

MAINDEC-08-DO4B-D

IDENTIFICATION

Product Code: MAINDEC-08-DO4B-D

Product Name: Random JMP Test

Date Created: March 25, 1968

Maintainer: Diagnostic Group

MAINDEC-08-DO4B-D

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.

A. Huntz

/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 1 /JMP 1 FROM1 (>516) INTO LOC. 1
2
3
SZA CLA
JMP I AER
TAD HALT
DCA I FROM
TAD HALT
DCA I FROM1
DCA 0
IAC
TAD CT
DCA CT
TAD CT
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
SEL 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
SEL
TAD THREE
DCA RANUM
CLL
TAD RANUM
TAD LIMHI
SEL 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		S&L CLA
0061	5102		JMP JPLP

/SELECT RANDOM TO ADDRESS

0062	1117	GTRAN1,	TAD RANUM
0063	7104		RAL CLL
0064	7430		S&L
0065	1120		TAD THREE
0066	3117		DCA RANUM
0067	7100		CLL
0070	1117		TAD RANUM
0071	1122		TAD LIMHI
0072	7630		S&L 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 TO

/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	/T 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	/T 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	/=
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
0201 7041
0202 3114
0203 1113
0204 3514
0205 1114
0206 7001
0207 3114
0210 1114
0211 1122
0212 7640
0213 5203
0214 1367
0215 3137
0216 3136
0217 5025

GOV,

JMP I PATCH

/TAD LIMLO

CIA

DCA TU

TAD HALT

DCA I TU

TAD TU

IAC

DCA TU

TAD TU

TAD LIMHI

SEA CLA

JMP GON

TAD M15

DCA CT1

DCA CT

JMP LOOP

ZERROK 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 TQ
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      TAD AMSG1
0276 3133      DCA WORK
0277 1533      LP,  TAD I WORK
0300 6046      TLS
0301 6041      TSF
0302 5301      JMP ,=1
0303 7201      CLA IAC
0304 1133      TAD WORK
0305 3133      DCA WORK
0306 1533      TAD I WORK
0307 1134      TAD M207
0310 7640      SZA CLA
0311 5277      JMP LP
0312 7604      LAS
0313 7710      SPA CLA
0314 7402      HLT          /HALT ON ERROR
0315 5006      JMP 6

0316 1137      SUP,  TAD CT1
0317 7001      IAC
0320 3137      DCA CT1
0321 1137      TAD CT1
0322 7640      SZA CLA
0323 5025      JMP LOOP

0324 1361      TAD AMS02
0325 3133      DCA WORK
0326 1133      LP1,  TAD WORK
0327 7001      IAC
0330 3133      DCA WORK
0331 1533      TAD I WORK
0332 6046      TLS
0333 6041      TSF
0334 5333      JMP ,=1
0335 1366      TAD M264
0336 7640      SZA CLA
0337 5326      JMP LP1
0340 5023      JMP LOOP=2

0341 0000      SLDC,  0
0342 3131      DCA SAVE+2
0343 1131      TAD SAVE+2
0344 7012      RTR
0345 7010      RAR
0346 3130      DCA SAVE+1
0347 1130      TAD SAVE+1
0350 7012      RTR
0351 7010      RAR
0352 3127      DCA SAVE
0353 1127      TAD SAVE
0354 7012      RTR
0355 7010      RAR
0356 0126      AND MSK/

```

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0357 1125
0360 5741

TAD TW6
JMP I SLOC

0361 0361
 0362 0215
 0363 0212
 0364 0260
 0365 0264

AMSG2, ,
 215 /CK
 212 /LF
 260 /D
 264 /E

0366 7514
 0367 7763

M264, -264
 M15, -15

0370 0400

PATCH, XPATCH

0400 0400
 0400 3000
 0401 1212
 0402 3001
 0403 1213
 0404 3002
 0405 1214
 0406 3003
 0407 1215
 0410 3616
 0411 5616

*400
 XPATCH, DCA 0 /RESTORE 0,1,2,3 AND GO
 TAD X1 /AWAY
 DCA 1
 TAD X2
 DCA 2
 TAD X3
 DCA 3
 TAD X4
 DCA I X>
 JMP I X>

0412 1114
 0413 7041
 0414 1000
 0415 1121
 0416 0200

X1, 1114 /TAD TO
 X2, CIA
 X3, 1000 /TAD 0
 X4, TAD LIMLO
 X5, 200

3

THERE ARE NO ERRORS

SYMBOL TABLE

AER	0132
AMSG1	0135
AMSG2	0361
CT	0136
CT1	0137
EH	0220
FROM	0115
FROM1	0116
GETRAN	0032
GUN	0203
GTRAN1	0062
HALT	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
HANUM	0117
SAVE	0127
SLOC	0341
SUP	0316
THREE	0120
TU	0114
TW6	0125
WORK	0133
XPATCH	0400
X1	0412
X2	0413
X3	0414
X4	0415

SYMBOL TABLE

X5 041.6

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
GDN	0203
ER	0220
LP	0277
SUP	0316
LP1	0320
SLOC	0341
AMSG2	0361
M264	0366
M15	0367
PATCH	0370
XPATCH	0400
X1	0412
X2	0413
X3	0414
X4	0415

SYMBOL TABLE

X5 0416

MAINDEC EVALUATION REQUEST

After sufficient familiarization with the operation and documentation of this MAINDEC, please indicate your assessment of the following areas and return this form to Digital Equipment Corporation.

IDENTIFICATION: MAINDEC NO. _____ Program Title _____

USAGE: Used by: Field Service Production Other _____

Frequency of Usage: Daily Weekly Monthly

SUGGESTIONS FOR IMPROVEMENT

1. Are the program loading and operating instructions: clear? , incomplete? , difficult to follow?

2. Do the error reports and program documentation provide sufficient diagnostic information. in all cases? , in most cases? , in very few cases? . Suggestions for improvement:

3. Is the program effective in isolating malfunctions: in all cases? , in most cases? , in very few cases? . Would additional Scope loops or Switch Register control be helpful? _____
Suggestions for improvement:

4. Does the program ever fail to detect malfunctions exposed by other software? _____
Were Margins used? _____ Please describe malfunction in detail:

5. Does the program ever report non-existent malfunctions? _____
Please indicate erroneous report and any pertinent operating conditions:

6. Does this MAINDEC ever expose malfunctions in the Central Processor or other peripheral units not detected by the appropriate MAINDEC? _____
Please describe malfunction and MAINDEC(S) used:

7. Does the document provide a general understanding of the functional programming requirements of the system? Good , Fair , None . Would a general description of programming requirements increase the effectiveness of this MAINDEC? _____

Remarks:

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