT TELETYPE
/CHANGE INSTRUCTION FIELD
/CLEAR TELEPRINTER FLAG
/TURN ON INTERRUPT
/GO TO JMP.

```

```

/FALSE INTERRUPT?
/NO
/YES, GO BACK
/GET INT DATA
/NEGATE
/SUBTRACT TALLY
/TEST
/GOOF
/UPDATE (JMP DOT) POINTER
/DO AGAIN
/START OVER

```

```

0072 7300 /TYPE OUT ROUTINE
0073 1010 /
0074 7640 /
0075 5106 /CLEAR ACL
0076 6201 /GET AUTO10=0000 NEVER TYPED
0077 1153 /NO?
0100 3010 /NO TYPE NUMERICS
0101 1410 /RESTORE DATA FIELD 0
0102 7450 /GET POINTER
0103 5106 /STORE IN AUTO10
0104 4554 /FETCH A CHARACTER
0105 5101 /DONE YET
      /YES
      /TYPE IT
      /NO

/ DATA TYPE OUT
/
DATA, TAD TALLY
      JMS OCTYP
      TAD INTSTO
      JMS OCTYP
      TAD BEGIN
      DCA .+1
      TAD TALLY
      JMS OCTYP
      TAD K215
      JMS TYPE
      TAD K212
      JMS TYPE
      LAS
      RTL
      JMP I PNTB
      OCTYP, 0 TEMP
      DCA K7774
      TAD CNTR
      DCA K1026
      HERE, TAD AUTO10
      REDO, DCA TEMP
      TAD TEMP
      RAL AUTO10
      SNL
      JMP REDO
      JMS TYPE
      ISZ CNTR
      JMP HERE
      TAD K0240
      JMS TYPE
      JMP I OCTYP

```

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0151 1026  
0152 0000  
0153 0153  
0154 0211  
0155 0217  
0156 0226  
0157 0000

K1026, 1026  
TALLY, 0000  
MESSA,  
TYPE, TYP0UT  
GOOF, GOOFN  
PNTB, PNTBN  
CNTR, 0

0160 0212  
0161 0215  
0162 0312  
0163 0315  
0164 0320  
0165 0256  
0166 0215  
0167 0212  
0170 0307  
0171 0317  
0172 0317  
0173 0304  
0174 0240  
0175 0302  
0176 0301  
0177 0304  
0200 0240  
0201 0240  
0202 0301  
0203 0304  
0204 0344  
0205 0322  
0206 0215  
0207 0212  
0210 0000

/CR  
/LF  
/J  
/M  
/P  
/.  
/CR  
/LF  
/G  
/D  
/D  
/SPACE  
/B  
/A  
/D  
/SPACE  
/SPACE  
/A  
/D  
/D  
/R  
/CR  
/LF

TYP0UT, 0

TLS

TSF

JMP

CLA

JMP I TYP0UT

/ERROR HANDLER  
/

0217 7604  
0220 7500  
0221 7402  
0222 7004  
0223 7500  
0224 5072  
0225 7004  
0226 7700  
0227 5067  
0230 1037  
0231 0232  
0232 0000

/READ SWITCHES  
/SR00=?  
/ERROR HALT  
/MOVE SR01 TO AC0  
/SR01=?  
/TYPE  
/MOVE SR02 TO AC0  
/SR02=?  
/GO  
/GET EXT MEM  
/CHANGE DATA FIELD  
/SET DATA FIELD

GOOFN, LAS  
SMA  
HLT  
RAL  
SMA  
JMP  
RAL  
SMA CLA  
JMP  
TAD  
DCA  
0000

TALK

PNTA+10  
BEGIN  
.+1

/JMP SELF	PDP-12	PAL10	V141	23-OCT-69	2151	PAGE 5-1
0233	1152		TAD	TALLY	/GET ADDRESS	
0234	0014		AND	K0177	/SAVE RELATIVE ADDRESS	
0235	1015		TAD	K5200	/AND BASIC JUMP	
0236	3552		DCA 1	TALLY	/STORE IT	
0237	5052		JMP	CIFLOC	/GO TO TEST	
			\$			