

MAINDEC-08-DO4B-D

IDENTIFICATION

Product Code: MAINDEC-08-DO4B-D

Product Name: Random JMP Test

Date Created: March 25, 1968

Maintainer: Diagnostic Group



1. ABSTRACT

This program tests the JMP instruction of the PDP-8. Most of memory is used as a JUMP field with a random number generator selecting each JUMP FROM and JUMP TO location.

2. REQUIREMENTS

2.1 Equipment

PDP-8 equipped with Teletype.

2.2 Storage

0000, 0364. The Binary Loader must be stored in the last memory page.

2.3 Preliminary Programs

It is assumed that MAINDEC 08-D01(n), 08-D02(n), and 08-D03(n) have run successfully.

3. LOADING PROCEDURE

3.1 Method

Use standard Binary Loader.

4. STARTING PROCEDURE

4.1 Control Switch Settings

- SR0 Halt on Error.
- SR2 Hold JUMP FROM addresses constant. (1)  
Select random JUMP FROM addresses. (0)
- SR3 Hold JUMP TO addresses constant. (1)  
Select random JUMP TO addresses. (0)

4.2 Starting Address

0200

Restart Address

0214

4.3 Operator Action

- a. Set SR to 0200 and press LOAD ADDRESS.
- b. Set SR to desired mode. If a particular memory location is desired for either a "constant FROM" or "constant TO", this memory address is entered into one of the locations shown below:

FROM 1	ADDRESS	=	0116
FROM	ADDRESS	=	0115
TO	ADDRESS	=	0114

NOTE: Always make (FROM 1) = (FROM) - 1

If SR2 or SR3 is set after the program has been started, the last address taken from the random number generator is used repeatedly.

- c. Press START.

5. OPERATING PROCEDURE

Same as section 4.

6. ERRORS

6.1 Error Halts

All unused memory locations are loaded with HLT orders. If the program executes one of these background HLTS, it is probable that the interrupt failed to occur following the JMP instruction.

6.2 Error Printouts

F wwww TO xxxx

Z = yyyy

(FROM) F wwww: wwww = the address of the JMP instruction.

(TO) T xxxx: xxxx = the address that the JMP instruction is jumping to.

(LOC 0000) Z = yyyy: yyyy = the address stored in location 0000 during the interrupt.

Note that yyyy should equal xxxx.

Example: the following is a typical error printout:

F 4252 TO 7020

Z = 7000

Line 1 of the printout is a statement of the problem. A JMP instruction is placed at location 4252. This JMP instruction is trying to jump to location 7020. Line 2 of the printout indicates

the error. The TO address (7020) was to have been stored in location 0000 but instead a 7000 was stored. Thus bit 7 was dropped.

6.3 Error Recovery

The program continues testing following an error printout. When enough information has been gathered from the error printouts, a FROM and TO address is selected for use in the scope mode loop. Enter the chosen addresses into proper locations (see section 4.3.b). Restart the program with SR2 and SR3 set. After allowing it to run for a moment push STOP, enter (5516) into location 1, and restart the program at location 0025 with SR2 and SR3 set. The scope mode loop is

Location	Coding
0000	
0001	JMP I FROM 1
xxxx	A, ION
xxxx	JMP I TO
0116	FROM 1, A

When it is desired to discontinue the scope mode loop, restore the original contents (1114) of location 1, and restart the program.

7. RESTRICTIONS

(None)

8. MISCELLANEOUS

8.1 Execution Time

7200 random tests/second

9. PROGRAM DESCRIPTION

The JMP instruction is checked through the use of the interrupt function. A random number generator selects a FROM and a TO address. An ION instruction is then placed at FROM -1 and the JMP instruction at FROM. The JMP instruction jumps to the address specified by TO. After executing these two orders, an interrupt occurs starting the program counter at location 1. A checking routine located here verifies that the operation was successful before starting the next test.

Random addresses are restricted as follows:  $0400 < \text{random address} < 7600$ . The area between 0400 and 7600 is filled with HLT instructions in case the interrupt fails. A "04" is printed after each group of 72,000 tests.



/RANDOM JMP TEST  
 /SR0=HALT ON ERROR  
 /SR2=CONSTANT FROM ADDRESS  
 /SR3=CONSTANT TO ADDRESS

0000 0000  
 0001 5001  
 0002 0002  
 0003 0003  
 0004 7640  
 0005 5532  
 0006 1113  
 0007 3515  
 0010 1113  
 0011 3516  
 0012 3000  
 0013 7001  
 0014 1136  
 0015 3136  
 0016 1136  
 0017 7640  
 0020 5025  
 0021 5422  
 0022 0316  
 0023 1140  
 0024 3137

```
*0
0                               /FOR SCOPE MODE INSERT
JMP I                            /JMP I FROM1 (5516) INTO LOC. 1
2
3
SZA CLA
JMP I AER
TAD HALT
DCA I FROM
TAD HALT
DCA I FROM1
DCA 0
IAC
TAD CI
DCA CT
TAD CI
SZA CLA
JMP LOOP
JMP I ,+1
SUP
TAD M17
DCA CT1
```

/CHECK FOR CONSTANT FROM

0025 7604  
 0026 7004  
 0027 7006  
 0030 7630  
 0031 5055

```
LOOP, LAS
      RAL
      RTL
      SZA CLA
      JMP LOOP1
```

/SELECT RANDOM FROM

0032 1117  
 0033 7104  
 0034 7430  
 0035 1120  
 0036 3117  
 0037 7100  
 0040 1117  
 0041 1122  
 0042 7630  
 0043 5032  
 0044 1117  
 0045 1121  
 0046 7620  
 0047 5032  
 0050 1117  
 0051 3115  
 0052 7040  
 0053 1115  
 0054 3116

```
GETRAN, TAD RANUM
        RAL CLL
        SZA L
        TAD THREE
        DCA RANUM
        CLL
        TAD RANUM
        TAD LIMHI
        SZA CLA
        JMP GETRAN
        TAD RANUM
        TAD LIMLO
        SNL CLA
        JMP GETRAN
        TAD RANUM
        DCA FROM
        CMA
        TAD FROM
        DCA FROM1
```

## /CHECK FOR CONSTANT TO ADDRESS

0055	7604	LOOP1,	LAS
0056	7006		RTL
0057	7006		RTL
0060	7630		SZL CLA
0061	5102		JMP JPLP

## /SELECT RANDOM TO ADDRESS

0062	1117	GTRAN1,	TAD RANUM
0063	7104		RAL CLL
0064	7430		SZL
0065	1120		TAD THREE
0066	3117		DCA RANUM
0067	7100		CLL
0070	1117		TAD RANUM
0071	1122		TAD LIMHI
0072	7630		SZL CLA
0073	5062		JMP GTRAN1
0074	1117		TAD RANUM
0075	1121		TAD LIMLO
0076	7620		SNL CLA
0077	5062		JMP GTRAN1
0100	1117		TAD RANUM
0101	3114		DCA TU

## /PLACE INSTRUCTIONS

0102	1123	JPLP,	TAD JMP1
0103	3515		DCA I FROM
0104	1124		TAD ITON
0105	3516		DCA I FROM1

## /RAISE FLAG

0106	6041		TSF
0107	6046		TLS
0110	6041		TSF
0111	5110		JMP ,-1

## /DO IT

0112	5516		JMP I FROM1	
0113	7402	HALT,	HLT	/JUMP FAILED



## /CONSTANTS, VARIABLES, AND SUCH

0114	0000	TO,	0	
0115	0000	FROM,	0	
0116	0000	FROM1,	0	
0117	2525	RANUM,	2525	
0120	0003	THREE,	3	
0121	7400	LIMLO,	-400	
0122	0200	LIMHI,	-7600	
0123	5514	JMP1,	JMP I TO	
0124	6001	ITON,	ION	
0125	0260	TW6,	260	
0126	0007	MSK7,	7	
0127	0000	SAVE,	0	
0130	0000		0	
0131	0000		0	
0132	0220	AER,	ER	
0133	0000	WORK,	0	
0134	7571	M207,	-207	
0135	0141	AMSG1,	MSG1	
0136	0000	CT,	0	
0137	0000	CT1,	0	
0140	7761	M17,	-17	
		/TTY MESSAGE		
0141	0215	MSG1,	215	/CR
0142	0212		212	/LF
0143	0212		212	/LF
0144	0306		306	/F FROM ADDRESS
0145	0240		240	/SPACE
0146	0000	INS1,	0	/X
0147	0000	INS2,	0	/X
0150	0000	INS3,	0	/X
0151	0000	INS4,	0	/X
0152	0240		240	/SPACE
0153	0324		324	/I JMP TO
0154	0240		240	/SPACE
0155	0000	INS5,	0	/X
0156	0000	INS6,	0	/X
0157	0000	INS7,	0	/X
0160	0000	INS8,	0	/X
0161	0215		215	/CR
0162	0212		212	/LF
0163	0377		377	/RUBOUT
0164	0332		332	/Z LOCATION ZERO
0165	0240		240	/SPACE
0166	0275		275	/E
0167	0240		240	/SPACE
0170	0000	INS9,	0	/X
0171	0000	INS10,	0	/X
0172	0000	INS11,	0	/X
0173	0000	INS12,	0	/X
0174	0207		207	/STOPPER

0200		*200	
		/SPREAD HALTS THROUGH MEMORY	
0200	5770		JMP I PATCH /TAD LIMLO
0201	7041		CIA
0202	3114		DCA TU
0203	1113	GUN,	TAD HALT
0204	3514		DCA I TU
0205	1114		TAD TU
0206	7001		IAC
0207	3114		DCA TU
0210	1114		TAD TU
0211	1122		TAD LIMH1
0212	7640		SZA CLA
0213	5203		JMP GUN
0214	1367		TAD M15
0215	3137		DCA CT1
0216	3136		DCA CT
0217	5025		JMP LOOP

		/ERROR ROUTINES	
0220	1115	ER,	TAD FROM
0221	4341		JMS SLOC
0222	3146		DCA INS1
0223	1127		TAD SAVE
0224	0126		AND MSK7
0225	1125		TAD TW6
0226	3147		DCA INS2
0227	1130		TAD SAVE+1
0230	0126		AND MSK7
0231	1125		TAD TW6
0232	3150		DCA INS3
0233	1131		TAD SAVE+2
0234	0126		AND MSK7
0235	1125		TAD TW6
0236	3151		DCA INS4
0237	1114		TAD TU
0240	4341		JMS SLOC
0241	3155		DCA INS5
0242	1127		TAD SAVE
0243	0126		AND MSK7
0244	1125		TAD TW6
0245	3156		DCA INS6
0246	1130		TAD SAVE+1
0247	0126		AND MSK7
0250	1125		TAD TW6
0251	3157		DCA INS7
0252	1131		TAD SAVE+2
0253	0126		AND MSK7
0254	1125		TAD TW6
0255	3160		DCA INS8
0256	1000		TAD N
0257	4341		JMS SLOC
0260	3170		DCA INS9
0261	1127		TAD SAVE
0262	0126		AND MSK7
0263	1125		TAD TW6
0264	3171		DCA INS10
0265	1130		TAD SAVE+1
0266	0126		AND MSK7
0267	1125		TAD TW6
0270	3172		DCA INS11
0271	1131		TAD SAVE+2
0272	0126		AND MSK7
0273	1125		TAD TW6
0274	3173		DCA INS12

## /PRINT ERROR MESSAGE

0275 1135  
 0276 3133  
 0277 1533  
 0300 6046  
 0301 6041  
 0302 5301  
 0303 7201  
 0304 1133  
 0305 3133  
 0306 1533  
 0307 1134  
 0310 7640  
 0311 5277  
 0312 7604  
 0313 7710  
 0314 7402  
 0315 5006

LP,  
 TAD AMSG1  
 DCA WORK  
 TAD I WORK  
 TLS  
 TSF  
 JMP ,=1  
 CLA IAC  
 TAD WORK  
 DCA WORK  
 TAD I WORK  
 TAD M207  
 SZA CLA  
 JMP LP  
 LAS  
 SPA CLA  
 HLT  
 JMP 6

/HALT ON ERROR

0316 1137  
 0317 7001  
 0320 3137  
 0321 1137  
 0322 7640  
 0323 5025

SUP,  
 TAD CT1  
 IAC  
 DCA CT1  
 TAD CT1  
 SZA CLA  
 JMP LOOP

0324 1361  
 0325 3133  
 0326 1133  
 0327 7001  
 0330 3133  
 0331 1533  
 0332 6046  
 0333 6041  
 0334 5333  
 0335 1366  
 0336 7640  
 0337 5326  
 0340 5023

LP1,  
 TAD AMSG2  
 DCA WORK  
 TAD WORK  
 IAC  
 DCA WORK  
 TAD I WORK  
 TLS  
 TSF  
 JMP ,=1  
 TAD M264  
 SZA CLA  
 JMP LP1  
 JMP LOOP=2

0341 0000  
 0342 3131  
 0343 1131  
 0344 7012  
 0345 7010  
 0346 3130  
 0347 1130  
 0350 7012  
 0351 7010  
 0352 3127  
 0353 1127  
 0354 7012  
 0355 7010  
 0356 0126

SLOC,  
 0  
 DCA SAVE\*2  
 TAD SAVE\*2  
 RTR  
 RAR  
 DCA SAVE\*1  
 TAD SAVE\*1  
 RTR  
 RAR  
 DCA SAVE  
 TAD SAVE  
 RTR  
 RAR  
 AND MSK7

0357 1125  
0360 5741

TAD TW6  
JMP I SLOC

0361	0361	AMSG2,	1	
0362	0215		215	/CR
0363	0212		212	/LF
0364	0260		260	/0
0365	0264		264	/E

0366	7514	M264,	-264	
0367	7763	M15,	-15	

0370	0400	PATCH,	XPATCH	
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	0400	*400		
0400	3000	XPATCH,	DCA 0	/RESTORE 0,1,2,3 AND GO
0401	1212		TAD X1	/AWAY
0402	3001		DCA 1	
0403	1213		TAD X2	
0404	3002		DCA 2	
0405	1214		TAD X3	
0406	3003		DCA 3	
0407	1215		TAD X4	
0410	3616		DCA I X5	
0411	5616		JMP I X5	

0412	1114	X1,	1114	/TAD TO
0413	7041	X2,	CIA	
0414	1000	X3,	1000	/TAD 0
0415	1121	X4,	TAD LIMLO	
0416	0200	X5,	200	

S

THERE ARE NO ERRORS

## SYMBOL TABLE

AER	0132
AMSG1	0135
AMSG2	0361
CI	0136
CI1	0137
ER	0220
FROM	0115
FROM1	0116
GETRAN	0032
GUN	0203
GTRAN1	0062
HALI	0113
INS1	0146
INS10	0171
INS11	0172
INS12	0173
INS2	0147
INS3	0150
INS4	0151
INS5	0155
INS6	0156
INS7	0157
INS8	0160
INS9	0170
ITON	0124
JMP1	0123
JPLP	0102
LIMHI	0122
LIMLO	0121
LOOP	0025
LOOP1	0055
LP	0277
LP1	0326
MSG1	0141
MSK7	0126
M15	0367
M17	0140
M207	0134
M264	0366
PATCH	0370
RANUM	0117
SAVE	0127
SL0C	0341
SUP	0316
THREE	0120
TU	0114
TW6	0125
WORK	0133
XPATCH	0400
X1	0412
X2	0413
X3	0414
X4	0415

SYMBOL TABLE

X5 0416

0000	0000
0001	0001
0002	0002
0003	0003
0004	0004
0005	0005
0006	0006
0007	0007
0008	0008
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0010	0010
0011	0011
0012	0012
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0065	0065
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0067	0067
0068	0068
0069	0069
0070	0070
0071	0071
0072	0072
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0074	0074
0075	0075
0076	0076
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0080	0080
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0090	0090
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0092	0092
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0097	0097
0098	0098
0099	0099



## SYMBOL TABLE

LOOP	0025
GETRAN	0032
LOOP1	0055
GTRAN1	0062
JPLP	0102
HALT	0113
TU	0114
FROM	0115
FROM1	0116
RANUM	0117
THREE	0120
LIMLO	0121
LIMHI	0122
JMP1	0123
ITON	0124
TW6	0125
MSK7	0126
SAVE	0127
AER	0132
WURK	0133
M207	0134
AMSG1	0135
CT	0136
CT1	0137
M17	0140
MSG1	0141
INS1	0146
INS2	0147
INS3	0150
INS4	0151
INS5	0155
INS6	0156
INS7	0157
INS8	0160
INS9	0170
INS10	0171
INS11	0172
INS12	0173
GON	0203
ER	0220
LP	0277
SUP	0316
LP1	0326
SLOC	0341
AMSG2	0361
M264	0366
M15	0367
PATCH	0370
XPATCH	0400
X1	0412
X2	0413
X3	0414
X4	0415

SYMBOL TABLE

X5 0416

0000	0000
0001	0001
0002	0002
0003	0003
0004	0004
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0010	0010
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0070	0070
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