

IDENTIFICATION

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

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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

4.3 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 = 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.

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 HALTS, 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 (5520) 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 I FROM 1 |
| XXXX | A, ION |
| XXXX | JMP I 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.

7. RESTRICTIONS

(NONE)

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.

/RANDOM JMP TEST
 /SR0(0)=HALT ON ERROR
 /SR2(1)=CONSTANT FROM ADDRESS
 /SR3(1)=CONSTANT TO ADDRESS

```

0000 0000 *0
0000 0000 0 /FOR SCOPE MODE INSERT
0001 5001 JMP 1 /JMP I FROM1 (5520) INTO LOC. I
0002 0002 2
0003 0003 3
0004 0000 0
0005 0000 0
0006 7640 SZA CLA
0007 5534 JMP I AER
0010 1115 TAD HALT
0011 3517 DCA I FROM
0012 1115 TAD HALT
0013 3520 DCA I FROM1
0014 3000 DCA 0
0015 7001 IAC
0016 1140 TAD CT
0017 3140 DCA CT
0020 1140 TAD CT
0021 7640 SZA CLA
0022 5027 JMP LOOP
0023 5424 JMP I ,+1
0024 0316 SUP
0025 1142 TAD M1?
0026 3141 DCA CT1

```

/CHECK FOR CONSTANT FROM

```

0027 7604 LOOP, 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 | TAD RANUM |
| 0053 | 3117 | DCA FROM |
| 0054 | 7040 | CMA |
| 0055 | 1117 | TAD FROM |
| 0056 | 3120 | DCA FROM1 |

/CHECK FOR CONSTANT TO ADDRESS

| | | |
|------|------|------------|
| 0057 | 7604 | LOOP1, LAS |
| 0060 | 7006 | RTL |
| 0061 | 7006 | RTL |
| 0062 | 7630 | SZL CLA |
| 0063 | 5104 | JMP JPLP |

/SELECT RANDOM TO ADDRESS

| | | |
|------|------|-------------------|
| 0064 | 1121 | GTRAN1, TAD RANUM |
| 0065 | 7104 | RAL CLL |
| 0066 | 7430 | SZL |
| 0067 | 1122 | TAD THREE |
| 0070 | 3121 | DCA RANUM |
| 0071 | 7100 | CLL |
| 0072 | 1121 | TAD RANUM |
| 0073 | 1124 | TAD LIMHI |
| 0074 | 7630 | SZL CLA |
| 0075 | 5064 | JMP GTRAN1 |
| 0076 | 1121 | TAD RANUM |
| 0077 | 1123 | TAD LIMLO |
| 0100 | 7620 | SNL CLA |
| 0101 | 5064 | JMP GTRAN1 |
| 0102 | 1121 | TAD RANUM |
| 0103 | 3116 | DCA TO |

/PLACE INSTRUCTIONS

| | | |
|------|------|----------------|
| 0104 | 1125 | JPLP, TAD JMP1 |
| 0105 | 3517 | DCA I FROM |
| 0106 | 1126 | TAD ITON |
| 0107 | 3520 | DCA I FROM1 |

/RAISE FLAG

| | | |
|------|------|---------|
| 0110 | 6041 | TSP |
| 0111 | 6046 | TLS |
| 0112 | 6041 | TSP |
| 0113 | 5112 | JMP .-1 |

/DO IT

| | | |
|------|------|-------------|
| 0114 | 5520 | JMP I FROM1 |
| 0115 | 7402 | HALT, HLT |

/JUMP FAILED

/CONSTANTS, VARIABLES, AND SUCH

0116 0000 TO, 0
 0117 0000 FROM, 0
 0120 0000 FROM1, 0
 0121 2525 RANUM, 2525
 0122 0003 THREE, 3
 0123 7400 LIMLO, -400
 0124 0200 LIMHI, -7600
 0125 5516 JMP1, JMP I TO
 0126 6001 ITON, ION
 0127 0260 TW6, 260
 0130 0007 MSK7, 7
 0131 0000 SAVE, 0
 0132 0000 0
 0133 0000 0
 0134 0220 AER, ER
 0135 0000 WORK, 0
 0136 7571 M207, -207
 0137 0143 AMSG1, MSG1
 0140 0000 CT, 0
 0141 0000 CT1, 0
 0142 7761 M17, -17

/TTY MESSAGE

0143 0215 MSG1, 215 /CR
 0144 0212 212 /LF
 0145 0212 212 /LF
 0146 0306 306 /F FROM ADDRESS
 0147 0240 240 /SPACE
 0150 0000 INS1, 0 /X
 0151 0000 INS2, 0 /X
 0152 0000 INS3, 0 /X
 0153 0000 INS4, 0 /X
 0154 0240 240 /SPACE
 0155 0324 324 /T JMP TO
 0156 0240 240 /SPACE
 0157 0000 INS5, 0 /X
 0160 0000 INS6, 0 /X
 0161 0000 INS7, 0 /X
 0162 0000 INS8, 0 /X
 0163 0215 215 /CR
 0164 0212 212 /LF
 0165 0377 377 /RUBOUT
 0166 0332 332 /Z LOCATION ZERO
 0167 0240 240 /SPACE
 0170 0275 275 /=
 0171 0240 240 /SPACE
 0172 0000 INS9, 0 /X
 0173 0000 INS10, 0 /X
 0174 0000 INS11, 0 /X
 0175 0000 INS12, 0 /X
 0176 0207 207 /STOPPER

/SPREAD HALTS THROUGH MEMORY

| | | | | |
|------|------|------|-------------|------------|
| 0200 | 5770 | | JMP I PATCH | /TAD LIMLO |
| 0201 | 7041 | | CIA | |
| 0202 | 3116 | | DCA TO | |
| 0203 | 1115 | GON, | TAD HALT | |
| 0204 | 3516 | | DCA I TO | |
| 0205 | 1116 | | TAD TO | |
| 0206 | 7001 | | IAC | |
| 0207 | 3116 | | DCA TO | |
| 0210 | 1116 | | TAD TO | |
| 0211 | 1124 | | TAD LIMHI | |
| 0212 | 7640 | | SZA CLA | |
| 0213 | 5203 | | JMP GON | |
| 0214 | 1367 | | TAD M15 | |
| 0215 | 3141 | | DCA CT1 | |
| 0216 | 3140 | | DCA CT | |
| 0217 | 5027 | | JMP LOOP | |

/ERROR ROUTINES

| | | | |
|------|------|-----|------------|
| 0220 | 1117 | ER, | TAD FROM |
| 0221 | 4341 | | JMS SLOC |
| 0222 | 3150 | | DCA INS1 |
| 0223 | 1131 | | TAD SAVE |
| 0224 | 0130 | | AND MSK7 |
| 0225 | 1127 | | TAD TW6 |
| 0226 | 3151 | | DCA INS2 |
| 0227 | 1132 | | TAD SAVE+1 |
| 0230 | 0130 | | AND MSK7 |
| 0231 | 1127 | | TAD TW6 |
| 0232 | 3152 | | DCA INS3 |
| 0233 | 1133 | | TAD SAVE+2 |
| 0234 | 0130 | | AND MSK7 |
| 0235 | 1127 | | TAD TW6 |
| 0236 | 3153 | | DCA INS4 |
| 0237 | 1116 | | TAD TO |
| 0240 | 4341 | | JMS SLOC |
| 0241 | 3157 | | DCA INS5 |
| 0242 | 1131 | | TAD SAVE |
| 0243 | 0130 | | AND MSK7 |
| 0244 | 1127 | | TAD TW6 |
| 0245 | 3160 | | DCA INS6 |
| 0246 | 1132 | | TAD SAVE+1 |
| 0247 | 0130 | | AND MSK7 |
| 0250 | 1127 | | TAD TW6 |
| 0251 | 3161 | | DCA INS7 |
| 0252 | 1133 | | TAD SAVE+2 |
| 0253 | 0130 | | AND MSK7 |
| 0254 | 1127 | | TAD TW6 |
| 0255 | 3162 | | DCA INS8 |
| 0256 | 1000 | | TAD 0 |
| 0257 | 4341 | | JMS SLOC |
| 0) | 3172 | | DCA INS9 |

| | | | |
|------|------|-----|--------|
| 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 | AMSG1 |
| 0276 | 3135 | DCA | WORK |
| 0277 | 1535 | LP, | TAD I WORK |
| 0300 | 6046 | | TLS |
| 0301 | 6041 | | TSF |
| 0302 | 5301 | | JMP ,=-1 |
| 0303 | 7201 | | CLA IAC |
| 0304 | 1135 | | TAD WORK |
| 0305 | 3135 | | DCA WORK |
| 0306 | 1535 | | TAD I WORK |
| 0307 | 1136 | | TAD M207 |
| 0310 | 7640 | | SZA 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 | | SZA CLA |
| 0323 | 5027 | | JMP LOOP |

| | | | |
|------|------|------|------------|
| 0324 | 1361 | | TAD AMSG2 |
| 0325 | 3135 | | DCA WORK |
| 0326 | 1135 | LP1, | TAD WORK |
| 0327 | 7001 | | IAC |
| 0330 | 3135 | | DCA WORK |
| 0331 | 1535 | | TAD I WORK |
| 0332 | 6046 | | TLS |
| 0333 | 6041 | | TSF |
| 0334 | 5333 | | JMP ,=-1 |
| 0335 | 1366 | | TAD M303 |
| 0336 | 7640 | | SZA 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 MSK7 |
| 0357 | 1127 | TAD TNA |
| 0360 | 5741 | JMP I 5LOC |

| | | | | |
|------|------|--------|-----|-----|
| 0361 | 0361 | AMSG2, | . | |
| 0362 | 0215 | | 215 | /CR |
| 0363 | 0212 | | 212 | /LF |
| 0364 | 0310 | | 310 | /H |
| 0365 | 0303 | | 303 | /C |

| | | | |
|------|------|-------|------|
| 0366 | 7495 | M303, | -303 |
| 0367 | 7763 | M15, | -15 |

| | | | |
|------|------|--------|--------|
| 0370 | 0400 | PATCH, | XPATCH |
|------|------|--------|--------|

| | | | | |
|------|------|---------|----------|-------------------------|
| 0400 | 0400 | *400 | | |
| 0400 | 3000 | XPATCH, | DCA 0 | /RESTORE 0,1,2,3 AND GO |
| 0401 | 1215 | | TAD X1 | /AWAY |
| 0402 | 3001 | | DCA 1 | |
| 0403 | 1216 | | TAD X2 | |
| 0404 | 3002 | | DCA 2 | |
| 0405 | 1217 | | TAD X3 | |
| 0406 | 3003 | | DCA 3 | |
| 0407 | 1220 | | TAD X4 | |
| 0410 | 3621 | | DCA I X5 | |
| 0411 | 7300 | | CLA CLL | |
| 0412 | 3004 | | DCA 4 | |
| 0413 | 3005 | | DCA 5 | |
| 0414 | 5621 | | JMP I X5 | |

| | | | | |
|------|------|-----|-----------|---------|
| 0415 | 1116 | X1, | 1116 | /TAD TO |
| 0416 | 7041 | X2, | CIA | |
| 0417 | 1000 | X3, | 1000 | /TAD 0 |
| 0420 | 1123 | X4, | TAD LIMLO | |
| 0421 | 0200 | X5, | 200 | |