IDENTIFICATION

PRODUCT CODE:	MAINDEC-8E-D0EB-D
PRODUCT NAME:	RANDOM TAD TEST
DATE CREATED:	JUNE 7,1971
MAINTAINER:	DIAGNOSTIC GROUP
AUTHOR:	MICHAEL DAVIS

1. ABSTRACT

THIS PROGRAM TESTS THE TAD INSTRUCTING OF THE PDP-8E, THE TAD 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 LOADED INTO LOCATIONS 6600 THRU 7577.
THE TEST AREA IS 0000-6577. TEMPORARY STORAGE LOCATIONS ARE LOCATED ON PAGE 0.

2.3 PRELIMINARY PROGRAMS

MAINDEC-8E-D0AA, D0BA, D0CA, D0DA

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
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 ERROR HALT

IF THE RESULTS OF THE TAD INSTRUCTION ARE INCORRECT,
THAT IS IF THE ACTUAL AND SIMULATED LINKS, OR THE ACTUAL
AND SIMULATED SUMS DO NOT AGREE, THE PROGRAM
WILL HALT AT 7407 WITH DATA1 IN THE AC.

DEPRESS CONTINUE TO DISPLAY DATA2 IN THE AC.
DEPRESS CONTINUE TO DISPLAY TAD 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
TAD) IN AC.
DEPRESS CONTINUE TO RESUME TEST

6.2 ERROR RECOVERY

SEE 6.1

6.3 LOOPING

SET SR00=1 TO PREVENT HALT AFTER ERROR,

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 5 SECONDS, THE PROGRAM WILL TYPE "T" AFTER EACH 4096 RANOOM TESTS UNLESS SR03=1,

9, PROGRAM DESCRIPTION

THE PROGRAM IS LOADED INTO LOCATIONS 6600-7577, WITH TEMPORARY STORAGE LOCATIONS ON PAGE 0;

THE PROGRAM USES SEPARATE RANDOM NUMBER GENERATORS TO GENERATE THE TAD INSTRUCTION, INSTRUCTION AND DATA ADDRESSES, AND THE TWO ARGUMENTS TO BE "TADDED", 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 TAD INSTRUCTION IS COMPARED TO A SIMULATED TAD, THE SIMULATOR IS SIMILAR TO THE ONE USED IN MAINDEC-8E-D0CA-D, NO TADS ARE USED IN THE PROGRAM ITSELF,

AFTER 4096 TESTS, THE PROGRAM TYPES "T" AND CONTINUES TESTING,

```
                        /
                        /RANDOM TAD TEST
                        /COPYRIGHT 1970, DIGITAL EQUIPMENT CORP., MAYNARD, MASS. 01754
                        /V 82 07552
                        /
                        /
                        /TEMPORARY STORAGE LOCATIONS
                        /
        0000    *0
0000    0000    RETURN, 0
0001    5001    INSTL,  JMP     .
0002    0002    INADDL, 2
0003    0003    DATADL, 3
0004    0000    PADDL,  0
0005    0000    IFLAGL, 0

        7501            MQA=7501
        7421            MQL=7421
        6007            CAF=6007

        0200    *200
0200    6007    START,  CAF
0201    5602            JMP I   .+1
0202    6600            STARTL
```



```
                        /
                        /GENERATE TEST INSTRUCTION AND DATA
                        /
        6600    *6600
6600    7300    STARTL, CLA CLL
6601    3376            DCA     CNTR1           /CLEAR PASS COUNTER
6602    7604    TEST1L, LAS
6603    0371            AND     SR11            /TEST SR11
6604    7640            SZA CLA                 /IS SR11=1
6605    5224            JMP     TDAT1L          /SR11=1, DO NOT GENERATE INSTRUCTION
6606    4746            JMS I   TGENL          /GENERATE INSTRUCTION
6607    3355            DCA     TIFLGL          /SAVE INDIRECT FLA
6610    7040            CMA
6611    0001            AND     INSTL           /GET INSTRUCTION
6612    3353            DCA     TINSTL          /SAVE IT
6613    7040            CMA
6614    0002            AND     INADDL          /GET INSTRUCTION ADDRESS
6615    3354            DCA     TINADL          /SAVE IT
6616    7040            CMA
6617    0003            AND     DATADL          /GET DATA ADDRESS
6620    3356            DCA     TDATAL          /SAVE IT
6621    7040            CMA
6622    0004            AND     PADDL           /GET INDIRECT TO DATA
6623    3357            DCA     TPADDL          /SAVE IT
6624    7604    TDAT1L, LAS
6625    0372            AND     SR10            /TEST SR10
```

```
6626  7640            SZA CLA                 /IS SR10=1
6627  5234            JMP     TDAT2L          /SR10=1, DO NOT GENERATE DATA1
6630  7040            CMA
6631  0360            AND     TDA1L           /GENERATE RANDOM NUMBER
6632  4752            JMS I   TRANDL
6633  3360            DCA     TDA1L
6634  7604  TDAT2L,   LAS
6635  0373            AND     SR09            /TEST SR09
6636  7640            SZA CLA                 /IS SR09=1
6637  5244            JMP     SETTL           /SR09=1, DO NOT GENERATE DATA2
6640  7040            CMA
6641  0361            AND     TDA2L           /GENERATE RANDOM NUMBER
6642  4752            JMS I   TRANDL
6643  3361            DCA     TDA2L

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                        /
                        /SET UP INSTRUCTION AND DATA AT TEST ADDRESS
                        /ALONG WITH RETURN TO THIS ROUTINE
                        /
6644  7340    SETTL,    CLA CLL CMA
6645  0353              AND     TINSTL          /GET INSTRUCTION
6646  3754              DCA I   TINADL          /STORE IN TEST LOCATION
6647  7040              CMA
6650  0355              AND     TIFLGL          /GET INDIRECT FLAG
6651  7650              SNA CLA                 /IS INSTRUCTION INDIRECT
6652  5302              JMP     DIRL            /NO, GET DATA
6653  7040              CMA
6654  0356              AND     TDATAL          /ADDRESS IS INDIRECT
6655  0367              AND     T7760           /IS ADDRESS AUTO-INDEX REGISTER
6656  7640              SZA CLA
6657  5276              JMP     NOTAUT          /NO
6660  7040              CMA
6661  0356              AND     TDATAL
6662  0375              AND     K10
6663  7650              SNA CLA
6664  5276              JMP     NOTAUT
6665  7040              CMA
6666  0357              AND     TPADDL          /ADDRESS IS AUTO-INDEX REGISTER
6667  7041              CIA                     /DECREMENT POINTER TO DATA
6670  7040              CMA
6671  3756              DCA I   TDATAL          /STORE IN TEST LOCATION
6672  7040              CMA
6673  0360              AND     TDA1L           /GET DATA
6674  3757              DCA I   TPADDL          /STORE IN TEST LOCATION
6675  5305              JMP     DOTSTL
6676  7040    NOTAUT,   CMA
6677  0357              AND     TPADDL
6700  3756              DCA I   TDATAL
6701  5272              JMP     .-7
6702  7040    DIRL,     CMA
6703  0360              AND     TDA1L           /GET DATA
6704  3756              DCA I   TDATAL          /STORE IN TEST LOCATION
                        /
                        /SIMULATE "TAD"
                        /
      7340    DOTSTL,   CLA CLL CMA
```

```
 6706  0360            AND     TDA1L           /GET DATA1
 6707  7421            MQL                     /SAVE IN MQ
 6710  7040            CMA
 6711  0361            AND     TDA2L           /GET DATA2
 6712  4751            JMS I   TSIMAD          /DO SIMULATION
 6713  3363            DCA     TSIMAC          /SAVE ANSWER
 6714  7010            RAR
 6715  3362            DCA     TSIML           /SAVE LINK

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                        /
                        /GO TO TEST
                        /
 6716  7040    DOANDL, CMA
 6717  0347            AND     TRETTL          /GET RETURN ADDRESS
 6720  3000            DCA     RETURN          /SAVE
 6721  7040            CMA
 6722  0354            AND     TINADL          /GET INSTRUCTION ADDRESS
 6723  7001            IAC                     /INCREMENT
 6724  7450            SNA                     /IS IT 0
 6725  5202            JMP     TEST1L          /YES, GENERATE NEW INFORMATION
 6726  3345            DCA     TEMP2L          /NO, SAVE
 6727  7040            CMA
 6730  0366            AND     T5400L          /GET RETURN INSTRUCTION
 6731  3745            DCA I   TEMP2L          /PUT IN TEST LOCATION
 6732  7140            CLL CMA
 6733  0361            AND     TDA2L           /GET DATA2
 6734  5754            JMP I   TINADL          /EXECUTE "TAD"
                        /
                        /RETURN HERE AFTER EXECUTION
                        /
 6735  3364    TRETUL, DCA     TAC             /SAVE AC
 6736  7010            RAR
 6737  3365            DCA     TLINK           /SAVE LINK
 6740  4774            JMS I   TCOMAD          /COMPARE REAL AND SIMULATED ADDITIONS
 6741  2376            ISZ     CNTR1
 6742  5202            JMP     TEST1L
 6743  4750            JMS I   TEPASL          /END OF PASS, 4096 TEST COMPLETE
 6744  5202            JMP     TEST1L

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                        /
                        /
                        /
 6745  0000    TEMP2L, 0
 6746  7000    TGENL,  GENL
 6747  6735    TRETTL, TRETUL
               TERROR,
 6750  7442    TEPASL, EPASL
 6751  7200    TSIMAD, RSIMAD
 6752  7430    TRANDL, RANDL
 6753  0000    TINSTL, 0
 6754  0000    TINADL, 0
 6755  0000    TIFLGL, 0
 6756  0000    TDATAL, 0
 6757  0000    TPADDL, 0
```

```
6760  0021    TDA1L,  21
6761  0037    TDA2L,  37
6762  0000    TSIML,  0
6763  0000    TSIMAC, 0
6764  0000    TAC,    0
6765  0000    TLINK,  0
6766  5400    T5403L, 5422
6767  7760    T7762,  7762
6770  7770    T7770,  7770
6771  0001    SR11,   1
6772  0002    SR10,   2
6773  0004    SR09,   4
6774  7313    TCOMAD, COMAD
6775  0010    K10,    10
6776  0000    CNTR1,  0

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                        /
                        /GENERATE INSTRUCTIONS AND ADDRESSES
                        /
      7000      PAGE
7000  0000      GENL,   0
                        /
                        /GENERATE "AND" INSTRUCTION
                        /
7001  7040      GANDL,  CMA
7002  0350              AND     R1L
7003  4762              JMS I   SRANDL          /GENERATE RANDOM NUMBER
7004  3350              DCA     R1L             /SAVE NUMBER
7005  7040              CMA
7006  0350              AND     R1L
7007  7421              MQL                     /GENERATE OP CODE
7010  7040              CMA
7011  0365              AND     K1000
7012  7501              MQA
7013  0352              AND     K1777
7014  3001              DCA     INSTL           /SAVE INSTRUCTION
7015  7040              CMA
7016  0001              AND     INSTL           /GET INSTRUCTION
7017  0355              AND     K0177L          /EXTRACT PAGE ADDRESS OF INSTRUCTION
7020  3361              DCA     TEMP3L          /SAVE PAGE ADDRESS OF INSTRUCTION
                        /
                        /GENERATE ADDRESS FOR INSTRUCTION
                        /
7021  7040      GANADL, CMA
7022  0353              AND     R2L
7023  4762              JMS I   SRANDL          /GENERATE RANDOM NUMBER
7024  3353              DCA     R2L             /SAVE NUMBER
7025  7040              CMA
7026  0353              AND     R2L
7027  4777'             JMS     LIMIT           /IS ADDRESS WITHIN LIMITS
7030  5221              JMP     GANADL          /NO, GENERATE NEW ADDRESS
7031  7040              CMA
7032  0353              AND     R2L
7033  0354              AND     P0L
7034  7640              SZA CLA                 /IS ADDRESS ON PAGE 0
7035  5244              JMP     PAGADL          /NO
      7040              CMA
```

```
  037  0353            AND     R2L             /GET PAGE ADDRESS OF INSTRUCTION
 7040  4776'  PAGAL,   JMS     ABS_            /GET DIFFERENCE BETWEEN PAGE ADDRESSES
 7041  7700            SMA CLA                 /IS DIFFERENCE >2
 7042  5221            JMP     GANADL          /NO
 7043  5255            JMP     PAL

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 7044  7040   PAGADL,  CMA
 7045  0001            AND     INSTL           /GET INSTRUCTION
 7046  0357            AND     K200L
 7047  7650            SNA CLA                 /IS PAGE BIT SET
 7050  5255            JMP     PAL             /NO, USE ADDRESS AS IS
 7051  7040            CMA
 7052  0353            AND     R2L             /PAGE BIT SET, EXTRACT PAGE ADDRESS FOR INSTRUCTION
 7053  0355            AND     K0177L
 7054  5240            JMP     PAGAL           /TEST FOR INTERFERENCE
 7055  7040   PAL,     CMA
 7056  0361            AND     TEMP3L          /MAKE SURE DATA WILL
 7057  7650            SNA CLA                 /NOT BE STORED IN LOCATION 0
 7060  5201            JMP     GANDL           /LOCATION ZERO, TRY AGAIN
 7061  7040            CMA                     /USE ADDRESS AS IS
 7062  0353            AND     R2L
 7063  3002            DCA     INADDL

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                        /
                        /GENERATE ADDRESS FOR DATA
                        /

 7064  7040   DAADL,   CMA
 7065  0001            AND     INSTL           /GET INSTRUCTION
 7066  0357            AND     K200L           /IS PAGE BIT OF INSTRUCTION SET
 7067  7650            SNA CLA
 7070  5307            JMP     P0AL            /NO, USE PAGE ADDRESS BITS OF INSTRUCTION FOR DATA ADDRESS
 7071  7040            CMA
 7072  0002            AND     INADDL          /EXTRACT PAGE OF INSTRUCTION ADDRESS
 7073  0354            AND     P0L
 7074  7421            MQL
 7075  7040            CMA
 7076  0361            AND     TEMP3L
 7077  7501            MQA                     /"OR" TOGETHER TO GET
 7100  3003            DCA     DATADL          /DATA ADDRESS
 7101  7040   INDIRL,  CMA
 7102  0001            AND     INSTL
 7103  0356            AND     K400L
 7104  7640            SZA CLA                 /IS INSTRUCTION INDIRECT
 7105  5313            JMP     PADL            /YES, INSTRUCTION IS INDIRECT
 7106  5600            JMP I   GENL            /EXIT
 7107  7040   P0AL,    CMA                     /USE PAGE ADDRESS OF INSTRUCTION
 7110  0361            AND     TEMP3L          /AS DTAT ADDRESS
 7111  3003            DCA     DATADL
 7112  5301            JMP     INDIRL
                        /
                        /GENERATE INDIRECT ADDRESS FOR DATA
                        /
```

```
7113  7040    PADL,   CMA
7114  0360            AND     R3L             /GENERATE RANDOM NUMBER
7115  4762            JMS I   SRANDL
7116  3360            DCA     R3L
7117  7040            CMA
7120  0360            AND     R3L
7121  4777'           JMS     LIMIT           /IS ADDRESS WITHIN LIMITS
7122  5313            JMP     PADL            /NO, TRY AGAIN
7123  7040            CMA
7124  0002            AND     INADDL          /GET INSTRUCTION ADDRESS
7125  4775'           JMS     ABSL1           /GENEREATE DIFFERENCE BETWEEN ADDRESSES
7126  7700            SMA CLA                 /DO INSTRUCTION AND ADDRESS INTERFERE
7127  5313            JMP     PADL            /YES
7130  7040            CMA                     /NO, TEST DATA ADDRESS AS ABOVE
7131  0003            AND     DATADL
7132  4775'           JMS     ABSL1
7133  7700            SMA CLA
7134  5313            JMP     PADL
7135  7040            CMA
7136  0360            AND     R3L             /ADDRESSES DO NOT INTERFERE
7137  7041            CIA                     /WILL LOCATION BE 0 IF DECREMENTED
7140  7040            CMA
7141  7650            SNA CLA

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7142  5313            JMP     PADL            /YES, GENERATE NEW POINTER
7143  7040            CMA
7144  0360            AND     R3L
7145  3004            DCA     PADDL
7146  7040            CMA
7147  5600            JMP I   GENL            /EXIT
                      /
                      /
                      /
7150  0001    R1L,    1
7151  0003    K3L,    3
7152  1777    K1777,  1777
7153  0005    R2L,    5
7154  7600    P0L,    7600
7155  0177    K0177L, 177
7156  0400    K400L,  400
7157  0200    K200L,  200
7160  0015    R3L,    15
7161  0000    TEMP3L, 0
7162  7430    SRANDL, RANDL
7163  7200    SRIMAD, RSIMAD
7164  1201    LIML,   1201
7165  1000    K1000,  1000


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                      /
                      /
                      /SIMULATED ADDITION
                      /
```

```
 176  7474
7177  7303
      7200    PAGE
7200  0000    RSIMAD, 0
7201  3344            DCA     ARG2            /SAVE ARGUMENTS
7202  7501            MQA
7203  3343            DCA     ARG1
                      /
                      /
                      /SIMULATE ADDITION BY SIMULATED GENERATEION OF SUM
                      /AND CARRY BITS
                      /
                      /
                      /FORM OR OF ARG1 WITH ARG2
                      /
7204  7340    SIMAD,  CLA CLL CMA
7205  0343            AND     ARG1            /LOAD AC WITH ARG1
7206  7421            MQL                     /PLACE IN MQ
7207  7040            CMA
7210  0344            AND     ARG2            /LOAD AC WITH ARG2
7211  7501            MQA                     /FORM ARG1 OR ARG2
7212  3345            DCA     A1ORA2          /SAVE ARG1 OR ARG2

                      /
                      /FORM XOR(EXCLUSIVE OR) OF ARG1 WITH ARG2
                      /BY A XOR B=(A AND NOTB)OR(NOTA AND B)
                      /
7213  7501            MQA                     /GET ARG1 FROM MQ
7214  7040            CMA                     /FORM NOTARG1
7215  0344            AND     ARG2            /AND WITH ARG2 TO GET ARG2 AND NOTARG1
7216  7421            MQL                     /SAVE IN MQ
7217  7040            CMA
7220  0344            AND     ARG2            /LOAD AC WITH ARG2
7221  7040            CMA                     /FORM NOTARG2
7222  0343            AND     ARG1            /AND WITH ARG1 TO GET ARG1 AND NOTARG2
7223  7501            MQA                     /OR WITH ARG2 AND NOTARG1
7224  3346            DCA     SIMAC           /TO GET ARG1 XOR ARG2
7225  3347            DCA     SIMLNK


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                      /
                      /AND ARG1 WITH ARG2
                      /TEST FOR CARRIES
                      /IF THERE ARE NO BITS IN COMMON BETWEEN ARG1 AND ARG2
                      /THERE WILL BE NO CARRIES GENERATED
                      /
7226  7040            CMA
7227  0343            AND     ARG1            /LOAD AC WITH ARG1
7230  0344            AND     ARG2            /AND WITH ARG2
7231  7450            SNA                     /ARE THERE ANY CARRIES
7232  5274            JMP     ENDSIM          /NO, TERMINATE SIMULATION
                      /
                      /GENERATE CARRIES
                      /
7233  7421            MQL                     /SAVE FIRST CARRIES
7234  7521    NXTCAR, MQA MQL                 /GET CARRIES FROM MQ
7235  0345            AND     A1ORA2          /AND WITH A1ORA2 TO SEE IF MORE CARRIES ARE GENERATED
7236  7450            SNA                     /ARE THERE ANY MORE CARRIES
```

```
7237  5244            JMP     ENCAR           /NO, END SIMULATION OF CARRIES
7240  7104            CLL RAL                 /PROPIGATE CARRIES
7241  7521            MQA MQL                 /GET PREVIOUS CARRIES FROM MQ, SAVE NEW CARRIES
7242  7501            MQA                     /OR NEW CARRIES WITH PREVIOUS CARRIES
7243  5234            JMP     NXTCAR          /CONTINUE
                      /
                      /TEST FOR CARRY INTO LINK
                      /
7244  7501  ENCAR,    MQA                     /GET CARRIES
7245  0345            AND     A1ORA2          /AND WITH A1ORA2
7246  0350            AND     K4000           /TEST BIT 00
7247  7450            SNA                     /IS BIT 00 1
7250  5253            JMP     ENCAR1          /NO, CARRIES DID NOT PROPIGATE INTO LINK
7251  3347            DCA     SIMLNK          /YES, SAVE CARRY INTO LINK
7252  5260            JMP     XORALL          /COMPLETE SIMULATION
7253  7130  ENCAR1,   CLL CML RAR             /SET AC=4000
7254  0343            AND     ARG1            /AND WITH ARG1
7255  0344            AND     ARG2            /AND WITH ARG2 TO SEE IF ORIGINAL
7256  7440            SZA                     /NUMBERS GENERATED CARRY INTO LINK
7257  3347            DCA     SIMLNK          /SAVE SIMULATED LINK

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                      /
                      /FORM XOR OF ARG1, ARG2, AND CARRIES
                      /TO GET FINAL SIMULATED SUM
                      /
7260  7501  XORALL,   MQA                     /SAVE SIMULATED CARRIES
7261  3351            DCA     CARRY
7262  7501            MQA
7263  7040            CMA
7264  0346            AND     SIMAC           /FORM A1ORA2 AND NOTCARRY
7265  7421            MQL                     /SAVE IN MQ
7266  7040            CMA
7267  0346            AND     SIMAC
7270  7040            CMA
7271  0351            AND     CARRY           /FORM CARRY AND NOTA1ORA2
7272  7501            MQA                     /OR WITH CONTENTS OF MQ
7273  3346            DCA     SIMAC
7274  7340  ENDSIM,   CLA CLL CMA
7275  0347            AND     SIMLNK
7276  7640            SZA CLA
7277  7020            CML
7300  7040            CMA
7301  0346            AND     SIMAC
7302  5600            JMP I   RSIMAD          /TO GET FINAL SIMULATED SUM
                      /
                      /TEST ADDRESS
                      /
7303  0000  LIMIT,    0
7304  7421            MQL                     /SAVE ARGUMENT IN MQ
7305  7040            CMA
7306  0777            AND     LIML            /LOAD AC WITH LIMIT
7307  4200            JMS     RSIMAD          /DO ADDITION
7310  7620            SNL CLA                 /LINK SET IF NUMBER TO LARGE
7311  2303            ISZ     LIMIT           /NUMBER OK
7312  5703            JMP I   LIMIT
```

```
                        /
                        /COMPARE SIMULATED AND REAL RESULT
                        /
 7313  0000    COMAD,   0
 7314  7340             CLA CLL CMA
 7315  0776'            AND     TSIML           /GET SIMULATED RESULTANT LINK
 7316  7640             SZA CLA
 7317  7020             CML
 7320  7040             CMA
 7321  0775'            AND     TLINK           /COMPARE TO REAL LINK
 7322  7640             SZA CLA
 7323  7020             CML
 7324  7430             SZL                     /IF SAME, LINK=0
 7325  5341             JMP     ERROR1          /NOT THE SAME, ERROR
 7326  7340             CLA CLL CMA
 7327  0774'            AND     TAC             /GET ADDITION RESULT
 7330  7040             CMA
 7331  0773'            AND     TSIMAC          /COMPARE TO COMPLEMENT OF SIMULATION RESULT

 7332  7440             SZA
 7333  5341             JMP     ERROR1          /NOT 0, ERROR
 7334  7040             CMA
 7335  0773'            AND     TSIMAC          /GET SIMULATION RESULT
 7336  7040             CMA
 7337  0774'            AND     TAC             /COMPARE TO COMPLEMENT OF REAL ADDITION
 7340  7640             SZA CLA
 7341  4752    ERROR1,  JMS I   ERRORS
 7342  5713             JMP I   COMAD
 7343  0000    ARG1,    0
 7344  0000    ARG2,    0
 7345  0000    A1ORA2,  0
 7346  0000    SIMAC,   0
 7347  0000    SIMLNK,  0
 7350  4000    K4000,   4000
 7351  0000    CARRY,   0
 7352  7400    ERRORS,  ERROR
```



```
                        /
                        /ERROR HANDLER
                        /
 7373  6763
 7374  6764
 7375  6765
 7376  6762
 7377  7164
       7400    PAGE
 7400  0000    ERROR,   0
 7401  7604             LAS
 7402  0267             AND     SR00            /TEST SR00
 7403  7640             SZA CLA                 /IS SR00=1
 7404  5600             JMP I   ERROR           /YES, DO NOT HALT
 7405  7240             CLA CMA
```

```
7406  0777'           AND     TDA1L           /HALT WITH DATA1 IN AC
7407  7402            HLT
7410  7240            CLA CMA
7411  0776'           AND     TDA2L           /HALT WITH DATA2 IN AC
7412  7402            HLT
7413  7240            CLA CMA
7414  0775'           AND     TINSTL          /HALT WITH INSTRUCTION IN AC
7415  7402            HLT
7416  7240            CLA CMA
7417  0774'           AND     TINADL          /HALT WITH INSTRUCTION ADDRESS IN AC
7420  7402            HLT
7421  7240            CLA CMA
7422  0773'           AND     TDATAL          /HALT WITH DATA ADDRESS IN AC
7423  7402            HLT
7424  7240            CLA CMA
7425  0772'           AND     TPADDL          /HALT WITH INDIRECT IN AC
7426  7402            HLT
7427  5600            JMP I   ERROR
                      /
                      /RANDOM NUMBER GENERATOR
                      /
7430  0000    RANDL,  0
7431  7104            CLL RAL
7432  7420            SNL
7433  5240            JMP     ENRAN
7434  7421            MQL
7435  7040            CMA
7436  0241            AND     K3
7437  4771'           JMS     RSIMAD
7440  5630    ENRAN,  JMP I   RANDL
7441  0003    K3,     3

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                      /
                      /END OF PASS
                      /
7442  0000    EPASL,  0
7443  7604            LAS
7444  0270            AND     SR03
7445  7640            SZA CLA
7446  5642            JMP I   EPASL
7447  7040            CMA
7450  0271            AND     C215
7451  4261            JMS     TYPE
7452  7040            CMA
7453  0272            AND     C212
7454  4261            JMS     TYPE
7455  7040            CMA
7456  0273            AND     C324
7457  4261            JMS     TYPE
7460  5642            JMP I   EPASL
                      /
                      /
                      /
7461  0000    TYPE,   0
7462  6046            TLS
7463  6041            TSF
```

```
 7464  5263            JMP     .-1
 7465  7200            CLA
 7466  5661            JMP I   TYPE
                       /
                       /
                       /
 7467  4000    SR00,   4000
 7470  0400    SR03,   0400
 7471  0215    C215,   215
 7472  0212    C212,   212
 7473  0324    C324,   324
                       /
                       /TEST FOR PROPER DIFFERENCE
                       /
 7474  0000    ABSL,   0
 7475  7041            CIA
 7476  7421            MQL
 7477  7040            CMA
 7500  0770'           AND     TEMP3L
 7501  4771'           JMS     RSIMAD
 7502  7500            SMA
 7503  7041            CIA
 7504  7001            IAC
 7505  7001            IAC
 7506  5674            JMP I   ABSL
```



```
                       /
                       /
                       /
 7507  0000    ABSL1,  0
 7510  7041            CIA
 7511  7421            MQL
 7512  7040            CMA
 7513  0767'           AND     R3L
 7514  4771'           JMS     RSIMAD
 7515  7500            SMA
 7516  7041            CIA
 7517  7001            IAC
 7520  7001            IAC
 7521  5707            JMP I   ABSL1
                       $
 7567  7160
 7570  7161
 7571  7200
 7572  6757
 7573  6756
 7574  6754
 7575  6753
 7576  6761
 7577  6760
```

```
0000  11111100  00000000  00000000  00000000  00000000  00000000  00000000  00000000
0100  00000000  00000000  00000000  00000000  00000000  00000000  00000000  00000000

0200  11100000  00000000  00000000  00000000  00000000  00000000  00000000  00000000
0300  00000000  00000000  00000000  00000000  00000000  00000000  00000000  00000000

0400
0500

0600
0700


1000
1100

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  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
6700  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111110


7000  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
7100  11111111  11111111  11111111  11111111  11111111  11111111  11111100  00000111

7200  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
7300  11111111  11111111  11111111  11111111  11111111  11100000  00000000  00011111

7400  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
7500  11111111  11111111  11000000  00000000  00000000  00000000  00000001  11111111

7600
7700
```


A10RA2	7345	PAGAL	7040
ABSL	7474	PAL	7055
ABSL1	7507	R1L	7150
ARG1	7343	R2L	7153
ARG2	7344	R3L	7160
C212	7472	RANDL	7430
C215	7471	RETURN	0000
C324	7473	RSIMAD	7200
CAF	6007	SETTL	6644
CARRY	7351	SIMAC	7346
CNTR1	6776	SIMAD	7204
COMAD	7313	SIMLNK	7347
DAADL	7064	SR00	7467

```
DATADL  0003            SR03    7470
DIRL    6702            SR09    6773
DOANDL  6716            SR10    6772
DOTSTL  6705            SR11    6771
ENCAR   7244            SRANDL  7162
ENCAR1  7253            SRIMAD  7163
ENDSIM  7274            START   0200
ENRAN   7440            STARTL  6600
EPASL   7442            T5400L  6766
ERROR   7400            T7760   6767
ERROR1  7341            T7770   6770
ERRORS  7352            TAC     6764
GANADL  7021            TCOMAD  6774
GANDL   7001            TDA1L   6760
GENL    7000            TDA2L   6761
IFLAGL  0005            TDAT1L  6624
INADDL  0002            TDAT2L  6634
INDIRL  7101            TDATAL  6756
INSTL   0001            TEMP2L  6745
K0177L  7155            TEMP3L  7161
K10     6775            TEPASL  6750
K1000   7165            TERROR  6750
K1777   7152            TEST1L  6602
K200L   7157            TGENL   6746
K3      7441            TIFLGL  6755
K3L     7151            TINADL  6754
K4000   7350            TINSTL  6753
K400L   7156            TLINK   6765
LIMIT   7303            TPADDL  6757
LIML    7164            TRANDL  6752
MQA     7501            TRETTL  6747
MQL     7421            TRETUL  6735
NOTAUT  6676            TSIMAC  6763
NXTCAR  7234            TSIMAD  6751
P0AL    7107            TSIML   6762
P0L     7154            TYPE    7461
PADDL   0004            XORALL  7260
PADL    7113
PAGADL  7044

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ERRORS DETECTED: 0

LINKS GENERATED: 23

RUN-TIME:  5 SECONDS

2K CORE USED
```