

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

RSW checked only at begin
ing of hour
(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 proceed 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		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

```
/JMP SELF PDP-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

/

```

0001 *1
0001 0000 INTDTA, 0000 /PDP-5 INTERRUPT
0002 0001 TAD INTDTA /GET PDP-5 INTERRUPT
0003 0050 SNA /IF AC=0 WERE IN AN 8 OR 12
0004 0000 TAD INTDTA=1 /GET PDP-8 INTERRUPT
0005 0007 DCA INTSTO /STORE FOR TYPING
0006 0057 JMP PNTA /EXIT TO TEST ROUTINE
0007 0000 INTSTO, 0000 /INTERRUPT STORAGE DATA

0010 *10
0010 0000 AUTO10, 0000 /TYPE OUT POINTER
0011 0070 K0070, 0070
0012 0000 TEMP, 0000
0013 0202 K6202, 6202
0014 0177 K0177, 0177
0015 5200 K5200, 5200
0016 0240 K0240, 0240
0017 7774 K7774, 7774

/
/DETERMINE MEMORY FIELD
/

0020 *20
0020 7604 START, LAS /GET BANK DATA
0021 7206 RTL /MOVE SR09,10,11
0022 7204 RAL
0023 0011 AND K0070 /SAVE FIELD DATA
0024 3007 DCA INTSTO /STORE FIELD DATA
0025 1007 TAD INTSTO /FETCH IT
0026 1076 TAD K6201 /CHANGE DATA FIELD
0027 3037 DCA BEGIN
0030 1007 TAD INTSTO /GET FIELD DATA
0031 1013 TAD K6202 /CHANGE INST FIELD
0032 3053 DCA CIFLOC=1 /STORE

/
/DETERMINE LOWER LIMIT OF TEST
/

0033 1007 TAD INTSTO /GET CHANGE FIELD DATA
0034 7650 SNA CLA /FIELD 0 OR EXTENDED
0035 1016 TAD K0240 /FIELD 0
0036 3012 DCA TEMP /STORE EITHER 0000 OR 0240

/
/LOAD SELECTED MEMORY BANK WITH (JMP DOT)
/

0037 0000 BEGIN, 0000 /CHANGE DATA FIELD
0040 1012 TAD TEMP /GET LOWER LIMIT

```

/JMP SELF PDP-12

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2041 3152
2042 1152

OCA
TAD

TALLY
TALLY

/SET TALLY
/GET IT

2043	0014	AND	K0177	/SAVE RELATIVE ADDRESS
2044	1015	TAD	K5200	/ADD BASIC JMP.
2045	3552	DCA I	TALLY	/STORE IT
2046	2152	ISZ	TALLY	/UPDATE POINTER
2047	5042	JMP	BEGIN+3	/DO SOME MORE
2050	1012	TAD	TEMP	/GET POINTR
2051	3152	DCA	TALLY	/RESET TALLY
/				
/GO TO TEST LOCATION				
/				
2052	6046	CIFLOC,	TL5	/HIT TELETYPE
2053	0000		0000	/CHANGE INSTRUCTION FIELD
2054	6032		KCC	/CLEAR TELEPRINTER FLAG
2055	6001		ION	/TURN ON INTERRUPT
2056	5552	JMP I	TALLY	/GO TO JMP.
/				
/TEST ROUTINE				
/				
0057	6031	PNTA,	KSF	/FALSE INTERRUPT?
0060	5062	JMP	,+2	/NO
0061	5053	JMP	CIFLOC+1	/YES, GO BACK
0062	1007	TAD	INTSTO	/GET INT DATA
0063	7041	CIA		/NEGATE
0064	1152	TAD	TALLY	/SUBTRACT TALLY
0065	7640	SZA	CLA	/TEST
0066	5555	JMP I	GOOF	/GOOF
0067	2152	ISZ	TALLY	/UPDATE (JMP DOT) POINTER
0070	5052	JMP	CIFLOC	/DO AGAIN
0071	5020	JMP	START	/START OVER

```

/
/TYPE OUT ROUTINE
/
0072 7300 TALK, CLA CLL /CLEAR ACL
0073 1010 TAD AUTO10 /GET AUTO10=0000 NEVER TYPED
0074 7640 SZA CLA /=0?
0075 5106 JMP DATA /NO TYPE NUMERICS
0076 6201 K6201, 6201 /RESTORE DATA FIELD 0
0077 1153 TAD MESSA /GET POINTER
0100 3010 DCA AUTO10 /STORE IN AUTO10
0101 1410 TAD I AUTO10 /FETCH A CHARACTER
0102 7450 SNA /DONE YET
0103 5106 JMP ,+3 /YES
0104 4554 JMS I TYPE /TYPE IT
0105 5101 JMP ,-4 /NO

/
/DATA TYPE OUT
/
0106 1152 DATA, TAD TALLY /GET ADDRESS
0107 4126 JMS OCTYP /TYPE
0110 1007 TAD INTSTO /GET ERROR
0111 4126 JMS OCTYP
0112 1037 TAD BEGIN /GET BANK
0113 3114 DCA ,+1 /STORE IT
0114 0000 0000 /CHANGE BANKS
0115 1552 TAD I TALLY
0116 4126 JMS OCTYP
0117 1160 TAD K215
0120 4554 JMS I TYPE
0121 1161 TAD K212
0122 4554 JMS I TYPE
0123 7604 LAS
0124 7006 RTL
0125 5556 JMP I PNTB
0126 0000 OCTYP, 0
0127 3012 DCA TEMP
0130 1017 TAD K7774
0131 3157 DCA CNTR
0132 1151 HERE, TAD K1026
0133 3010 REDO, DCA AUTO10
0134 1012 TAD TEMP
0135 7004 RAL
0136 3012 DCA TEMP
0137 1010 TAD AUTO10
0140 7004 RAL
0141 7420 SNL
0142 5133 JMP REDO
0143 4554 JMS I TYPE
0144 2157 ISZ CNTR
0145 5132 JMP HERE
0146 1016 TAD K0240
0147 4554 JMS I TYPE
0150 5526 JMP I OCTYP

```

0151	1026	K1026,	1026	
0152	0000	TALLY,	0000	
0153	0153	MESSA,	MESSA	
0154	0211	TYPE,	TYPOUT	
0155	0217	GOOF,	GOOFN	
0156	0226	PNTB,	PNTBN	
0157	0000	CNTR,	0	
0160	0212	K215,	0212	/CR
0161	0215	K212,	0215	/LF
0162	0312		0312	/J
0163	0315		0315	/M
0164	0320		0320	/P
0165	0256		0256	/.
0166	0215		0215	/CR
0167	0212		0212	/LF
0170	0307		0307	/G
0171	0317		0317	/O
0172	0317		0317	/O
0173	0304		0304	/D
0174	0240		0240	/SPACE
0175	0302		0302	/B
0176	0301		0301	/A
0177	0304		0304	/D
0200	0240		0240	/SPACE
0201	0240		0240	/SPACE
0202	0301		0301	/A
0203	0304		0304	/D
0204	0344		0344	/D
0205	0322		0322	/R
0206	0215		0215	/CR
0207	0212		0212	/LF
0210	0000		0000	
0211	0000	TYPOUT,	0	
0212	6046		TLS	
0213	6041		TSF	
0214	5213		JMP	,-1
0215	7200		CLA	
0216	5611		JMP I	TYPOUT
		/		
		/ERROR HANDLER		
		/		
0217	7604	GOOFN,	LAS	/READ SWITCHES
0220	7500		SMA	/SR00=?
0221	7402		HLT	/ERROR HALT
0222	7004		RAL	/MOVE SR01 TO AC0
0223	7500		SMA	/SR01=?
0224	5072		JMP	TALK
0225	7004		RAL	/MOVE SR02 TO AC0
0226	7700	PNTBN,	SMA	CLA
0227	5067		JMP	PNTA+10
0230	1037		TAD	BEGIN
0231	3232		DCA	,-1
0232	0000		0000	

0233 1152
0234 0014
0235 1015
0236 3552
0237 5052

TAD TALLY
AND K0177
TAD K5200
DCA I TALLY
JMP CIFLOC
\$

/GET ADDRESS
/SAVE RELATIVE ADDRESS
/AND BASIC JUMP
/STORE IT
/GO TO TEST