IDENTIFICATION

PRODUCT CODE: MAINDEC-8E-D0DB-D

PRODUCT NAME: RANDOM AND TEST

DATE CREATED: JUNE 7,1971

MAINTAINER: DIAGNOSTIC GROUP

AUTHOR: MICHAEL DAVIS

)   )   )   .

1. ABSTRACT

    ...IS PROGRAM TESTS THE AND INSTRUCTING OF THE PDP-8E, THE
    AND INSTRUCTION, INSTRUCTION ADDRESS, OPERAND ADDRESS AND
    BOTH OPERANDS ARE PRODUCED BY RANDOM NUMBER GENERATORS,

2. REQUIREMENTS

2.1 EQUIPMENT

    PDP-8E EQUIPPED WITH AT LEAST 4K OF MEMORY,

    TELETYPE,

2.2 STORAGE

    THE PROGRAM IS INITIALLY LOADED INTO LOCATIONS 0000 THRU 1177,
    THE INITIAL TEST AREA IS 1200-7777, WHEN THE PROGRAM RELOCATES,
    IT OCCUPIES 6600-7777, THE TEST AREA IS THEN 0000-6577,

2.3 PRELIMINARY PROGRAMS

    MAINDEC-8E-D0AA, D0BA, D0CA

3. LOADING PROCEDURE

    THE STANDARD PROCEDURE FOR LOADING BINARY TAPES IS TO BE USED.

4. STARTING PROCEDURE

4.1 STARTING ADDRESS

    0200

4.2 CONTROL SWITCH SETTINGS

    SR00=1, SUPPRESS HALT ON ERROR
    SR01=1, HALT AT END OF PASS, RESTORE LOADERS
    SR02=1, SUPPRESS PROGRAM RELOCATION
    SR03=1, SUPPRESS END OF PASS TYPEOUT
    SR09=1, HOLD DATA 1 CONSTANT
    SR10=1, HOLD DATA 2 CONSTANT
    SR11=1, HOLD INSTRUCTION CONSTANT

4.3   OPERATOR ACTION

4.3.1   SET SR TO 0200

4.3.2   PRESS LOAD ADDRESS SWITCH

4.3.3   SET SR TO 0000

4.3.4   PRESS CLEAR AND CONTINUE SWITCHES

5.   OPERATING PROCEDURE

         SAME AS 4.

6.   ERRORS

6.1   RELOCATION ERROR

         IF AN ERROR OCCURS DURING PROGRAM RELOCATION, THE PROGRAM WILL
         HALT AT 234 OR 6634, DEPENDING UPON WHETHER THE PROGRAM IS
         LOCATED LOW OR HIGH.

6.2   DATA ERRORS

         IF THE LINK IS SET AFTER COMPLETION OF THE AND INSTRUCTION, OR
         IF THE RESULTS OF THE AND INSTRUCTION ARE INCORRECT, THE PROGRAM
         WILL HALT AT 731(7331) WITH DATA1 IN THE AC.

         DEPRESS CONTINUE TO DISPLAY DATA2 IN THE AC.
         DEPRESS CONTINUE TO DISPLAY AND INSTRUCTION IN AC.
         DEPRESS CONTINUE TO DISPLAY INSTRUCTION ADDRESS IN AC.
         DEPRESS CONTINUE TO DISPLAY DATA2 ADDRESS IN AC.
         DEPRESS CONTINUE TO DISPLAY INDIRECT POINTER (USED BY INDIRECT
         AND) IN AC.
         DEPRESS CONTINUE TO RESUME TEST

6.3   ERROR RECOVERY

6.3.1   RELOCATION ERROR

         RELOAD PROGRAM

)   )   )

6.3.2   DATA ERROR
)--------

         SEE 6.2

6.4   LOOPING

         SET SR00=1 TO PREVENT HALT AFTER ERROR,

         SET SR02=1 TO PREVENT RELOCATION,

         SET SR03=1 TO SUPPRESS END OF PASS TYPEOUT,

         SET SR09-SR11=1 TO HOLD INSTRUCTION AND DATA CONSTANT,

7.   RESTRICTIONS

         NONE

8.   EXECUTION TIME

         THE PROGRAM PERFORMS 4096 RANDOM TESTS IN APPROXIMATELY 2
         SECONDS AND THEN RELOCATES, THE PROGRAM WILL TYPE "A" AFTER
         EACH 4096 RANDOM TESTS UNLESS SR03=1,

9.   PROGRAM DESCRIPTION

         THE PROGRAM IS INITIALLY LOADED INTO LOCATIONS 0200-1177,
         WITH TEMPORARY STORAGE LOCATIONS ON PAGE 0. AFTER INITIAL
         KEYSTART, THE PROGRAM WILL SAVE RIM AND BIN LOADERS IN PAGE 0
         AND WILL THEN PROCEED TO USE LOCATIONS 1200-7777 AS A TEST
         AREA,

         THE PROGRAM USES SEPARATE RANDOM NUMBER GENERATORS TO GENERATE
         THE AND INSTRUCTION, INSTRUCTION AND DATA ADDRESSES, AND THE
         TWO ARGUMENTS TO BE "ANDED", THE INSTRUCTIONS AND DATA ARE
         STORED IN THEIR PREVIOUSLY GENERATED ADDRESSES, THE PROGRAM
         TRANSFERS TO THE LOCATION OF THE INSTRUCTION AND EXECUTES IT,
         THE PROGRAM THEN TRANSFERS TO A COMPARISON ROUTINE WHERE THE
         ACTUAL RESULT OF THE AND INSTRUCTION IS COMPARED TO A SIMULATED
         AND,

         AFTER 4096 TESTS, THE PROGRAM TYPES "A", RELOCATES, AND
         CONTINUES TESTING,

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                        /
                        /RANDOM AND TEST
                        /COPYRIGHT 1970, DIGITAL EQUIPMENT CORP., MAYNARD, MASS. 01754
                        /V 82 07552
                        /
                        /
                        /TEMPORARY TRANSFER LOCATIONS ON PAGE 0
                        /
        0000            *0
0000    0000    TTANDL, 0
0001    5001    INSTL,  JMP      .                      /STORAGE FOR AND INSTRUCTION
0002    0002    INADDL, 2                 /STORAGE FOR AND INSTRUCTION ADDRESS
0003    0003    DATADL, 3                       /STORAGE FOR DATA ADDRESS
0004    0003    IFLAGL, 3                       /STORAGE FOR INSTRUCTION INDIRECT FLAG
0005    0000    PADDL,  0                       /STORAGE FOR DATA INDIRECT ADDRESS
0006    0000    LIML,   0
0007    0000    PAGL,   0

        0010            *10
0010    0000    PNTRL,  0

        6007            CAF=6007
        7501            MQA=7501
        7421            MQL=7421
        0266            CNTR1L=LOHIL
        0020            *20
0020    0000    TEMP3L, 0


                        /
                        /INITIALIZATION AND CONTROL ROUTINES
                        /
        0200            *200
0200    6007    STARTL, CAF
0201    1204            TAD      .+3            /SAVE RIM AND BIN IN PAGE 0
0202    3201    PNTR1L, DCA      .-1            /ONLY AT INITIAL KEYSTART
0203    4205    PNTR2L, JMS      SAVBNL         /201 BECOMES JMP SETLKL
0204    5274    TEMP1L, JMP      SETLKL         /FOR ALL FUTURE PASSES
                        /
                        /TRANSFER RIM AND BIN LOADERS TO PAGE 0
                        /
0205    0000    SAVBNL, 0
0206    1374            TAD      C7600L         /SET AC=-200, NUMBER OF
0207    3266            DCA      CNTR1L         /LOCATIONS TO BE TRANSFERRED
0210    1374            TAD      C7600L         /FIRST "FROM"
0211    3202            DCA      PNTR1L         /LOCATION=7600
0212    3203            DCA      PNTR2L         /FIRST "TO" LOCATION=0
0213    4225            JMS      RELOL          /PERFORM TRANSFER
0214    5625            JMP I    SAVBNL         /EXIT
```

```
0215  0000  RESBNL,  0
0216  1374          TAD      C7600L        /SET AC=-200, NUMBER OF
0217  3266          DCA      CNTR1L        /LOCATIONS TO BE TRANSFERRED
0220  3202          DCA      PNTR1L        /FIRST "FROM" ADDRESS=0
0221  1374          TAD      C7600L        /FIRST "TO"
0222  3203          DCA      PNTR2L        /ADDRESS=7600
0223  4225          JMS      RELOL         /PERFORM TRANSFER
0224  5615          JMP I    RESBNL        /EXIT
                    /
                    /DATA TRANSFER ROUTINE

                    /

0225  0000  RELOL,  0
0226  1602          TAD I    PNTR1L        /GET DATA
0227  3603          DCA I    PNTR2L        /TRANSFER
0230  1602          TAD I    PNTR1L        /GET DATA
0231  7041          CIA
0232  1603          TAD I    PNTR2L        /COMPARE
0233  7640          SZA CLA
0234  7402          HLT                    /TRANSFER ERROR
0235  2202          ISZ      PNTR1L        /NEXT "FROM" LOCATION
0236  7000          NOP
0237  2203          ISZ      PNTR2L        /NEXT "TO" LOCATION
0240  7000          NOP
0241  2266          ISZ      CNTR1L
0242  5226          JMP      RELOL+1
0243  5625          JMP I    RELOL
                    /
                    /TRANSFER PROGRAM TO UPPER MEMORY
                    /
0244  4215  REHL,   JMS      RESBNL        /TRANSFER RIM AND BIN LOADERS
0245  1373          TAD      C7000L        /SET AC=-1000, NUMBER OF
0246  3266          DCA      CNTR1L        /LOCATIONS TO BE TRANSFERRED
0247  1365          TAD      C200L         /FIRST "FROM"
0250  3202          DCA      PNTR1L        /ADDRESS=200
0251  1372          TAD      C6600L        /FIRST "TO"
0252  3203          DCA      PNTR2L        /ADDRESS=6600
0253  4225          JMS      RELOL         /PERFORM TRANSFER
0254  5772          JMP I    C6600L        /GO TO PROGRAM START
                    /
                    /TRANSFER PROGRAM TO LOWER MEMORY
                    /
0255  4205  RELL,   JMS      SAVBNL        /TRANSFER RIM AND BIN LOADERS
0256  1373          TAD      C7000L        /SET AC=-1000, NUMBER OF
0257  3266          DCA      CNTR1L        /LOCATIONS TO BE TRANSFERED
0260  1372          TAD      C6600L        /FIRST "FROM"
0261  3202          DCA      PNTR1L        /ADDRESS=6600
0262  1365          TAD      C200L         /FIRST "TO"
0263  3203          DCA      PNTR2L        /ADDRESS=200
```

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```
0264  4225          JMS      RELOL         /PERFORM TRANSFER
0265  5765          JMP I    C200L         /GO TO PROGRAM START
```

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```
                    /
                    /DETERMINE IF PROGRAM IS IN LOWER OR UPPER MEMORY
                    /
0266    0000    LOHIL,  0                           /PC
0267    7330            CLA CLL CML RAR             /SET AC=4000
0270    1266            TAD     .-2                 /ADD PC
0271    7630            SZL CLA                     /IS LINK=0
0272    1371            TAD     C6400L              /NO, HIGH CORE
0273    5666            JMP I   LOHIL               /RETURN
                    /
                    /TRANSFER TO LINKAGE GENERATION
                    /
0274    7300    SETLKL, CLA CLL
0275    3202            DCA     PNTR1L              /CLEAR PASS COUNTER
0276    4266            JMS     LOHIL               /DETERMINE IF PROGRAM IS HIGH OR LOW
0277    5377            JMP     GOSETL              /GO TO TEST WITH ADDRESS MODIFIER IN AC
                    /
                    /SIMULATE LOGICAL AND WITH A AND B=NOT((NOTA)OR(NOTB))
                    /
0300    0000    SANDL,  0
0301    7040            CMA                         /NOTA
0302    3204            DCA     TEMP1L              /SAVE NOTA
0303    7501            MQA                         /GET B
0304    7040            CMA                         /NOTB
0305    7421            MQL                         /SAVE NOTB
0306    1204            TAD     TEMP1L              /GET NOTA
0307    7501            MQA                         /OR WITH NOTB
0310    7040            CMA                         /COMPLEMENT
0311    5700            JMP I   SANDL               /EXIT WITH RESULT IN AC
                    /
                    /TEST SWITCHES
                    /
0312    0000    SWITCL, 0
0313    7421            MQL                         /SAVE TEST BIT
0314    7604            LAS                         /GET SWITCHES
0315    4300            JMS     SANDL               /AND SWITCHES WITH TEST BIT
0316    7650            SNA CLA                     /IS SWITCH 0
0317    2312            ISZ     SWITCL              /NO SKIP INSTRUCTION AFTER RETURN
0320    5712            JMP I   SWITCL
```

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```
                    /
                    /END OF PASS
                    /
0321    0000    EPASL,  0
0322    2202            ISZ     PNTR1L              /END OF PASS ?
0323    5721            JMP I   EPASL               /NO, RETURN
0324    7332            CLA CLL CML RTR
0325    7012            RTR                         /SET AC=400
0326    4312            JMS     SWITCL              /TEST SR03
0327    5336            JMP     .+7                 /SUPPRESS END OF PASS TYPEOUT
0330    1366            TAD     C215L
0331    4337            JMS     TYPEL               /TYPE CARRIAGE RETURN
0332    1367            TAD     C212L
0333    4337            JMS     TYPEL               /TYPE LINEFEED
0334    1370            TAD     A
0335    4337            JMS     TYPEL               /TYPL
```

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        0336  5345          JMP    HALTL          /TEST FOR HALT, RELOCATION
                            /
                            /OUTPUT CHARACTER
                            /
        0337  0000   TYPEL,  0
        0340  6046          TLS
        0341  6041          TSF
        0342  5341          JMP    .-1
        0343  7200          CLA
        0344  5737          JMP I  TYPEL
```

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```
                            /
                            /CHECK FOR HALT
                            /
        0345  7332   HALTL,  CLA CLL CML RTR     /SET AC=2000
        0346  4312          JMS    SWITCL        /TEST SR01
        0347  7410          SKP                  /SR01=1, HALT
        0350  5355          JMP    RRELL         /CHECK FOR RELOCATION
        0351  4266          JMS    LOHIL         /DETERMINE IF PROGRAM IS HIGH OR LOW
        0352  7650          SNA CLA              /AC=0, PROGRAM LOW
        0353  4215          JMS    RESBNL        /PROGRAM LOW, RESTORE LOADERS
        0354  7402          HLT
                            /
                            /CHECK FOR RELOCATION
                            /
        0355  7332   RRELL,  CLA CLL CML RTR
        0356  7010          RAR                  /SET AC=1000
        0357  4312          JMS    SWITCL        /TEST SR02
        0360  5721          JMP I  EPASL         /SR02=1,DO NOT RELOCATE PROGRAM
        0361  4266          JMS    LOHIL         /DETERMINE IF PROGRAM IS HIGH OR LOW
        0362  7650          SNA CLA              /AC=0, PROGRAM LOW
        0363  5244          JMP    REHL          /PROGRAM LOW, RELOCATE TO HIGH CORE
        0364  5255          JMP    RELL          /PROGRAM HIGH, RELOCATE TO LOW CORE
        0365  0200   C200L,  200
        0366  0215   C215L,  215
        0367  0212   C212L,  212
        0370  0301   A,      301
        0371  6400   C6400L, 6400
        0372  6600   C6600L, 6600
        0373  7000   C7000L, 7000
        0374  7600   C7600L, 7600
                            /
        0377                *377
        0377  7000   GOSETL, NOP
```

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```
                            /
                            /SET UP ADDRESS POINTERS AND CONSTANTS AND TRANSFER TO NEXT PAGE
                            /
        0400                *400
        0400  3237   SETAL,  DCA    TEMPL         /SAVE ADDRESS MODIFIER
        0401  1242          TAD    LISTL         /GET POINTER FOR TRANSFER
        0402  1237          TAD    TEMPL         /MODIFY FOR LOW OR HIGH CORE
```

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0403  3010              DCA     PNTRL       /SET UP AUTO-INDEX REGISTER
0404  1243              TAD     LGENL       /GET POINTER TO INSTRUCTION GENERATION
0405  1237              TAD     TEMPL       /MODIFY FOR LOW OR HIGH CORE
0406  3410              DCA  I  PNTRL       /TRANSFER TO NEXT PAGE
0407  1245              TAD     LSANDL      /GET POINTER TO AND SIMULATER
0410  1237              TAD     TEMPL       /MODIFY FOR LOW OR HIGH CORE
0411  3410              DCA  I  PNTRL       /TRANSFER TO NEXT PAGE
0412  1246              TAD     LRETUL      /GET POINTER FOR EXECUTION RETURN
0413  1237              TAD     TEMPL       /MODIFY FOR LOW OR HIGH CORE
0414  3410              DCA  I  PNTRL       /TRANSFER TO NEXT PAGE
0415  1247              TAD     LSWITL      /GET POINTER TO SWITCH SENSING
0416  1237              TAD     TEMPL       /MODIFY FOR LOW OR HIGH CORE
0417  3410              DCA  I  PNTRL       /TRANSFER TO NEXT PAGE
0420  1244              TAD     LEPASL      /GET POINTER TO END OF PASS
0421  1237              TAD     TEMPL       /MODIFY FOR LOW OR HIGH CORE
0422  3410              DCA  I  PNTRL       /TRANSFER TO NEXT PAGE
0423  1237              TAD     TEMPL       /GET ADDRESS MODIFIER
0424  7640              SZA CLA             /IS TEST IN LOW CORE
0425  5233              JMP     LHICOL      /NO,SET UP FOR HIGH CORE
0426  1240              TAD     L200L       /SET PAGE 0 EXCLUSION BIT
0427  3410              DCA  I  PNTRL       /TRANSFER TO NEXT PAGE
0430  1250              TAD     L6600L      /GET LOW CORE ADDRESS LIMIT
0431  3410              DCA  I  PNTRL       /TRANSFER TO NEXT PAGE
0432  5377              JMP     GOTSTL      /GO TO TEST
0433  3410      LHICOL, DCA  I  PNTRL       /CLERA PAGE 0 EXCLUSION BIT
0434  1251              TAD     L1201L      /GET HIGH CORE ADDRESS LIMIT
0435  3410              DCA  I  PNTRL       /TRANSFER TO NEXT PAGE
0436  5377              JMP     GOTSTL      /GO TO TEST

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                              /
0437  0000      TEMPL,  0
0440  0200      L200L,  200
0441  7000      L7000L, 7000
0442  0753      LISTL,  TGENL-1
0443  1000      LGENL,  GENL
0444  0521      LEPASL, EPASL
0445  0300      LSANDL, SANDL
0446  0712      LRETUL, TRETUL
0447  0312      LSWITL, SWITCL
0450  6600      L6600L, 6600
0451  1201      L1201L, 1201
      0577              *577
0577  7000      GOTSTL, NOP

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                              /
                              /GENERATE TEST INSTRUCTION AND DATA
                              /
      0600              *600
0600  7300      TEST1L, CLA CLL
0601  1355              TAD     TANDL       /GET POINTER TO SIMULATED AND
0602  3000              DCA     TTANDL      /PLACE IN TRANSFER LOCATION
 603  7001              IAC                 /SET
 604  4757              JMS  I  TSWITL      /TEST     1
```

```
0605    5224            JMP     TDAT1L      /SR   ), DO NOT GENERATE INSTRUCTION
0606    1362            TAD     TLIML       /NO  )T ADDRESS LIMIT
0607    3026            DCA     LIML        /SAVE
0610    1361            TAD     TPAGBL      /GET PAGE EXCLUSION BIT
0611    3027            DCA     PAGL
0612    4754            JMS I   TGENL       /GENERATE INSTRUCTION
0613    3365            DCA     TIFLGL      /SAVE INDIRECT FLA
0614    1001            TAD     INSTL       /GET INSTRUCTION
0615    3363            DCA     TINSTL      /SAVE IT
0616    1002            TAD     INADDL      /GET INSTRUCTION ADDRESS
0617    3364            DCA     TINADL      /SAVE IT
0620    1003            TAD     DATADL      /GET DATA ADDRESS
0621    3366            DCA     TDATAL      /SAVE IT
0622    1005            TAD     PADDL       /GET INDIRECT TO DATA
0623    3367            DCA     TPADDL      /SAVE IT
0624    7105    TDAT1L, CLL IAC RAL         /SET AC=2
0625    4757            JMS I   TSWITL      /TEST SR10
0626    5234            JMP     TDAT2L      /SR10=1, DO NOT GENERATE DATA1
0627    1370            TAD     TDA1L       /GENERATE RANDOM NUMBER
0630    7104            CLL RAL
0631    7430            SZL
0632    1374            TAD     T3L
0633    3370            DCA     TDA1L
0634    7307    TDAT2L, CLA CLL IAC RTL     /SET AC=4
0635    4757            JMS I   TSWITL      /TEST SR09
0636    5244            JMP     SETTL       /SR09=1, DO NOT GENERATE DATA2
0637    1371            TAD     TDA2L       /GENERATE RANDOM NUMBER
0640    7104            CLL RAL
0641    7430            SZL
0642    1374            TAD     T3L
0643    3371            DCA     TDA2L

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                        /
                        /SET UP INSTRUCTION AND DATA AT TEST ADDRESS
                        /ALONG WITH RETURN TO THIS ROUTINE
                        /
0644    7300    SETTL,  CLA CLL
0645    1363            TAD     TINSTL      /GET INSTRUCTION
0646    3764            DCA I   TINADL      /STORE IN TEST LOCATION
0647    1365            TAD     TIFLGL      /GET INDIRECT FLAG
0650    7650            SNA CLA             /IS INSTRUCTION INDIRECT
0651    5267            JMP     DIRL        /NO, GET DATA
0652    1366            TAD     TDATAL      /INDIRECT, IS ADDRESS
0653    1375            TAD     T7760       /AUTO-INDEX REGISTER
0654    7630            SZL CLA
0655    5262            JMP     .+5         /NO, USE POINTER AS IS
0656    1366            TAD     TDATAL
0657    1376            TAD     T7770
0660    7630            SZL CLA
0661    7040            CMA                 /ADDRESS IS AUTO-INDEX REGISTER
0662    1367            TAD     TPADDL      /GET INDIRECT ADDRESS
0663    3766            DCA I   TDATAL      /STORE IN TEST LOCATION
0664    1370            TAD     TDA1L       /GET DATA
0665    3767            DCA I   TPADDL      /STORE IN TEST LOCATION
0666    5271            JMP     DOTSTL
0667    1370    DIRL,   TAD     TDA1L       /GET DATA
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0670   3/66              DCA I   TDATAL          /STORE IN TEST LOCATION
                    /
                    /SIMULATE "AND"
                    /
0671   7300     DOTSTL, CLA CLL
0672   1370             TAD     TDA1L            /GET DATA1
0673   7421             MQL                      /SAVE IN MQ
0674   7371             TAD     TDA2L            /GET DATA2
0675   4755             JMS I   TANDL            /DO SIMULATION
0676   3372             DCA     TSIML            /SAVE ANSWER
                    /
                    /GO TO TEST
                    /
0677   1356     DOANDL, TAD     TRETTL           /GET RETURN ADDRESS
0700   3000             DCA     TTANDL           /SAVE
0701   1364             TAD     TINADL           /GET INSTRUCTION ADDRESS
0702   7001             IAC                      /INCREMENT
0703   7450             SNA                      /IS IT 0
0704   5200             JMP     TEST1L           /YES, GENERATE NEW INFORMATION
0705   3353             DCA     TEMP2L           /NO, SAVE
0706   1373             TAD     T5400L           /GET RETURN INSTRUCTION
0707   3753             DCA I   TEMP2L           /PUT IN TEST LOCATION
0710   1371             TAD     TDA2L            /GET DATA2
0711   5764             JMP I   TINADL           /EXECUTE "AND"

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                    /
                    /RETURN HERE AFTER EXECUTION
                    /
0712   3377     TRETUL, DCA     TRACL            /SAVE AC
0713   7430             SZL                      /IS LINK=1
0714   4324             JMS     ERROR            /LINK=1, ERROR
0715   1372             TAD     TSIML            /GET SIMULATION RESULT
0716   7041             CIA
0717   1377             TAD     TRACL            /ADD REAL RESULT
0720   7640             SZA CLA                  /ARE THEY THE SAME
0721   4324             JMS     ERROR            /NO, ERROR
0722   4760             JMS I   TEPASL           /END OF PASS
0723   5200             JMP     TEST1L
                    /
                    /ERROR HANDLER
                    /
0724   0000     ERROR,  0
0725   7330             CLA CLL CML RAR          /SET AC=4000
0726   4757             JMS I   TSWITL           /TEST SR00
0727   5351             JMP     TEXITL           /SR00=1, DO NOT HALT ON ERROR
0730   1370             TAD     TDA1L            /DISPLAY DATA1 IN AC
0731   7402             HLT
0732   7200             CLA
0733   1371             TAD     TDA2L            /DISPLAY DATA2 IN AC
0734   7402             HLT
0735   7200             CLA
0736   1001             TAD     INSTL            /DISPLAY INSTRUCTION IN AC
0737   7402             HLT
0740   7200             CLA
0741   1364             TAD     TINADL           /DISPL )INSTRUCTION ADDRESS IN AC
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0742   7402           HLT
0743   7200           CLA
0744   1366           TAD    TDATAL        /DS1, AY DATA ADDRESS IN AC
0745   7402           HLT
0746   7200           CLA
0747   1367           TAD    TPADDL        /DSIPLAY INDIRECT IN AC
0750   7402           HLT
0751   7300   TEXITL, CLA CLL
0752   5724           JMP I  ERROR
                      /
                      /
                      /
0753   0000   TEMP2L, 0
0754   0000   TGENL,  0
0755   0000   TANDL,  0
0756   0000   TRETTL, 0
0757   0000   TSWITL, 0
0760   0000   TEPASL, 0
0761   0000   TPAGBL, 0
0762   0000   TLIML,  0
0763   0000   TINSTL, 0
0764   0000   TINADL, 0
0765   0000   TIFLGL, 0

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0766   0000   TDATAL, 0
0767   0000   TPADDL, 0
0770   0021   TDA1L,  21
0771   0037   TDA2L,  37
0772   0000   TSIML,  0
0773   5400   T5400L, 5400
0774   0003   T3L,    3
0775   7760   T7760,  7760
0776   7770   T7770,  7770
0777   0000   TRACL,  0

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                      /
                      /GENERATE INSTRUCTIONS AND ADDRESSES
                      /
       1000           *1000
1000   0000   GENL,   0
                      /
                      /GENERATE "AND" INSTRUCTION
                      /
1001   1367   GANDL,  TAD    R1L
1002   4340           JMS    RANDL         /GENERATE RANDOM NUMBER
1003   3367           DCA    R1L           /SAVE NUMBER
1004   1367           TAD    R1L
1005   7421           MQL
1006   1007           TAD    PAGL
1007   7501           MQA                  /OR RANDOM NUMBER WITH EXCLUSION BIT
1010   7421           MQL
1011   1371           TAD    K0777         /MASK OFF 3MSB
1012   4400           JMS I  TTANDL        /TO GET "0" OP CODE
1013   3001           DCA    INSTL         /SAVE INSTRUCTION
1014   1001           TAD    INSTL         /GET INSTRUCTION
```

```
1015   4354           JMS     AND17L          /EXTRACT PAGE ADDRESS OF INSTRUCTION
1016   3020           DCA     TEMP3L          /SAVE PAGE ADDRESS OF INSTRUCTION
                      /
                      /GENERATE ADDRESS FOR INSTRUCTION
                      /
1017   1372   GANADL, TAD     R2L
1020   4340           JMS     RANDL           /GENERATE RANDOM NUMBER
1021   3372           DCA     R2L             /SAVE NUMBER
1022   4345           JMS     CLIML           /SET UP TO TEST ADDRESS LIMITS
1023   1372           TAD     R2L
1024   7620           SNL CLA                 /IS ADDRESS WITHIN LIMITS
1025   5217           JMP     GANADL          /NO, GENERATE NEW ADDRESS
1026   1372           TAD     R2L
1027   1373           TAD     P0L
1030   7620           SNL CLA                 /IS ADDRESS ON PAGE 0
1031   5246           JMP     PAGADL          /NO
1032   1020           TAD     TEMP3L          /GET PAGE ADDRESS OF INSTRUCTION
1033   7041           CIA
1034   1372           TAD     R2L             /SUBTRACT ADDRESS
1035   4361   PAGAL,  JMS     ABSL
1036   7700           SMA CLA                 /IS DIFFERENCE >2
1037   5217           JMP     GANADL          /NO
1040   1020   PAL,    TAD     TEMP3L          /GET PAGE ADDRESS OF INSTRUCTION
1041   7650           SNA CLA                 /DOES INSTRUCTION REFERENCE LOCATION 0
1042   5201           JMP     GANDL           /YES, GENERATE NEW INSTRUCTION
1043   1372           TAD     R2L             /YES, USE ADDRESS
1044   3002           DCA     INADDL
1045   5261           JMP     DAADL           /GENERATE ADDRESS FOR DATA
1046   1001   PAGADL, TAD     INSTL           /GET INSTRUCTION
1047   7421           MQL
1050   1376           TAD     K200L
1051   4400           JMS I   TTANDL          /MASK CURRENT PAGE BIT
1052   7650           SNA CLA                 /IS PAGE BIT SET
1053   5240           JMP     PAL             /NO, USE ADDRESS AS IS
```

```
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```

```
1054   1372           TAD     R2L
1055   4354           JMS     AND17L
1056   7041           CIA
1057   1020           TAD     TEMP3L
1060   5235           JMP     PAGAL
```

```
/          PAL10   V141    17-JUN-71       7:23    PAGE 12
```

```
                      /
                      /GENERATE ADDRESS FOR DATA
                      /
1061   1001   DAADL,  TAD     INSTL           /GET INSTRUCTION
1062   7421           MQL
1063   1376           TAD     K200L
1064   4400           JMS I   TTANDL          /DOES INSTRUCTION REFERENCE PAGE 0
1065   7650           SNA CLA
1066   5306           JMP     P0AL            /YES
1067   1002           TAD     INADDL
370    7421           MQL
071    1373           TAD     P0L
```

```
(       1072   4420           JMS I   TTANDL      /EX( r PAGE OF ADDRESS          (
        1073   7421           MQL
        1074   1020           TAD     TEMP3L
        1075   7501           MQA                 /"OR" TOGETHER TO GET
        1076   3003           DCA     DATADL      /DATA ADDRESS
        1077   1001   INDIRL, TAD     INSTL
        1100   7421           MQL
        1101   1375           TAD     K400L
        1102   4420           JMS I   TTANDL
        1103   7640           SZA CLA             /IS INSTRUCTION INDIRECT
        1104   5311           JMP     PADL        /YES, INSTRUCTION IS INDIRECT
        1105   5600           JMP I   GENL        /EXIT
        1106   1020   POAL,   TAD     TEMP3L
        1107   3003           DCA     DATADL
        1110   5277           JMP     INDIRL
                       /
                       /GENERATE INDIRECT ADDRESS FOR DATA
                       /
        1111   1377   PADL,   TAD     R3L         /GENERATE RANDOM NUMBER
        1112   4340           JMS     RANDL
        1113   3377           DCA     R3L
        1114   4345           JMS     CLIML
        1115   1377           TAD     R3L
        1116   7620           SNL CLA             /IS ADDRESS WITHIN LIMITS
        1117   5311           JMP     PADL        /NO, TRY AGAIN
        1120   1002           TAD     INADDL      /GET INSTRUCTION ADDRESS
        1121   7041           CIA
        1122   1377           TAD     R3L         /SUBSTRACT INDIRECT
        1123   4361           JMS     ABSL        /GENERATE -ABSOLUTE VALUE
        1124   7700           SMA CLA             /DO INSTRUCTION AND ADDRESS INTERFERE
        1125   5311           JMP     PADL        /YES
        1126   1003           TAD     DATADL
        1127   7041           CIA
        1130   1377           TAD     R3L
        1131   4361           JMS     ABSL
        1132   7700           SMA CLA
        1133   5311           JMP     PADL
        1134   1377           TAD     R3L         /NO
        1135   3005           DCA     PADDL
        1136   7040           CMA

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        1137   5600           JMP I   GENL        /EXIT


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        1140   0000   RANDL,  0
        1141   7104           CLL RAL
        1142   7430           SZL
        1143   1370           TAD     K3L
        1144   5740           JMP I   RANDL
                       /
                       /
                       /
        1145   0000   CLIML,  0
        1146   1007           TAD     PAGL
        1147   7100           CLL
```

```
                      1150  7650    SNA CLA
                      1151  7020            CML
                      1152  1006            TAD     LIML
                      1153  5745            JMP I   CLIML
                                            /
                                            /
                                            /
                      1154  0000    AND17L, 0
                      1155  7421            MQL
                      1156  1374            TAD     K0177L
                      1157  4400            JMS I   TTANDL
                      1160  5754            JMP I   AND17L
                                            /
                                            /
                      1161  0000    ABSL,   0
                      1162  7500            SMA
                      1163  7041            CIA
                      1164  7001            IAC
                      1165  7001            IAC
                      1166  5761            JMP I   ABSL
                                            /
                                            /
                                            /
                      1167  0001    R1L,    1
                      1170  0003    K3L,    3
                      1171  0777    K0777,  777
                      1172  0005    R2L,    5
                      1173  7600    P0L,    7600
                      1174  0177    K0177L, 177
                      1175  0400    K400L,  400
                      1176  0200    K200L,  200
                      1177  0015    R3L,    15

                                            S

        /       PAL10    V141    17-JUN-71        7:23     PAGE 13-1


0000  11111111  10000000  10000000  00000000  00000000  00000000  00000000  00000000
0100  00000000  00000000  00000000  00000000  00000000  00000000  00000000  00000000

0200  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
0300  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111001

0400  11111111  11111111  11111111  11111111  11111111  11000000  00000000  00000000
0500  00000000  00000000  00000000  00000000  00000000  00000000  00000000  00000001

0600  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
0700  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111


1000  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
1100  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111

1200        )                                      )                              )
1300
```

1400
1500   )   )   )   .

1600
1700   ,

2000
2100

2200
2300

2400
2500

2600
2700

3000
3100

3200
3300

3400
3500

3600
3700
        /   PAL10   V141   17-JUN-71   7:23   PAGE 13-2

4000
4100

4200
4300

4400
4500

4600
4700

5000
5100

5200
5300

5400
5500

5600
5700

```
6000
6100

6200
6300

6400
6500

6600
6700


7000
7100

7200
7300

7400
7500

7600
7700
```

A	0370	PADDL	0005		TSIML	0772
ABSL	1161	PADL	1111		TSWITL	0757
AND17L	1154	PAGADL	1046		TTANDL	0000
C200L	0365	PAGAL	1035		TYPEL	0337
C212L	0367	PAGL	0007			
C215L	0366	PAL	1040			
C6400L	0371	PNTR1L	0202			
C6600L	0372	PNTR2L	0203			
C7000L	0373	PNTRL	0010			
C7600L	0374	R1L	1167			
CAF	6007	R2L	1172			
CLIML	1145	R3L	1177			
CNTR1L	0266	RANDL	1140			
DAADL	1061	REHL	0244			
DATADL	0003	RELL	0255			
DIRL	0667	RELOL	0225			
DOANDL	0677	RESBNL	0215			
DOTSTL	0671	RRELL	0355			
EPASL	0321	SANDL	0300			
ERROR	0724	SAVBNL	0205			
GANADL	1017	SETAL	0400			
GANDL	1001	SETLKL	0274			
GENL	1000	SETTL	0644			
GOSETL	0377	STARTL	0200			
GOTSTL	0577	SWITCL	0312			
HALTL	0345	T3L	0774			
IFLAGL	0004	T5400L	0773			
INADDL	0002	T7760	0775			
INDIRL	1077	T7770	0776			
INSTL	0001	TANDL	0755			
77L	1174	TDA1L	0770			
77	1171	TDA2L	0771			

```
KF        1176        TDAT1L    0624
KL        1170        TDAT2L    0634
K400L     1175        TDATAL    0766
L1201L    0451        TEMP1L    0204
L200L     0440        TEMP2L    0753
L6600L    0450        TEMP3L    0020
L7000L    0441        TEMPL     0437
LEPASL    0444        TEPASL    0760
LGENL     0443        TEST1L    0600
LHICOL    0433        TEXITL    0751
LIML      0006        TGENL     0754
LISTL     0442        TIFLGL    0765
LOHIL     0266        TINADL    0764
LRETUL    0446        TINSTL    0763
LSANDL    0445        TLIML     0762
LSWITL    0447        TPADDL    0767
MQA       7501        TPAGBL    0761
MQL       7421        TRACL     0777
P0AL      1106        TRETTL    0756
P0L       1173        TRETUL    0712

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```

ERRORS DETECTED: 0

LINKS GENERATED: 0

RUN-TIME: 5 SECONDS

2K CORE USED