IDENTIFICATION

PRODUCT CODE: MAINDEC-8E-D0HC-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 CTI
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                 /HALT ON ERROR
0315  5010          JMP 10

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
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```
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 TW4
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

              $
```