

IDENTIFICATION

PRODUCT CODE: MAINDEC-8E-DØHC-D
PRODUCT NAME: RANDOM JMP TEST
DATE CREATED: JUNE 11, 1971
MAINTAINER: DIAGNOSTIC GROUP
AUTHOR: BRUCE HANSEN

1. ABSTRACT

THIS PROGRAM TESTS THE JMP INSTRUCTION OF THE PDP-8E. 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-8E EQUIPPED WITH TELETYPE,

2.2 STORAGE

0000,0421, THE BINARY LOADER MUST BE STORED IN THE LAST MEMORY PAGE,

2.3 PRELIMINARY PROGRAMS

IT IS ASSUMED THAT MAINDEC-8E-D0A(N), AND MAINDEC-8E-D0B(N) HAVE RUN SUCCESSFULLY,

3. LOADING PROCEDURE

3.1 METHOD

USE STANDARD BINARY LOADER,

4. STARTING PROCEDURE

4.1 CONTROL SWITCH SETTINGS

SR0(0) 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

4.5

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 = 0120

FROM ADDRESS = 0117

TO ADDRESS = 0116

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 CLEAR THEN CONTINUE.

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 4.3.8). RESTART THE PROGRAM WITH SR2 AND SR3 SET. AFTER ALLOWING IT TO RUN FOR A MOMENT, PUSH HALT, ENTER (3520) INTO LOCATION 1, AND RESTART THE PROGRAM AT LOCATION 0027 WITH SR2 AND SR3 SET. THE SCOPE MODE LOOP IS

LOCATION	CODING
0000	
0001	JMP 1 FROM 1
XXXX	A, 10N
XXXX	JMP 1 TO
0120	FROM 1, A

WHEN IT IS DESIRED TO DISCONTINUE THE SCOPE MODE LOOP, RESTORE THE ORIGINAL CONTENT 1116 INTO LOCATION 1, AND RESTART THE PROGRAM.

RESTRICTIONS

(NONE)

7.

8. MISCELLANEOUS

8.1 EXECUTION TIME

7200 RANDOM TEST/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<RANDOM ADDRESS <7600. THE AREA BETWEEN 0400 AND 7600 IS FILLED WITH HLT INSTRUCTIONS IN CASE THE INTERRUPT FAILS. A "HC" IS PRINTED AFTER EACH GROUP OF 72,000 TESTS.

```
0000 0000 /RANDOM JMP TEST
0001 5001 /SR0(0)=HALT ON ERROR
0002 0002 /SR2(1)=CONSTANT FROM ADDRESS
0003 0003 /SR3(1)=CONSTANT TO ADDRESS
0004 0000
0005 0000
0006 7640
0007 5534
0010 1115
0011 3517
0012 1115
0013 3520
0014 3000
0015 7001
0016 1140
0017 3140
0020 1140
0021 7640
0022 5027
0023 5424
0024 0316
0025 1142
0026 3141

0000 0000 /FOR SCOPE MODE INSERT
0001 5001 /JMP I FROM1 (5520) INTO LOC: I
0002 0002
0003 0003
0004 0000
0005 0000
0006 7640
0007 5534
0010 1115
0011 3517
0012 1115
0013 3520
0014 3000
0015 7001
0016 1140
0017 3140
0020 1140
0021 7640
0022 5027
0023 5424
0024 0316
0025 1142
0026 3141

0000 0000
0001 5001
0002 0002
0003 0003
0004 0000
0005 0000
0006 7640
0007 5534
0010 1115
0011 3517
0012 1115
0013 3520
0014 3000
0015 7001
0016 1140
0017 3140
0020 1140
0021 7640
0022 5027
0023 5424
0024 0316
0025 1142
0026 3141
```

/CHECK FOR CONSTANT FROM

```
0027 7604 LAS
0030 7004 RAL
0031 7006 RTL
0032 7630 SZL CLA
0033 5057 JMP LOOP1
```

/SELECT RANDOM FROM

```
0034 1121 GETRAN, TAD RANUM
0035 7104 RAL CLL
0036 7430 SZL
0037 1122 TAD THREE
0040 3121 DCA RANUM
0041 7100 CLL
0042 1121 TAD RANUM
0043 1124 TAD LIMHI
0044 7630 SZL CLA
0045 5034 JMP GETRAN
0046 1121 TAD RANUM
0047 1123 TAD LIMLO
0050 7620 SNL CLA
0051 5034 JMP GETRAN
```

0052 1121
0053 3117
0054 7040
0055 1117
0056 3120

TAD RANUM
DCA FROM
CMA
TAD FROM
DCA FROM1

/CHECK FOR CONSTANT TO ADDRESS

0057 7604
0060 7006
0061 7006
0062 7630
0063 5104

LOOP1, LAS
RTL
RTL
SEL CLA
JMP JPLP

/SELECT RANDOM TO ADDRESS

0064 1121
0065 7104
0066 7430
0067 1122
0070 3121
0071 7100
0072 1121
0073 1124
0074 7630
0075 5064
0076 1121
0077 1123
0100 7620
0101 5064
0102 1121
0103 3116

GTRAN1, TAD RANUM
RAL CLL
SEL
TAD THREE
DCA RANUM
CLL
TAD RANUM
TAD LIMHI
SEL CLA
JMP GTRAN1
TAD RANUM
TAD LIMLO
SNL CLA
JMP GTRAN1
TAD RANUM
DCA TO

/PLACE INSTRUCTIONS

0104 1125
0105 3517
0106 1126
0107 3520

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

/RAISE FLAG
TSF
TLS
TSF
JMP 1

0110 6041
0111 6046
0112 6041
0113 5112

/DO IT

0114 5520
0115 7402

JMP I FROM1
HALT, HLT /JUMP FAILED

/CONSTANTS, VARIABLES, AND SUCH

/SPREAD HALTS THROUGH MEMORY

/TAD LIMLO

JMP I PATCH

CIA TO
DCA TO
TAD HALT
DCA I TO
TAD TO
IAC
DCA TO
TAD TO
TAD LIMHI
SZA CLA
JMP GON
TAD M15
DCA CTI
DCA CT
JMP LOOP

0200 5770
0201 7041
0202 3116
0203 1115
0204 3516
0205 1116
0206 7001
0207 3116
0210 1116
0211 1124
0212 7640
0213 5203
0214 1367
0215 3141
0216 3140
0217 5027

/ERROR ROUTINES
ER,
TAD FROM
JMS SLOC
DCA INS1
TAD SAVE
AND MSK7
TAD TW6
DCA INS2
TAD SAVE+1
AND MSK7
TAD TW6
DCA INS3
TAD SAVE+2
AND MSK7
TAD TW6
DCA INS4
TAD TO
JMS SLOC
DCA INS5
TAD SAVE
AND MSK7
TAD TW6
DCA INS6
TAD SAVE+1
AND MSK7
TAD TW6
DCA INS7
TAD SAVE+2
AND MSK7
TAD TW6
DCA INS8
TAD 0
JMS SLOC
DCA INS9

0220 1117
0221 4341
0222 3150
0223 1131
0224 0130
0225 1127
0226 3151
0227 1132
0230 0130
0231 1127
0232 3152
0233 1133
0234 0130
0235 1127
0236 3153
0237 1116
0240 4341
0241 3157
0242 1131
0243 0130
0244 1127
0245 3160
0246 1132
0247 0130
0250 1127
0251 3161
0252 1133
0253 0130
0254 1127
0255 3162
0256 1000
0257 4341
0 3172

```

0261 1131 TAD SAVE
0262 0130 AND MSK7
0263 1127 TAD TW6
0264 3173 DCA INS10
0265 1132 TAD SAVE+1
0266 0130 AND MSK7
0267 1127 TAD TW6
0270 3174 DCA INS11
0271 1133 TAD SAVE+2
0272 0130 AND MSK7
0273 1127 TAD TW6
0274 3175 DCA INS12

```

/PRINT ERROR MESSAGE

```

0275 1137 TAD MSG1
0276 3135 DCA WORK
0277 1535 TAD I WORK
0300 6046 TLS
0301 6041 TSF
0302 5301 JMP I=1
0303 7201 CLA IAC
0304 1135 TAD WORK
0305 3135 DCA WORK
0306 1535 TAD I WORK
0307 1136 TAD M207
0310 7640 SEA CLA
0311 5277 JMP LP
0312 7604 LAS
0313 7700 SMA CLA
0314 7402 HLT
0315 5010 JMP 10

```

/HALT ON ERROR

```

0316 1141 SUP, TAD CTI
0317 7001 IAC
0320 3141 DCA CTI
0321 1141 TAD CTI
0322 7640 SEA CLA
0323 5027 JMP LOOP

```

```

0324 1361 TAD MSG2
0325 3135 DCA WORK
0326 1135 TAD WORK
0327 7001 IAC
0330 3135 DCA WORK
0331 1535 TAD I WORK
0332 6046 TLS
0333 6041 TSF
0334 5333 JMP I=1
0335 1366 TAD M303
0336 7640 SEA CLA
0337 5326 JMP LP1
0340 5025 JMP LOOP=2

```

0341 0000 SLOC, 0

0342 3133 DCA SAVE+2
0343 1133 TAD SAVE+2
0344 7012 RTR
0345 7010 RAR
0346 3132 DCA SAVE+1
0347 1132 TAD SAVE+1
0350 7012 RTR
0351 7010 RAR
0352 3131 DCA SAVE
0353 1131 TAD SAVE
0354 7012 RTR
0355 7010 RAR
0356 0130 AND HSK7
0357 1127 TAD TWA
0360 5741 JMP I SLOC

0361 0361 . /CR
0362 0215 215 /LF
0363 0212 212 /LF
0364 0310 310 /H
0365 0303 303 /C

0366 7475 M303. -303
0367 7763 M15. -15
0370 0400 PATCH, XPATCH

MSG2. /RESTORE 0,1,2,3 AND GO
/AWAY

*400 DCA 0
XPATCH, TAD X1
DCA 1
TAD X2
DCA 2
TAD X3
DCA 3
TAD X4
DCA 1 X5
CLA CLL
DCA 4
DCA 5
JMP I X5

X1, 1116 /TAD TO
X2, CIA /TAD 0
X3, 1000
X4, TAD LIMLO
X5, 200

0400 0400
0401 1215
0402 3001
0403 1216
0404 3002
0405 1217
0406 3003
0407 1220
0410 3621
0411 7300
0412 3004
0413 3005
0414 5621
0415 1116
0416 7041
0417 1000
0420 1123
0421 0200