IDENTIFICATION

PRODUCT CODE: MAINDEC-8E-D0EB-D

PRODUCT NAME: RANDOM TAD TEST

DATE CREATED: JUNE 7,1971

MAINTAINER: DIAGNOSTIC GROUP

AUTHOR: MICHAEL DAVIS

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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 RANDOM 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,

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```
                    /
                    /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
```

```
                     /
                     /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
```

```
   706    0360              AND     TDA1L          /GET    DA1
  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   5422    T5422L,  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
```

```
                        /
                        /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  .GE 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
```

```
      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
```

```
                            /
                            /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  5620             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
                       /
```

7   ) 7527   )

```
  ↓76   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
```

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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   5620            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   2771            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
```

```
 464   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

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                         /
                         /
                         /
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

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```

```
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
           /          PAL10    V141      17-JUN-71        7:23      PAGE 16-2



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
```

```
A1ORA2   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  6/16          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   7420          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