IDENTIFICATION

PRODUCT CODE: MAINDEC-8E-DØHC-D

PRODUCT NAME: RANDOM JMP TEST

DATE CREATED: JUNE 11, 1971

MAINTAINER: DIAGNOSTIC GROUP

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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 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 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      *0
0000      0000              0                   /FOR SCOPE MODE INSERT
0001      5001              JMP 1               /JMP I FROM1 (5520) INTO LOC. 1
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 M17
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          TSF
0111  6046          TLS
0112  6041          TSF
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  FROMI,  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  AMSGI,  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


      0200  *200
```

```
                        /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
0260  3172              DCA INS9
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```
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                 /HALT ON ERROR
0315  5010          JMP 10

0316  1141    SUP,  TAD CT1
0317  7001          IAC
0320  3141          DCA CT1
0321  1141          TAD CT1
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 TW6
0360  5741          JMP I SLOC

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

0366  7475  M303,   -303
0367  7763  M15,    -15

0370  0400  PATCH,  XPATCH


      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

              $
```