

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 www TO xxxx

Z = yyyy

(FROM) F www: www = 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
/SP0=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
JMP 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 CL
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
 0056 7006
 0057 7006
 0060 7630
 0061 5102

LOOP1, LAS
 RTL
 RTL
 SZL CLA
 JMP JPLP

/SELECT RANDOM TO ADDRESS

0062 1117
 0063 7104
 0064 7430
 0065 1120
 0066 3117
 0067 7100
 0070 1117
 0071 1122
 0072 7630
 0073 5062
 0074 1117
 0075 1121
 0076 7620
 0077 5062
 0100 1117
 0101 3114

GTRAN1, TAD RANUM
 RAL CLL
 SZL
 TAD THREE
 DCA RANUM
 CLL
 TAD RANUM
 TAD LIMHI
 SZL CLA
 JMP GTRAN1
 TAD RANUM
 TAD LIMLO
 SNL CLA
 JMP GTRAN1
 TAD RANUM
 DCA TU

/PLACE INSTRUCTIONS

0102 1123
 0103 3515
 0104 1124
 0105 3516

JPLP, TAD JMP1
 DCA I FROM
 TAD ITON
 DCA I FROM1

/RAISE FLAG

0106 6041
 0107 6046
 0110 6041
 0111 5110

TSF
 TLS
 TSF
 JMP ,=1

/DO IT

0112 5516
 0113 7402

JMP I FROM1
 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 1 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	TAD HALT	
0204	3514	DCA I TO	
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

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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

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
WORK	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