)   )   )

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,

```
                            /
                            /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    5605                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
```

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

```
                         /
                         /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            /TYPE
```

```
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
```

```
                        /
                        /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
```

```
                        /
                        /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
```

```
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
0603   7001          IAC                /SET
0604   4757          JMS  I TSWITL      /TEST
```

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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  3/66              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
```

```
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   1371            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
```

```
0742  7402           HLT
0743  7200           CLA
0744  1366           TAD    TDATAL        /DSILAY 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
```

```
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
```

```
                     /
                     /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
```

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

```
                        /
                        /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
1070  7421              MQL
1071  1373              TAD    P0L
```

```
1072  4420           JMS I   TTANDL          /EX( T 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   P0AL,   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