IDENTIFICATION

PRODUCT CODE:	MAINDEC-8E-DØDA-D-(D)
PRODUCT NAME:	RANDOM AND TEST
DATE CREATED:	NOVEMBER 2, 1970
MAINTAINER:	DIAGNOSTIC GROUP
AUTHOR:	MICHAEL DAVIS

1. ABSTRACT

THIS 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    5605            JMP I   SAVBNL          /EXIT



                        /
                        /TRANSFER RIM AND BIN LOADERS TO PAGE 37
```

```
                        /
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



                        /
                        /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
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0333  4337            JMS     TYPEL           /TYPE LINEFEED
0334  1370            TAD     A
0335  4337            JMS     TYPEL           /TYPE A
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     L12201L         /GET HIGH CORE ADDRESS LIMIT
0435    3410            DCA I   PNTRL           /TRANSFER TO NEXT PAGE
0436    5377            JMP     GOTSTL          /GO TO TEST


                        /
0437    0000    TEMPL,  0
0440    0200    L200L,  200
0441    7000    L7000L, 7000
0442    0753    LISTL,  TGENL-1
0443    1000    LGENL,  GENL
0444    0321    LEPASL, EPASL
0445    0300    LSANDL, SANDL
0446    0712    LRETUL, TRETUL
0447    0312    LSWITL, SWITCL
0450    6600    L6600L, 6600
0451    1201    L12201L, 1201
                0577    *577
0577    7000    GOTSTL, NOP


                        /
                        /GENERATE TEST INSTRUCTION AND DATA
                        /
                0600    *600
```

```
0620  7300  TEST1L, CLA CLL
0621  1355         TAD     TANDL          /GET POINTER TO SIMULATED AND
0622  3000         DCA     TTANDL         /PLACE IN TRANSFER LOCATION
0623  7001         IAC                    /SET AC=1
0624  4757         JMS I   TSWITL         /TEST SR11
0625  5224         JMP     TDAT1L         /SR11=1, DO NOT GENERATE INSTRUCTION
0626  1362         TAD     TLIML          /NO, GET ADDRESS LIMIT
0627  3006         DCA     LIML           /SAVE
0630  1361         TAD     TPAGBL         /GET PAGE EXCLUSION BIT
0631  3007         DCA     PAGL
0632  4754         JMS I   TGENL          /GENERATE INSTRUCTION
0633  3365         DCA     TIFLGL         /SAVE INDIRECT FLA
0634  1001         TAD     INSTL          /GET INSTRUCTION
0635  3363         DCA     TINSTL         /SAVE IT
0636  1002         TAD     INADDL         /GET INSTRUCTION ADDRESS
0637  3364         DCA     TINADL         /SAVE IT
0640  1003         TAD     DATADL         /GET DATA ADDRESS
0641  3366         DCA     TDATAL         /SAVE IT
0642  1005         TAD     PADDL          /GET INDIRECT TO DATA
0643  3367         DCA     TPADDL         /SAVE IT
0644  7105  TDAT1L, CLL IAC RAL          /SET AC=2
0645  4757         JMS I   TSWITL         /TEST SR10
0646  5234         JMP     TDAT2L         /SR10=1, DO NOT GENERATE DATA1
0647  1370         TAD     TDA1L          /GENERATE RANDOM NUMBER
0650  7104         CLL RAL
0651  7430         SZL
0652  1374         TAD     T3L
0653  3370         DCA     TDA1L
0654  7307  TDAT2L, CLA CLL IAC RTL       /SET AC=4
0655  4757         JMS I   TSWITL         /TEST SR09
0656  5244         JMP     SETTL          /SR09=1, DO NOT GENERATE DATA2
0657  1371         TAD     TDA2L          /GENERATE RANDOM NUMBER
0660  7104         CLL RAL
0661  7430         SZL
0662  1374         TAD     T3L
0663  3371         DCA     TDA2L


                   /
                   /SET UP INSTRUCTION AND DATA AT TEST ADDRESS
                   /ALONG WITH RETURN TO THIS ROUTINE
                   /
0664  7300  SETTL, CLA CLL
0665  1363         TAD     TINSTL         /GET INSTRUCTION
0666  3764         DCA I   TINADL         /STORE IN TEST LOCATION
0667  1365         TAD     TIFLGL         /GET INDIRECT FLAG
0670  7650         SNA CLA                /IS INSTRUCTION INDIRECT
0671  5267         JMP     DIRL           /NO, GET DATA
0672  1366         TAD     TDATAL         /INDIRECT, IS ADDRESS
0673  1375         TAD     T7760          /AUTO-INDEX REGISTER
0674  7630         SZL CLA
0675  5262         JMP     .+5            /NO, USE POINTER AS IS
0676  1366         TAD     TDATAL
0677  1376         TAD     T7770
```

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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
0670  3766            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"



                      /
                      /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          /DISPLAY INSTRUCTION ADDRESS IN AC
0742  7402            HLT
0743  7200            CLA
0744  1366            TAD     TDATAL          /DISPLAY DATA ADDRESS IN AC
0745  7402            HLT
0746  7200            CLA
0747  1367            TAD     TPADDL          /DISPLAY 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    TSKITL, 0
0760  0000    TEPABL, 0
0761  0000    TPADDL, 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    T7750,  7760
0776  7772    T7770,  7772
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  4400         JMS I    TTANDL          /EXTRACT 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  4400         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
1137  5600         JMP I    GENL            /EXIT
```

```
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

                      $
```

```
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
```

```
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		
K0177L	1174	TDA1L	0770		
K0777	1171	TDA2L	0771		
K200L	1176	TDAT1L	0624		
K3L	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		

ERRORS DETECTED: 0

LINKS GENERATED: 0

RUN-TIME: 5 SECONDS

2K CORE USED