IDENTIFICATION

PRODUCT CODE:	MAINDEC-8E-D0CC-D
PRODUCT NAME:	8E ADDER TESTS
DATE CREATED:	SEPT. 1, 1971
MAINTAINER:	DIAGNOSTIC GROUP
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1, ABSTRACT

THIS PROGRAM TESTS THE ADDER CIRCUITS OF THE PDP-8E. THE PROGRAM IS COMPOSED OF FIVE PARTS.

A SIMULATOR FOR THE TAD INSTRUCTION WHICH TESTS ALL COMBINATIONS OF TWO ARGUMENT ADDITIONS.

A SIMULATOR FOR ROTATE INSTRUCTIONS THAT TESTS ROTATION OF ALL POSSIBLE ARGUMENTS WITH RAL, RAR, RTL, RTR AND BSW.

A CARRY GENERATION TEST

A SERIES OF RANDOM NUMBER TESTS

A FIELD RELOCATION ADDER TEST

2, REQUIREMENTS

2,1 EQUIPMENT

PDP-8E EQUIPPED WITH AT LEAST 4K OF MEMORY AND A TELETYPE

2,2 STORAGE

THE PROGRAM IS STORED IN LOCATIONS 0000-6000 AND UTILIZES LOCATIONS 7775-7777 AS A TEST AREA.

2,3 PRELIMINARY PROGRAMS

MAINDEC-8E-D0AA, D0BA

RUN ALL EXTENDED MEMORY TESTS PRIOR TO RUNNING RELOCATION ADDER TEST.

3, LOADING PROCEDURE

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

4, STARTING PROCEDURE

4,1 CONTROL SWITCH SETTINGS

SR00=1 SUPPRESS HALT ON ERROR
SR01=1 SUPPRESS ERROR TYPEOUT
SR02=1 LOOP ON ERROR
SR03=1 FAST TEST
SR04=0 LOOP IN CURRENT MEMORY BANK
SR04=1 RELOCATE TO NEXT EXISTING BANK
SR06-08 AMOUNT OF EXTENDED BANKS OF MEMORY
SR09=1 HALT AT END OF TEST
SR10=1 SUPPRESS END OF TEST TYPEOUT
SR11=1 LOOP ON PRESENT TEST

4,2 STARTING ADDRESSES

NORMAL STARTING ADDRESS=0200
RESTORE LOADERS=7600

4,3 OPERATOR ACTION

4,3,1 SET SR=0200

4,3,2 PRESS ADDR LOAD SWITCH

4,3,3 SET SR=0000

4,3,4 SET SWITCH REGISTER TO DESIRED FUNCTIONS SEE 4,1

4,3,5 PRESS CLEAR AND CONT SWITCHES

5, OPERATING PROCEDURE

5,1 FAST TEST

THE ADDITION SIMULATOR NORMALLY STARTS WITH ARG1 AND ARG2 0000, TO SPEED UP THE TEST, THE VALUE OF ARG2 MAY BE SET AT SOME OTHER VALUE INITIALLY, TO DO THIS, DEPOSIT THE DESIRED VALUE IN LOCATION 170, AND PROCEED AS IN 4,, BUT WITH SR=0400 INSTEAD OF 0000 IN 4,3,3

5,2 TO RESTORE AND START BINARY LOADER, STOP PROGRAM, LOAD ADDRESS 7600 AND START COMPUTER,

5,3 RELOCATION ADDER TEST

IF SR04=1 THE ADDER TEST WILL RELOCATE TO THE NEXT SEQUENTIAL EXISTING MEMORY BANK AT THE COMPLETION OF EVERY PASS, THE EXACT AMOUNT OF EXISTING EXTENDED MEMORY BANKS MUST BE IN SR06-08 TO RUN THIS PORTION OF THE ADDER TEST, PRIOR TO EACH RELOCATION THE PROGRAM WILL COMPARE THE BANKS FOUND UNDER TEST TO THE BANK AMOUNT IN SR06-08 AND START RELOCATION, THE FOLLOWING MESSAGE WILL BE TYPED ON TELETYPE,

********** X EXTENDED BANKS OF MEMORY TO BANK X ********

5,4 OPTIONS

SEE 4,1

6, ERRORS

6,1 ERROR MESSAGES

6,1,1 SIMULATED ADDITION TEST

IF A FAILURE OCCURS DURING THE SIMULATED ADDITION TEST, THE PROGRAM WILL TYPE THE FOLLOWING MESSAGE AND THEN HALT!

SIMULATED ADD TEST FAILED

ARG1	ARG2	SIMULATED	ARG1+ARG2	ARG2+ARG1
XXXXXXXXXXXX	XXXXXXXXXXXX	X XXXXXXXXXXXX	X XXXXXXXXXXXX	X XXXXXXXXXXXX

ARG1 AND ARG2 ARE THE TWO NUMBERS THAT WERE ADDED,
SIMULATED IS THE ANSWER PRODUCED BY THE ADDITION SIMULATOR
)K AND AC)
)1+ARG2 IS THE RESULT OF ADDING ARG2 TO ARG1

(ARG1 IS IN AC INITIALLY)
ARG2+ARG1 IS THE RESULT OF ADDING ARG1 TO ARG2
(ARG2 IS IN AC INITIALLY),

NOTE: EITHER THE SIMULATION OR THE ACTUAL ADDITIONS MAY HAVE FAILED,

6,1,2 SIMULATED ROTATE TEST

IF A FAILURE OCCURS DURING THE SIMULATED ROTATE TEST, THE PROGRAM WILL TYPE THE FOLLOWING MESSAGE AND THEN HALT:

```
SIMULATED AAA TEST FAILED
ORIGINAL          SIMULATED          ACTUAL
XXXXXXXXXXXX  X XXXXXXXXXXXX  X XXXXXXXXXXXX
```

ORIGINAL IS THE LINK AND ACCUMULATOR TO BE ROTATED
SIMULATED IS THE SIMULATED RESULT OF ROTATION
ACTUAL IS THE REAL RESULT OF ROTATION
AAA IS THE INSTRUCTION BEING TESTED, I.E. RAL,RAR,RTL,RTR,BSW

6,1,3 FALSE CARRY TEST

IF A FAILURE OCCURS DURING THE FALSE CARRY TEST, THE PROGRAM WILL TYPE THE FOLLOWING MESSAGE AND THEN HALT:

```
        DATA ERROR
AAAA    X XXXXXXXXXXXX
```

AAAA IS THE STARTING ADDRESS OF THE TEST THAT FAILED
X XXXXXXXXXXXX ARE THE CONTENTS OF THE LINK AND AC

NOTE: EACH FALSE CARRY TEST EXPECTS LINK=1 AND AC=0 AS A RESULT,

6,1,4 RANDOM ADD TEST 1

IF A FAILURE OCCURS DURING RANDOM ADD TEST 1, THE PROGRAM WILL TYPE THE FOLLOWING MESSAGE AND THEN HALT:

```
        RANDOM ADD TEST 1 FAILED
   RANDA        RANDC          RESULT
XXXXXXXXXXXX XXXXXXXXXXXX X XXXXXXXXXXXX
```

RANDA IS A RANDOM NUMBER
RANDC IS THE COMPLEMENT OF RANDA
RESULT IS THE RESULT OF CONSECUTIVE ADDITIONS OF RANDA AND RANDC

NOTE: THE EXPECTED RESULT IS LINK=1, AC=0

6,1,5 RANDOM ADD TEST 2

IF A FAILURE OCCURS DURING RANDOM ADD TEST 2, THE PROGRAM WILL TYPE THE FOLLOWING MESSAGE AND HALT:

```
RANDOM ADD TEST 2 FAILED
    ARG1          ARG2          EXPECTED        ARG1+ARG2
XXXXXXXXXXXX XXXXXXXXXXXX X XXXXXXXXXXXX X XXXXXXXXXXXX
```

6,1,6 RANDOM ROTATE TESTS

IF A FAILURE OCCURS DURING ONE OF THE RANDOM ROTATE TESTS, THE PROGRAM WILL TYPE THE FOLLOWING MESSAGE AND THEN HALT:

```
RANDOM AAA TEST FAILED
   ORIGINAL          ACTUAL
X XXXXXXXXXXX  X XXXXXXXXXXX
```

AAA=RAR, RAL, RTR OR RTL

6,2 ERROR HALTS

THE FOLLOWING TABLE LISTS ERROR HALT LOCATIONS AND THE TEST THAT THEY APPLY TO

LOCATION	TEST
502	SIMAD
1066	SIMROT (WITH LOCATION OF SPECIFIC TEST IN AC)
3035	FCT (WITH LOCATION OF SPECIFIC TEST IN AC)
3510	RNAD1
4041	RNAD2
5061	RANDOM ROTATE (WITH LOCATION OF SPECIFIC TEST IN AC)

6,2 ERROR RECOVERY

DEPRESS CONT TO RESUME TEST

6,3 LOOPING ON ERROR

6,3,1 SWITCH REGISTER CONTROL

SET SR00=1 TO SUPPRESS ERROR HALT
SET SR01=1 TO SUPPRESS ERROR TYPEOUT
SET SR02=2 TO LOOP
DEPRESS CONT

6,3,2 PROGRAM MODIFICATION

THERE ARE NOPS IN EACH TEST PROVIDED TO ALLOW THE OPERATOR TO SET UP LOOPS TIGHTER THAN THOSE AVAILABLE IN 6,3,1.

7. RESTRICTIONS

EXTENDED MEMORY TESTS SHOULD BE RUN PRIOR TO RUNNING RELOCATION ADDER TEST.

8, EXECUTION TIME

TIME DEPENDENT ON AMOUNT OF MEMORY, FOR EACH BANK
APPROXIMATELY 35 MINUTES, IF SRØ3=1, AND KXXXX=7777(SEE 5,1)
ONE PASS TAKES APPROXIMATELY 40 SECONDS,

AS EACH TEST OR GROUP OF TESTS IS COMPLETED, THE NAME OF THAT
TEST WILL BE TYPED, THE SEQUENCE IS:

SIMAD
SIMROT
FCT
RANDOM

9, PROGRAM DESCRIPTION

9,1 SIMULATED ADDITION TEST

THE SIMULATED ADDITION TESTS SIMULATES THE ADDITION OF TWO
ARGUMENTS, ARG1 AND ARG2, ACTUAL ADDITIONS ARE PERFORMED, AND
THEN THE ACTUAL RESULTS ARE COMPARED TO THE SIMULATED
ANSWER,

THE SIMULATOR OPERATES IN THE FOLLOWING MANNER:
THE ARGUMENTS ARE "ANDED" TOGETHER, AND ANY BITS IN THE
RESULT THAT ARE 1'S WILL BE CARRY BITS', THE ARGUMENTS ARE
"OR'D" TOGETHER AND THE RESULT IS STORED, THE PREVIOUSLY
GENERATED CARRIES ARE ROTATED ONCE TO THE LEFT AND THEN
"ANDED" WITH THE "OR" OF THE TWO ARGUMENTS, ANY BITS THAT ARE
1'S ARE ALSO CARRIES AND THESE ARE COMBINED WITH THE PREVIOUS
CARRIES, THE PROCEDURE CONTINUES UNTIL NO NEW CARRIES ARE
GENERATED, THE FINAL CARRY RESULT IS EXCLUSIVE "OR'" WITH THE
"OR" OF THE ARGUMENTS TO GET THE SIMULATED SUM,

9,2 SIMULATED ROTATE TESTS

EACH OF THE ROTATE INSTRUCTIONS, RAR, RAL, RTR, RTL AND BSW
IS SIMULATED FOR ALL POSSIBLE COMBINATIONS OF AC AND LINK,
AND THE RESULTS ARE COMPARED TO THE RESULTS OF THE ACTUAL
ROTATE,

9,3 FALSE CARRY TEST

VARIOUS COMBINATIONS OF INSTRUCTIONS AND DATA ARE USED TO
DETECT EITHER FALSE CARRIES, OR MISSINGCARRIES,

9,4 RANDOM ADD TEST 1

A RANDOM NUMBER AND ITS COMPLEMENT ARE ADDED SUCCESSIVELY
AND THE EXPECTED RESULT IS ALWAYS LINK=1, AC=Ø,

9,5 RANDOM ADD TEST 2

A RANDOM NUMBER, AND ITS MODIFIED COMPLIMENT ARE ADDED TO
PRODUCE 1 KNOW BIT IN THE AC, WITH THE LINK=1,

9,6 RANDOM ROTATE TEST

A RANDOM NUMBER IS SUCCESSIVELY ROTATED AND THE EXPECTED
RESULT IS THE ORIGINAL NUMBER,

9,6 RELOCATION ADDER TEST

ALL TESTS LISTED ABOVE ARE RELOCATED TO EXTENDED BANKS
AND RUN,

10, LISTING

```
                        /
                        /ADDER TEST
                        /FOR PDP-8/E
                        /COPYRIGHT 1970 DIGITAL EQUIPMENT CORP, MAYNARD MASS,
                        /V 82 07552
                        /
                        /INSTRUCTION DEFINITIONS
                        /
          7501    MQA=7501
          7421    MQL=7421
          7002    BSW=7002
          6007    CAF=6007
                        /
                        /SWITCH REGISTER MASK BITS
                        /
          0103    SR00=K4000
          0104    SR01=K2000
          0105    SR02=K1000
          0106    SR03=K0400
          0107    SR04=K0200
          0110    SR05=K0100
          0111    SR06=K0040
          0112    SR07=K0020
          0113    SR08=K0010
          0114    SR09=K0004
          0115    SR10=K0002
          0116    SR11=K0001
                        /
                        /LOCATION EQUIVALENCIES
                        /
          0023    RAC=ARG1                /AC TO BE ROTATED
          0024    RLNK=ARG2               /LINK TO BE ROTATED
          0031    RRAC=SUM1               /AC AFTER REAL ROTATE
          0033    RRLNK=SUM2              /LINK AFTER REAL ROTATE
          0025    TEMPAC=SIMAC            /TEMPORARY AC STORAGE
          0026    TEMPL=SIMLNK            /TEMPORARY LINK STORAGE
          0037    TEMPI=WD1               /TEMPORARY DATA STORAGE
          0037    W1=WD1                  /    "       "     "
          0040    W2=WD2                  /    "       "     "
          0035    RHFLG=AHFLG             /ROTATE TEST ERROR HEADER FLAG
          0067    NERROP=XLOOP

          7775    *7775
7775      0000    TSTA0,  0
7776      0000    TSTA1,  0
7777      0000    TSTA2,  0

          0000    *0000
0000      0000    TSTA3,  0
0001      5001    TSTA4,  JMP
0002      0002    TSTA5,  2
0003      0003    TSTA6,  3
0004      0000    TSTA7,  0
```

```
0010            *10
                        /
                        /INDEX REGISTERS
                        /
0010  0000      TSTIND, 0
0011  0000      POINT1, 0
0012  0000      POINT2, 0

0020            *20
0020  0000      CNTR1,  0
0021  0022      ADA1,   ADA2
0022  7777      ADA2,   7777
                        /
                        /SIMULATION VARIABLES
                        /
0023  0000      ARG1,   0
0024  0000      ARG2,   0
0025  0000      SIMAC,  0
0026  0000      SIMLNK, 0
0027  0000      AIORA2, 0
0030  0000      CARRY,  0
0031  0000      SUM1,   0
0032  0000      LINK1,  0
0033  0000      SUM2,   0
0034  0000      LINK2,  0

                        /
                        /MESSAGE OUTPUT VARIABLES
                        /
0035  0000      AMFLG,  0
0036  0000      CHAR,   0
0037  0000      WD1,    0
0040  0000      WD2,    0
                        /
                        /RANDOM VARIABLES
                        /
0041  0037      RANDA,  37
0042  0000      RANDB,  0
0043  0000      RANDC,  0
0044  0000      LINKR,  0
0045  0000      LINKRC, 0



                        /
                        /INDIRECT POINTERS
                        /
0046  1600      XPRINT, PRINT           /CHARACTER STRING TYPE
0047  1652      XTYPE,  TYPE            /CHARACTER TYPE
0050  1133      XRHD,   RHD             /TYPE ROTATE ERROR HEADER
```

```
0051  1200    XSROT,  SROTAL          /COMMON ROTATE SIMULATOR
0052  0756    XRALTA, RALTAB-1        /RAL MASK TABLE
0053  1157    XRTLTA, RTLTAB-1        /RTL MASK TABLE
0054  1140    XRTRTA, RTRTAB-1        /RTR MASK TABLE
0055  1657    XBSWTA, BSWTAB-1        /BYTE SWAP MASK TABLE
0056  1000    XCOMRO, COMROT          /ROTATE COMPARISON FOR SIMULATION
0057  1031    XNXTRO, NXTROT          /ROTATE SETUP FOR SIMULATION
0060  0504    XLNKOU, LNKOUT          /TYPE LINK
0061  0523    XWDOUT, WDOUT           /TYPE DATA WORD
0062  3000    XAMEAS, SAMEAS          /COMPARE DATA
0063  3730    XAMEA,  SAMEA
0064  3017    XAVREG, SAVREG          /SAVE AC AND LINK
0065  3037    XDATER, DATER           /DATA ERROR HANDLER FOR FCT
0066  3027    XHALT2, HALT2           /DATA ERROR HALT FOR FCT
0067  3046    XLOOP,  LOOP            /LOOP ON TEST
0070  7775    XSTA0,  TSTA0
0071  7776    XSTA1,  TSTA1
0072  7777    XSTA2,  TSTA2
0073  3512    XRAND,  RANDOM          /RANDOM NUMBER GENERATOR
0074  0410    XLOOP2, HLTA-4
0075  0552    XLOOP1, LOOP1
                      /
                      /WIDELY USED CONSTANTS
                      /
0076  0240    K240,   240
0077  0260    K260,   260
0100  0261    K261,   261
0101  6000    K6000,  6000

0102  0102    XRARTA, .
0103  4000    K4000,  4000
0104  2000    K2000,  2000
0105  1000    K1000,  1000
0106  0400    K0400,  400
0107  0200    K0200,  200
0110  0100    K0100,  100
0111  0040    K0040,  40
0112  0020    K0020,  20
0113  0010    K0010,  10
0114  0004    K0004,  4
0115  0002    K0002,  2
0116  0001    K0001,  1
0117  0000            0
0120  4000            4000
0121  0001            1

                      /
                      /
                      /TEST POINTERS FOR FCT
                      /
0122  2004    SEQ1,   FCT1
0123  2043    SEQ2,   FCT2
0124  2076    SEQ3,   FCT3
0125  2200    SEQ4,   FCT4
0126  2232    SEQ5,   FCT5
```

```
0127  2270    SEQ6,   FCT6
0130  2400    SEQ7,   FCT7
0131  2436    SEQ8,   FCT8
0132  2472    SEQ9,   FCT9
0133  2600    SEQ10,  FCT10
0134  2634    SEQ11,  FCT11
0135  2667    SEQ12,  FCT12
                      /
                      /
                      /SETUP INSTRUCTIONS FOR FCT
                      /
0136  1376    INS1,   1376                    /=TAD ,-1 IN 7777
0137  7001    INS3,   7001                    /=IAC
0140  5404    INS4,   5404                    /=JMP I ,+2 IN 0002
0141  5402    INS5,   5402                    /=JMP I ,+1 IN 0001
0142  7070    INS6,   7070                    /=CMA CML RAR
0143  2376    INS7,   2376                    /=ISZ ,-1 IN 7777
0144  2000    INS8,   2000                    /=ISZ ,+1 IN 7777
0145  2410    INS9,   2410                    /=ISZ I TSTIND
0146  4000    INS10,  4000                    /=JMS ,+1 IN 7777
0147  4776    INS11,  4776                    /=JMS I ,-1 IN 7777
0150  4410    INS12,  4410                    /=JMS I TSTIND
0151  5403    INS13,  5403                    /=JMP I ,+1 IN 0002
0152  5401    INS14,  5401                    /=JMP I ,+1 IN 0000
0153  4377    INS15,  4377                    /=JMS , IN 7777
0154  2004    SEQ,    FCT1
0155  5301    BIN,    5301

                      /
                      /TEST FOR FAST TAD SIMULATION
                      /
0156  6007    START,  CAF                     /CLEAR ALL FLAGS
0157  7604            LAS                     /GET SWITCHES
0160  0106            AND     SR03            /TEST SR03
0161  7650            SNA CLA                 /IS SR03=1
0162  5177            JMP     GOTEST          /DO TEST WITH ALL NUMBERS
0163  7240            CLA CMA
0164  0170            AND     KXXXX           /YES, START AT XXXX
0165  3024            DCA     ARG2
0166  5567            JMP I   ,+1
0167  0202            RSIMAD+2
0170  0000    KXXXX,  0               /INSERT DESIRED STARTING VALUE FOR ARG2 HERE
0171  0000    K0,     0000
0172  0007    K0007,  0007
0173  0070    K0070,  0070
0174  0000    FLDNUM, 0
0175  0000    FLDSAV, 0
0176  0000    FLDCNT, 0
      0177    *177
0177  7410    GOTEST, SKP                     /SKIP JMP TO START

                      /
                      /
                      /SIMULATED ADDITION TEST
                      /
```

```
        0200    *200
0200    5156    RSIMAD, JMP     START           /GO TO FAST TEST CHECK
0201    3024            DCA     ARG2
0202    3023            DCA     ARG1            /CLEAR SIMULATION VARIABLES
0203    3035            DCA     AHFLG           /CLEAR ERROR MESSAGE FLAG
                        /
                        /
                        /SIMULATE ADDITION BY SIMULATED GENERATEION OF SUM
                        /AND CARRY BITS
                        /
                        /
                        /FORM OR OF ARG1 WITH ARG2
                        /
0204    7340    SIMAD,  CLA CLL CMA
0205    0023            AND     ARG1            /LOAD AC WITH ARG1
0206    7421            MQL                     /PLACE IN MQ
0207    7040            CMA
0210    0024            AND     ARG2            /LOAD AC WITH ARG2
0211    7501            MQA                     /FORM ARG1 OR ARG2
0212    3027            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)
                        /
0213    7501            MQA                     /GET ARG1 FROM MQ
0214    7040            CMA                     /FORM NOTARG1
0215    0024            AND     ARG2            /AND WITH ARG2 TO GET ARG2 AND NOTARG1
0216    7421            MQL                     /SAVE IN MQ
0217    7040            CMA
0220    0024            AND     ARG2            /LOAD AC WITH ARG2
0221    7040            CMA                     /FORM NOTARG2
0222    0023            AND     ARG1            /AND WITH ARG1 TO GET ARG1 AND NOTARG2
0223    7501            MQA                     /OR WITH ARG2 AND NOTARG1
0224    3025            DCA     SIMAC           /TO GET ARG1 XOR ARG2
0225    3026            DCA     SIMLNK


                        /
                        /AND ARG1 WITH ARG2
                        /TEST FOR CARRIES
                        /IF THERE ARE NO BITS IN COMMON BETWEEN ARG1 AND ARG2
                        /THERE WILL BE NO CARRIES GENERATED
                        /
0226    7040            CMA
0227    0023            AND     ARG1            /LOAD AC WITH ARG1
0230    0024            AND     ARG2            /AND WITH ARG2
0231    7450            SNA                     /ARE THERE ANY CARRIES
0232    5274            JMP     ADD             /NO, TERMINATE SIMULATION
                        /
                        /GENERATE CARRIES
                        /
0233    7421            MQL                     /SAVE FIRST CARRIES
0234    7521    NXTCAR, MQA MQL                 /GET CARRIES FROM MQ
0235    0027            AND     A1ORA2          /AND WITH A1ORA2 TO SEE IF MORE CARRIES ARE GENERATED
```

```
0236  7450          SNA                     /ARE THERE ANY MORE CARRIES
0237  5244          JMP     ENCAR           /NO, END SIMULATION OF CARRIES
0240  7104          CLL RAL                 /PROPIGATE CARRIES
0241  7521          MQA MQL                 /GET PREVIOUS CARRIES FROM MQ, SAVE NEW CARRIES
0242  7501          MQA                     /OR NEW CARRIES WITH PREVIOUS CARRIES
0243  5234          JMP     NXTCAR          /CONTINUE
                    /
                    /TEST FOR CARRY INTO LINK
                    /
0244  7501  ENCAR,  MQA                     /GET CARRIES
0245  0027          AND     A1ORA2          /AND WITH A1ORA2
0246  0103          AND     K4000           /TEST BIT 00
0247  7450          SNA                     /IS BIT 00 1
0250  5253          JMP     ENCAR1          /NO, CARRIES DID NOT PROPIGATE INTO LINK
0251  3026          DCA     SIMLNK          /YES, SAVE CARRY INTO LINK
0252  5260          JMP     XORALL          /COMPLETE SIMULATION
0253  7130  ENCAR1, CLL CML RAR             /SET AC=4000
0254  0023          AND     ARG1            /AND WITH ARG1
0255  0024          AND     ARG2            /AND WITH ARG2 TO SEE IF ORIGINAL
0256  7440          SZA                     /NUMBERS GENERATED CARRY INTO LINK
0257  3026          DCA     SIMLNK          /SAVE SIMULATED LINK


                    /
                    /FORM XOR OF ARG1, ARG2 AND CARRIES
                    /TO GET FINAL SIMULATED SUM
                    /
0260  7501  XORALL, MQA                     /SAVE SIMULATED CARRIES
0261  3030          DCA     CARRY
0262  7501          MQA
0263  7040          CMA
0264  0025          AND     SIMAC           /FORM A1ORA2 AND NOTCARRY
0265  7421          MQL                     /SAVE IN MQ
0266  7040          CMA
0267  0025          AND     SIMAC
0270  7040          CMA
0271  0030          AND     CARRY           /FORM CARRY AND NOTA1ORA2
0272  7501          MQA                     /OR WITH CONTENTS OF MQ
0273  3025          DCA     SIMAC           /TO GET FINAL SIMULATED SUM
                    /
                    /
                    /PERFORM ADDITIONS ARG1+ARG2 AND ARG2+ARG1
0274  7340  ADD,    CLA CLL CMA
0275  0023          AND     ARG1            /LOAD AC WITH ARG1
0276  1024          TAD     ARG2            /ADD ARG2
0277  7000          NOP
0300  3031          DCA     SUM1            /SAVE RESULT
0301  7010          RAR
0302  3032          DCA     LINK1           /SAVE LINK
0303  7040          CMA
0304  0024          AND     ARG2            /LOAD AC WITH ARG2
0305  1023          TAD     ARG1            /ADD ARG1
0306  7000          NOP
0307  3033          DCA     SUM2            /SAVE RESULT
0310  7010          RAR
```

```
0311  3034            DCA     LINK2           /SAVE LINK
0312  7000            NOP
                      /
                      /
                      /COMPARE RESULTS OF REAL ADDS
                      /IF A=B, A XOR B=0, THIS IS USED TO COMPARE RESULTS
                      /
0313  7340            CLA CLL CMA
0314  0031            AND     SUM1            /GET RESULT OF ARG1+ARG2
0315  7040            CMA                     /COMPLEMENT
0316  0033            AND     SUM2            /AND RESULTS OF ARG2+ARG1
0317  7440            SZA                     /IS SUM2 AND NOTSUM1=0
0320  5377            JMP     ERROR1          /NO, ERROR
0321  7040            CMA
0322  0033            AND     SUM2            /LOAD AC WITH RESULTS OF ARG2+ARG1
0323  7040            CMA                     /COMPLEMENT
0324  0031            AND     SUM1            /AND WITH SUM1
0325  7440            SZA                     /IS SUM1 AND NOTSUM2=0
0326  5377            JMP     ERROR1          /NO, ERROR

                      /
                      /
                      /COMPARE REAL AND SIMULATED ADDS
                      /
0327  7340            CLA CLL CMA
0330  0031            AND     SUM1            /LOAD AC WITH RESULTS OF ARG1+ARG2
0331  7040            CMA                     /COMPLEMENT
0332  0025            AND     SIMAC           /AND WITH RESULTS OF SIMULATION
0333  7440            SZA                     /IS SIMAC AND NOTSUM1=0
0334  5377            JMP     ERROR1          /NO, ERROR
0335  7040            CMA
0336  0025            AND     SIMAC           /LOAD AC WITH SIMULATION RESULTS
0337  7040            CMA                     /COMPLEMENT
0340  0031            AND     SUM1            /AND WITH RESULTS OF ARG1+ARG2
0341  7440            SZA                     /IS SUM1 AND NOTSIMAC=0
0342  5377            JMP     ERROR1          /NO, ERROR


                      /
                      /COMPARE LINKS GENERATED BY REAL ADDS
                      /
0343  7340            CLA CLL CMA
0344  0032            AND     LINK1           /GET LINK FROM ARG1+ARG2
0345  7004            RAL
0346  7240            CLA CMA
0347  0034            AND     LINK2           /GET LINK FROM ARG2+ARG1
0350  7640            SZA CLA
0351  7020            CML
0352  7430            SZL                     /ARE THEY THE SAME
0353  5377            JMP     ERROR1          /NO, ERROR


                      /
                      /
                      /COMPARE LINKS GENERATED BY REAL AND SIMULATED ADDS
```

```
                        /
0354  7340               CLA CLL CMA
0355  0032               AND     LINK1           /GET LINK FROM ARG1+ARG2
0356  7004               RAL
0357  7240               CLA CMA
0360  0026               AND     SIMLNK          /GET LINK FROM SIMULATION
0361  7640               SZA CLA
0362  7020               CML
0363  7430               SZL                     /ARE THEY THE SAME
0364  5377               JMP     ERROR1          /NO, ERROR

                        /
                        /
                        /SET UP FOR NEXT ADDITION
                        /
0365  5474     NXTADD,  JMP I   XLOOP2          /TEST FOR SIMULATION WITH SAME DATA
0366  2023               ISZ     ARG1            /INCREMENT ARG1
0367  5204               JMP     SIMAD           /GO TO SIMULATION
0370  2024               ISZ     ARG2            /INCREMENT ARG2
0371  7410               SKP                     /GO TO SIMULATION
0372  5475               JMP I   XLOOP1          /TEST FOR TRANSFER TO NEXT TEST
0373  7240               CLA CMA
0374  0024               AND     ARG2            /TRANSFER ARG2 TO ARG1
0375  3023               DCA     ARG1
0376  5204               JMP     SIMAD           /CONTINUE SIMULATION
      0377     *377
0377  7000     ERROR1,  NOP
                        /
                        /
                        /ERROR HANDLER FOR ADDITION TEST
      0400     *400     /
0400  7604     ADDERR,  LAS                     /GET SWITCHES
0401  0104               AND     SR01            /TEST SR01
0402  7650               SNA CLA                 /SUPPRESS TYPEOUT IF SR01=1
0403  4217               JMS     ADPRT           /TYPE ERROR MESSAGE
0404  7604     HLTA,    LAS
0405  0103               AND     SR00
0406  7650               SNA CLA                 /HALT IF SR00=0
0407  4277               JMS     HALTA           /HALT WITH ADDRESS OF TEST IN AC
0410  7604               LAS
0411  0105               AND     SR02            /TEST SR02
0412  7640               SZA CLA                 /LOOP WITH SAME DATA IF SR02=1
0413  5615               JMP I   XADD            /LOOP WITH SAME DATA
0414  5616               JMP I   XNXTAD
0415  0274     XADD,    ADD
0416  0366     XNXTAD,  NXTADD+1

                        /
                        /TYPE ERROR MESSAGE FOR ADDITION TEST
                        /
0417  0000     ADPRT,   0
0420  7340               CLA CLL CMA
0421  0035               AND     AHFLG           /GET FLAG FOR ERROR MESSAGE HEADER TYPEOUT
0422  7650               SNA CLA                 /HAS HEADER FOR TEST BEEN TYPED
0423  4267               JMS     AHOUT           /NO TYPE HEADER
```

```
0424  7040          CMA
0425  0023          AND     ARG1
0426  3037          DCA     WD1
0427  4323          JMS     WDOUT           /OUTPUT ARG1
0430  7040          CMA
0431  0024          AND     ARG2
0432  3037          DCA     WD1
0433  4323          JMS     WDOUT           /OUTPUT ARG2
0434  7040          CMA
0435  0026          AND     SIMLNK
0436  3040          DCA     WD2
0437  7040          CMA
0440  0025          AND     SIMAC
0441  3037          DCA     WD1
0442  4304          JMS     LNKOUT          /OUTPUT SIMULATED LINK
0443  4323          JMS     WDOUT           /OUTPUT SIMULATED SUM
0444  7040          CMA
0445  0032          AND     LINK1
0446  3040          DCA     WD2
0447  7040          CMA
0450  0031          AND     SUM1
0451  3037          DCA     WD1
0452  4304          JMS     LNKOUT          /OUTPUT LINK1
0453  4323          JMS     WDOUT           /OUTPUT SUM1
0454  7040          CMA
0455  0034          AND     LINK2
0456  3040          DCA     WD2
0457  7040          CMA
0460  0033          AND     SUM2
0461  3037          DCA     WD1
0462  4304          JMS     LNKOUT          /OUTPUT LINK2
0463  4323          JMS     WDOUT           /OUTPUT SUM2
0464  4446          JMS I   XPRINT
0465  5742          CRLF=1
0466  5204          JMP     HLTA            /TEST FOR HALT

                    /
                    /TYPE HEADER FOR ADDITION TEST ERROR MESSAGE
                    /
0467  0000  AHOUT,  0
0470  4446          JMS I   XPRINT          /TYPE "SIMULATED ADD TEST FAILED
0471  5417          EM1=1
0472  4446          JMS I   XPRINT          /TYPE ARG1, ARG2, SIMULATED, ARG1+ARG2, ARG2+ARG1
0473  5177          DH1=1
0474  7240          CLA CMA                 /SET ADD TEST HEADER FLAG
0475  3035          DCA     AHFLG           /TO PREVENT MULTIPLE HEADER TYPEOUTS
0476  5667          JMP I   AHOUT
                    /
                    /HALT WITH ADDRESS OF TEST IN AC
                    /
0477  0000  HALTA,  0
0500  7240          CLA CMA
0501  0351          AND     ADT
0502  7402          HLT                     /HALT WITH ADDRESS OF ADDITION TEST IN AC
0503  5677          JMP I   HALTA
```

```
                        /
                        /
                        /TYPE LINK
                        /
0504  0000    LNKOUT,   0
0505  7340              CLA CLL CMA
0506  0040              AND     WD2
0507  7640              SZA CLA
0510  5320              JMP     OUT1
0511  7040              CMA
0512  0077              AND     K260
0513  4447    TYLNK,    JMS I   XTYPE
0514  7040              CMA
0515  0076              AND     K240
0516  4447              JMS I   XTYPE
0517  5704              JMP I   LNKOUT
0520  7040    OUT1,     CMA
0521  0100              AND     K261
0522  5313              JMP     TYLNK
                        /
                        /TYPE DATA WORD
                        /
0523  0000    WDOUT,    0
0524  7340              CLA CLL CMA
0525  0102              AND     XRARTA
0526  3011              DCA     POINT1
0527  7040    NXBIT,    CMA
0530  0411              AND I   POINT1
0531  7450              SNA
0532  5345              JMP     SP1
0533  0037              AND     WD1
0534  7640              SZA CLA
0535  5342              JMP     OUT1A
0536  7040              CMA
0537  0077              AND     K260


0540  4447    TYBIT,    JMS I   XTYPE
0541  5327              JMP     NXBIT
0542  7040    OUT1A,    CMA
0543  0100              AND     K261
0544  5340              JMP     TYBIT
0545  7040    SP1,      CMA
0546  0076              AND     K240
0547  4447              JMS I   XTYPE
0550  5723              JMP I   WDOUT
0551  0204    ADT,      SIMAD
                        /
                        /
                        /END OF SIMULATED ADD TEST
                        /
0552  7604    LOOP1,    LAS
0553  0115              AND     SR10            /TEST SR10
0554  7650              SNA CLA                 /IS SR10=1
```

```
0555  5370          JMP     SADOK           /NO, TYPE END OF TEST MESSAGE
0556  7604  ADHLT,  LAS
0557  0114          AND     SR09            /TEST SR09
0560  7640          SZA CLA                 /IS SR09=1
0561  7402          HLT                     /YES, HALT AT END OF TEST
0562  7604          LAS
0563  0116          AND     SR11            /TEST SR11
0564  7650          SNA CLA                 /IS SR11=1
0565  5377          JMP     SIMR            /NO, GO TO NEXT TEST
0566  5767          JMP I   .+1             /REPEAT SIMAD
0567  0204          SIMAD
0570  4446  SADOK,  JMS I   XPRINT
0571  5721          OK1-1
0572  5356          JMP     ADHLT
      0577  *577
0577  7000  SIMR,   NOP


                    /
                    /
                    /TEST ROTATION BY COMPARISON OF REAL AND SIMULATED
                    /ROTATES
                    /
      0600  *600
0600  4752  SIMR01, JMS I   XR1             /SET UP FOR RAL TEST
                    /
                    /TEST RAL
                    /
0601  7340  SIMRAL, CLA CLL CMA
0602  0052          AND     XRALTA          /GET MASK TABLE FOR
0603  3012          DCA     POINT2          /SIMULATED RAL
0604  4451          JMS I   XSROT           /SIMULATE RAL
0605  7340  RRAL,   CLA CLL CMA
0606  0024          AND     RLNK            /SET UP TO DO REAL ROTATES
0607  7640          SZA CLA
0610  7020          CML
0611  7040          CMA
0612  0023          AND     RAC
0613  7004          RAL                     /DO REAL RAL
0614  7000          NOP
0615  3031          DCA     RRAC            /SAVE ROTATED ACCUMULATOR
0616  7430          SZL
0617  7040          CMA
0620  3033          DCA     RRLNK           /SAVE ROTATED LINK
0621  4456          JMS I   XCOMRO          /COMPARE ROTATES
0622  5205          JMP     RRAL            /RETURN HERE FOR LOOP ON ERROR
0623  4457          JMS I   XNXTRO          /SET UP FOR NEXT ROTATE
0624  5201          JMP     SIMRAL          /CONTINUE RAL TEST


0625  4753  SIMR02, JMS I   XR2
                    /
                    /TEST RAR
```

```
                        /
0626  7340    SIMRAR, CLA CLL CMA
0627  0102            AND     XRARTA          /GET MASK TABLE FOR
0630  3012            DCA     POINT2          /SIMULATED RAR
0631  4451            JMS I   XSROT           /SIMULATED RAR
0632  7340    RRAR,   CLA CLL CMA
0633  0024            AND     RLNK            /SET UP TP DO REAL RAR
0634  7640            SZA CLA
0635  7020            CML
0636  7040            CMA
0637  0023            AND     RAC
0640  7010            RAR                     /DO REAL RAR
0641  7000            NOP
0642  3031            DCA     RRAC            /SAVE ROTATED ACCUMULATOR
0643  7430            SZL
0644  7040            CMA
0645  3033            DCA     RRLNK           /SAVE ROTATED LINK
0646  4456            JMS I   XCOMRO          /COMPARE ROTATES
0647  5232            JMP     RRAR            /RETURN HERE FOR LOOP ON ERROR
0650  4457            JMS I   XNXTRO          /SET UP FOR NEXT ROTATE
0651  5226            JMP     SIMRAR          /CONTINUE RAR TEST


0652  4754    SIMR03, JMS I   XR3
                        /
                        /TEST RTL
                        /
0653  7340    SIMRTL, CLA CLL CMA
0654  0053            AND     XRTLTA          /GET MASK TABLE FOR
0655  3012            DCA     POINT2          /SIMULATED RTL
0656  4451            JMS I   XSROT           /SIMULATE RTL
0657  7340    RRTL,   CLA CLL CMA
0660  0024            AND     RLNK            /SET UP TO DO REAL ROTATE
0661  7640            SZA CLA
0662  7020            CML
0663  7040            CMA
0664  0023            AND     RAC
0665  7006            RTL                     /DO REAL ROTATE
0666  7000            NOP
0667  3031            DCA     RRAC            /SAVE ROTATED ACCUMULATOR
0670  7430            SZL
0671  7040            CMA
0672  3033            DCA     RRLNK           /SAVE ROTATED LINK
0673  4456            JMS I   XCOMRO          /COMPARE ROTATES
0674  5257            JMP     RRTL            /RETURN HERE FOR LOOP ON ERROR
0675  4457            JMS I   XNXTRO          /SET UP TO DO NEXT ROTATE
0676  5253            JMP     SIMRTL          /CONTINUE RTL TEST


0677  4755    SIMR04, JMS I   XR4
                        /
                        /TEST RTR
                        /
```

```
0700  7340  SIMRTR, CLA CLL CMA
0701  0054         AND     XRTRTA          /GET MASK TABLE FOR
0702  3012         DCA     POINT2          /SIMULATED RTR
0703  4451         JMS I   XSROT           /SIMULATE RTR
0704  7340  RRTR,  CLA CLL CMA
0705  0024         AND     RLNK            /SET UP TO DO REAL ROTATE
0706  7640         SZA CLA
0707  7020         CML
0710  7040         CMA
0711  0023         AND     RAC
0712  7012         RTR                     /DO REAL ROTATE
0713  7000         NOP
0714  3031         DCA     RRAC            /SAVE ROTATED ACCUMULATOR
0715  7430         SZL
0716  7040         CMA
0717  3033         DCA     RRLNK           /SAVE ROTATED LINK
0720  4456         JMS I   XCOMRO          /COMPARE ROTATES
0721  5304         JMP     RRTR            /RETURN HERE FOR LOOP ON ERROR
0722  4457         JMS I   XNXTRO          /SET UP TO DO NEXT ROTATE
0723  5300         JMP     SIMRTR          /CONTINUE RTR TEST


0724  4756  SIMRO5, JMS I   XR5
                    /
                    /TEST BYTE SWAP
                    /
0725  7340  SIMBSW, CLA CLL CMA
0726  0055         AND     XBSWTA          /GET MASK TABLE FOR
0727  3012         DCA     POINT2          /SIMULATED BSW
0730  4776         JMS I   XSBSW           /SIMULATE BSW
0731  7340  RBSW,  CLA CLL CMA
0732  0024         AND     RLNK                    /SET UP FOR REAL BSW
0733  7640         SZA CLA
0734  7020         CML
0735  7040         CMA
0736  0023         AND     RAC
0737  7002         BSW                     /DO REAL BSW
0740  7000         NOP
0741  3031         DCA     RRAC            /SAVE ROTATED ACCUMULATOR
0742  7430         SZL
0743  7040         CMA
0744  3033         DCA     RRLNK           /SAVE ROTATED LINK
0745  4456         JMS I   XCOMRO          /COMPARE ROTATES
0746  5331         JMP     RBSW            /RETURN HERE FOR LOOP ON ERROR
0747  4457         JMS I   XNXTRO          /SET UP FOR NEXT ROTATE
0750  5325         JMP     SIMBSW          /CONTINUE BSW TEST
0751  5777         JMP I   XROTDN          /END OF ROTATE SIMULATION TESTS

0752  1400  XR1,    R1
0753  1410  XR2,    R2
0754  1420  XR3,    R3
0755  1430  XR4,    R4
0756  1440  XR5,    R5
0757  0001  RALTAB, 1
```

```
0760  0002            2
0761  0004            4
0762  0010            10
0763  0020            20
0764  0040            40
0765  0100            100
0766  0200            200
0767  0400            400
0770  1000            1000
0771  2000            2000
0772  4000            4000
0773  0000            0
0774  0001            1
0775  4000            4000
0776  1236    XSBSW,  SBSW
0777  1323    XROTON, ROTONE



                      /
                      /(TAPE 2)
                      /COMPARE RESULTS OF REAL AND SIMULATED ROTATES
                      /
      1000    *1000
1000  0000    COMROT, 0
                      /
                      /COMPARE ROTATED ACCUMULATORS
                      /
1001  7340            CLA CLL CMA
1002  0025            AND     SIMAC           /GET SIMULATED ROTATED ACCUMULATOR
1003  7040            CMA                     /COMPLEMENT
1004  0031            AND     RRAC            /AND WITH REAL ROTATED ACCUMULATOR
1005  7440            SZA                     /IS NOTSIMAC AND RRAC=0
1006  5226            JMP     ERROT           /NO, ERROR
1007  7040            CMA
1010  0031            AND     RRAC            /GET REAL ROTATED ACCUMULATOR
1011  7040            CMA                     /COMPLEMENT
1012  0025            AND     SIMAC           /AND WITH SIMULATED ROTATED ACCUMULATOR
1013  7440            SZA                     /IS SIMAC AND NOTRRAC=0
1014  5226            JMP     ERROT           /NO, ERROR
                      /
                      /COMPARE ROTATED LINKS
                      /
1015  7340            CLA CLL CMA
1016  0026            AND     SIMLNK          /GET SIMULATED LINK
1017  7640            SZA CLA
1020  7020            CML
1021  7040            CMA
1022  0033            AND     RRLNK           /GET REAL ROTATED LINK
1023  7440            SZA
1024  7020            CML
1025  7430            SZL                     /ARE THEY THE SAME
1026  5246    ERROT,  JMP     ERROR2          /NO, ERROR
```

```
1027  2200            ISZ     COMROT          /RETURN HERE IF NO LOOP ON ERROR
1030  5600            JMP I   COMROT
                      /
                      /
                      /SET UP TO DO NEXT ROTATE
                      /
1031  0000    NXTROT, 0
1032  7340            CLA CLL CMA
1033  0024            AND     RLNK            /GET LINK OF WORD TO BE ROTATED
1034  7640            SZA CLA                 /IS IT 0
1035  5244            JMP     NEWLNK          /NO, CLEAR IT
1036  7040            CMA                     /YES, SET IT
1037  3024            DCA     RLNK
1040  2023            ISZ     RAC             /INCREMENT NUMBER TO BE ROTATED
1041  5631            JMP I   NXTROT          /CONTINUE SIMULATION OF PRESENT ROTATE INSTRUCTION
1042  2231            ISZ     NXTROT          /PRESENT SIMULATION DONE
1043  5631            JMP I   NXTROT          /GO TO NEXT TEST
1044  3024    NEWLNK, DCA     RLNK
1045  5631            JMP I   NXTROT



                      /
                      /
                      /ERROR HANDLER FOR ROTATE TEST
                      /
1046  7604    ERROR2, LAS
1047  0104            AND     SR01            /TEST SR01
1050  7650            SNA CLA                 /IS SR01=1
1051  4271            JMS     ROTPRT          /NO, TYPE ERROR MESSAGE
1052  7604    HLTB,   LAS
1053  0103            AND     SR00            /TEST SR00
1054  7650            SNA CLA                 /IS SR00=1
1055  5263            JMP     HALTB           /NO, HALT WITH ADDRESS OF TEST IN AC
1056  7604            LAS
1057  0105            AND     SR02            /TEST SR02
1060  7650            SNA CLA                 /IS SR02=1
1061  5227            JMP     ERROT+1         /NO, GO TO NEW DATA
1062  5230            JMP     ERROT+2         /YES, LOOP WITH SAME DATA
1063  7340    HALTB,  CLA CLL CMA
1064  0451            AND I   XSROT
1065  1270            TAD     M4
1066  7402            HLT
1067  5256            JMP     HLTB+4
1070  7774    M4,     -4



                      /
                      /ERROR TYPEOUT FOR SIMULATED ROTATE TEST ERRORS
                      /
1071  0000    ROTPRT, 0
1072  7340            CLA CLL CMA
1073  0035            AND     RHFLG           /GET ROTATE TEST HEADER FLAG
1074  7650            SNA CLA                 /HAS HEADER BEEN TYPED
```

```
1075  4331            JMS     RHOUT           /NO, TYPE HEADER
1076  7040            CMA
1077  0023            AND     RAC
1100  3037            DCA     WD1
1101  7040            CMA
1102  0024            AND     RLNK
1103  3040            DCA     WD2
1104  4460            JMS I   XLNKOU          /OUTPUT ORIGINAL LINK
1105  4461            JMS I   XWDOUT          /OUTPUT ORIGINAL WORD
1106  7040            CMA
1107  0025            AND     SIMAC
1110  3037            DCA     WD1
1111  7040            CMA
1112  0026            AND     SIMLNK
1113  3040            DCA     WD2
1114  4460            JMS I   XLNKOU          /OUTPUT SIMULATED ROTATED LINK
1115  4461            JMS I   XWDOUT          /OUTPUT SIMULATED ROTATED WORD
1116  7040            CMA
1117  0031            AND     RRAC
1120  3037            DCA     WD1
1121  7040            CMA
1122  0033            AND     RRLNK
1123  3040            DCA     WD2
1124  4460            JMS I   XLNKOU          /OUTPUT ACTUAL ROTATED LINK
1125  4461            JMS I   XWDOUT          /OUTPUT ACTUAL ROTATED WORD
1126  4446            JMS I   XPRINT
1127  5742            CRLF-1
1130  5671            JMP I   ROTPRT

                      /
                      /OUTPUT HEADER FOR ROTATE ERROR MESSAGE
                      /
1131  0000  RHOUT,   0
1132  4446            JMS I   XPRINT          /TYPE SIMULATED XXX TEST FAILED
1133  0000  RHD,     0                       /WHERE XXX IS THE INSTRUCTION THAT FAILED
1134  4446            JMS I   XPRINT          /TYPE ORIGINAL, SIMULATED ACTUAL
1135  5244            DH2-1
1136  7240            CLA CMA
1137  3035            DCA     RHFLG
1140  5731            JMP I   RHOUT


1141  2000  RIRTAB, 2000
1142  0400            400
1143  0100            100
1144  0020            20
1145  0004            4
1146  0001            1
1147  4000            4000
1150  1000            1000
1151  0200            200
1152  0040            40
1153  0010            10
1154  0002            2
```

```
1155  0000            0
1156  2000            2000
1157  0002            2

1160  0002    RTLTAB, 2
1161  0010            10
1162  0040            40
1163  0200            200
1164  1000            1000
1165  4000            4000
1166  0001            1
1167  0004            4
1170  0020            20
1171  0100            100
1172  0400            400
1173  2000            2000
1174  0000            0
1175  0002            2
1176  2000            2000



                      /
                      /
                      /ROTATION SIMULATOR COMMON ROUTINE
                      /ROTATE FUNCTION SIMULATED DEPENDS
                      /UPON MASK TABLE SELECTED
                      /
      1200    *1200
1200  0000    SROTAL, 0
1201  7300            CLA CLL
1202  3025            DCA     SIMAC           /CLEAR SIMULATION ARGUMENTS
1203  3026            DCA     SIMLNK
1204  7040            CMA
1205  0412            AND I   POINT2          /GET FIRST MASK BIT FROM TABLE
1206  3037            DCA     WD1
1207  7040    NBIT,   CMA
1210  0412            AND I   POINT2          /GET MASK BIT FROM TABLE
1211  7450            SNA                     /IS IT 0
1212  5303            JMP     ENDROT          /YES, FINISH SIMULATION
1213  3040            DCA     WD2
1214  7040            CMA
1215  0023            AND     RAC             /LOAD AC WITH WORD TO BE ROTATED
1216  0037            AND     WD1             /TEST BIT TO BE ROTATED
1217  7440            SZA                     /IS IS 0
1220  4225            JMS     OR1             /NO, PLACE BIT INTO NEW POSITION
1221  7040            CMA
1222  0040            AND     WD2             /BIT TO BE ROTATED
1223  3037            DCA     WD1             /BECOMES NEW MASK
1224  5207            JMP     NBIT            /CONTINUE SIMULATION
                      /
                      /OR BITS TO FORM PARTIALLY ROTATED WORD
                      /
1225  0000    OR1,    0
1226  7240            CLA CMA
```

```
1227  0040            AND     WD2             /GET BIT TO BE INSERTED
1230  7421            MQL                     /SAVE IN MQ
1231  7040            CMA
1232  0025            AND     SIMAC           /GET SIMULATED ROTATED WORD
1233  7501            MQA                     /OR BIT INTO POSITION
1234  3025            DCA     SIMAC           /SAVE PARTIALLY ROTATED WORD
1235  5625            JMP I   OR1


                      /
                      /SIMULATE BYTE SWAP
                      /
1236  0000  SBSW,     0
1237  7340            CLA CLL CMA
1240  0236            AND     SBSW            /SET UP FOR ERROR RETURN
1241  3451            DCA I   XSROT
1242  3025            DCA     SIMAC           /CLEAR SIMULATION ARGUMENTS
1243  3026            DCA     SIMLNK
1244  7040  N1BIT,    CMA
1245  0412            AND I   POINT2          /GET MASK FROM TABLE
1246  7450            SNA                     /IS IT 0
1247  5277            JMP     ENDBSW          /YES, FINISH SIMULATION
1250  3037            DCA     WD1
1251  7040            CMA
1252  0412            AND I   POINT2
1253  3040            DCA     WD2
1254  7040            CMA
1255  0023            AND     RAC             /GET WORD TO BE ROTATED
1256  0037            AND     WD1             /TEST BIT TO BE ROTATED
1257  7440            SZA                     /IS IT 0
1260  4225            JMS     OR1             /NO, PLACE BIT IN NEW POSITION
1261  7040            CMA
1262  0037            AND     WD1             /INTERCHANGE MASK AND BIT TO BE ROTATED
1263  7421            MQL
1264  7040            CMA
1265  0040            AND     WD2
1266  3037            DCA     WD1
1267  7501            MQA
1270  3040            DCA     WD2
1271  7040            CMA
1272  0023            AND     RAC             /GET WORD TO BE ROTATED
1273  0037            AND     WD1             /TEST BIT TO BE ROTATED
1274  7440            SZA                     /IS IT 0
1275  4225            JMS     OR1             /NO, PLACE BIT IN NEW POSITION
1276  5244            JMP     N1BIT           /CONTINUE SIMULATION
1277  7340  ENDBSW,   CLA CLL CMA
1300  0024            AND     RLNK
1301  3026            DCA     SIMLNK
1302  5636            JMP I   SBSW


                      /
                      /
```

```
                        /END OF ROTATE, SHIFT LINK
                        /
1303  7340    ENDROT, CLA CLL CMA
1304  0412            AND I   POINT2          /GET BIT TO BE ROTATED FROM LINK
1305  3040            DCA     WD2
1306  7040            CMA
1307  0116            AND     K0001           /GET MASK FOR LINK
1310  0024            AND     RLNK            /TEST LINK
1311  7440            SZA                     /IS LINK 0
1312  4225            JMS     OR1             /PLACE LINK IN NEW POSITION
1313  7040            CMA
1314  0412            AND I   POINT2          /GET MASK FOR BIT TO BE ROTATED INTO LINK
1315  0023            AND     RAC             /TEST BIT IN WORD TO BE ROTATED INTO LINK
1316  7440            SZA                     /IS IT 0
1317  7240            CLA CMA                 /NO, SET LINK=1
1320  0116            AND     K0001
1321  3026            DCA     SIMLNK
1322  5600            JMP I   SROTAL
                        /
1323  7604    ROTONE, LAS
1324  0115            AND     SR10            /TEST SR10
1325  7650            SNA CLA                 /IS SR10=1
1326  5342            JMP     SROTOK          /NO, TYPE "SIMROT"
1327  7604    ROTHLT, LAS
1330  0114            AND     SR09            /TEST SR09
1331  7640            SZA CLA                 /IS SR09=1
1332  7402            HLT                     /YES, HALT AT END OF ROTATE TESTS
1333  7604            LAS
1334  0116            AND     SR11            /TEST SR11
1335  7650            SNA CLA                 /IS SR11=1
1336  5740            JMP I   .+2             /NO, GO TO NEXT TEST
1337  5741            JMP I   .+2             /YES, REPEAT ROTATE TESTS
1340  2000            FCT
1341  0600            SIMRO1
1342  4446    SROTOK, JMS I   XPRINT
1343  5725            OK2=1
1344  5327            JMP     ROTHLT


                        /
                        /
                        /SET UP FOR ROTATE TESTS
                        /
      1400      PAGE
1400  0000    R1,     0
1401  7340            CLA CLL CMA
1402  0250            AND     XM2             /SET UP HEADER
1403  3450            DCA I   XRHD            /FOR RAL TEST ERROR MESSAGE
1404  3035            DCA     RHFLG           /CLEAR ROTATE HEADER FLAG
1405  3024            DCA     RLNK
1406  3023            DCA     RAC
1407  5600            JMP I   R1
1410  0000    R2,     0
1411  7340            CLA CLL CMA
```

```
1412  0251            AND     XM3             /SET UP HEADER
1413  3450            DCA I   XRHD            /FOR RAR TEST ERROR MESSAGE
1414  3035            DCA     RHFLG
1415  3024            DCA     RLNK
1416  3023            DCA     RAC
1417  5610            JMP I   R2
1420  0000    R3,     0
1421  7340            CLA CLL CMA
1422  0252            AND     XM4             /SET UP HEADER
1423  3450            DCA I   XRHD            /FOR RTR TEST ERROR MESSAGE
1424  3035            DCA     RHFLG
1425  3024            DCA     RLNK
1426  3023            DCA     RAC
1427  5620            JMP I   R3
1430  0000    R4,     0
1431  7340            CLA CLL CMA
1432  0253            AND     XM5             /SET UP HEADER
1433  3450            DCA I   XRHD            /FOR RTL TEST ERROR MESSAGE
1434  3035            DCA     RHFLG
1435  3024            DCA     RLNK
1436  3023            DCA     RAC
1437  5630            JMP I   R4
1440  0000    R5,     0
1441  7340            CLA CLL CMA
1442  0254            AND     XM6             /SET UP HEADER
1443  3450            DCA I   XRHD            /FOR BSW TEST ERROR MESSAGE
1444  3035            DCA     RHFLG
1445  3024            DCA     RLNK
1446  3023            DCA     RAC
1447  5640            JMP I   R5
1450  5440    XM2,    EM2-1
1451  5461    XM3,    EM3-1
1452  5502    XM4,    EM4-1
1453  5523    XM5,    EM5-1
1454  5544    XM6,    EM6-1

                      /
                      /
                      /CHARACTER STRING TYPE ROUTINE
                      /←=RETURN, ↓=LINE FEED
      1600    PAGE
1600  0000    PRINT,  0
1601  7300            CLA CLL
1602  1600            TAD I   PRINT
1603  3011            DCA     POINT1
1604  2200            ISZ     PRINT
1605  1411            TAD I   POINT1
1606  3036            DCA     CHAR
1607  1036            TAD     CHAR
1610  7012            RTR
1611  7012            RTR
1612  7012            RTR
1613  4217            JMS     TYPSET
1614  1036            TAD     CHAR
1615  4217            JMS     TYPSET
```

```
1616  5205            JMP     PRINT+5
1617  0000  TYPSET,   0
1620  0245            AND     K0077
1621  7450            SNA
1622  5600            JMP I   PRINT
1623  1246            TAD     M40
1624  7510            SPA
1625  5230            JMP     .+3
1626  1076            TAD     K240
1627  5243            JMP     MTP
1630  7001            IAC
1631  7440            SZA
1632  5235            JMP     .+3
1633  1251            TAD     K215
1634  5243            JMP     MTP
1635  7001            IAC
1636  7440            SZA
1637  5242            JMP     .+3
1640  1250            TAD     K212
1641  5243            JMP     MTP
1642  1247            TAD     K336
1643  4447  MTP,      JMS I   XTYPE
1644  5617            JMP I   TYPSET
1645  0077  K0077,    0077
1646  7740  M40,      7740
1647  0336  K336,     0336
1650  0212  K212,     0212
1651  0215  K215,     0215
1652  0000  TYPE,     0
1653  6046            TLS
1654  6041            TSF
1655  5254            JMP     .-1
1656  7200            CLA
1657  5652            JMP I   TYPE


1660  0001  BSWTAB,   1
1661  0100            100
1662  0002            2
1663  0200            200
1664  0004            4
1665  0400            400
1666  0010            10
1667  1000            1000
1670  0020            20
1671  2000            2000
1672  0040            40
1673  4000            4000
1674  0000            0

      2000  PAGE
2000  7300  FCT,      CLA CLL
2001  1122            TAD     SEQ1
2002  3154            DCA     SEQ
```

```
2003  3020            DCA     CNTR1

                      /
                      /
                      /FALSE CARRY TEST#1
                      /
2004  7300    FCT1,   CLA CLL
                      /
                      /PLACE INSTRUCTIONS AND DATA IN TEST ADDRESSES
                      /
2005  7300    FCS1,   CLA CLL                 /DATA=0000
2006  3471            DCA I   XSTA1           /LOC,=7776
2007  1136            TAD     INS1            /INSTRUCTION=TAD ,+1
2010  3472            DCA I   XSTA2           /LOC,=7777
2011  1332            TAD     INS2            /INSTRUCTION=TAD ,+3
2012  3000            DCA     TSTA3           /LOC,=0000
2013  1137            TAD     INS3            /INSTRUCTION=IAC
2014  3001            DCA     TSTA4           /LOC,=0001
2015  1140            TAD     INS4            /INSTRUCTION=JMP I ,+2
2016  3002            DCA     TSTA5           /LOC,=0002
2017  7240            CLA CMA                 /DATA=7777
2020  3003            DCA     TSTA6           /LOC,=0003
2021  1327            TAD     ADI             /ADDRESS=RETI
2022  3004            DCA     TSTA7           /LOC,=0004
                      /
                      /EXECUTE INSTRUCTIONS PREVIOUSLY ASSEMBLED IN TEST
                      /ADDRESSES
                      /
2023  7300    FCL1,   CLA CLL
2024  5472            JMP I   XSTA2
2025  7000    RET1,   NOP                     /PROVIDED FOR PROGRAM MODIFICATION
2026  7000            NOP
2027  4464            JMS I   XAVREG          /SAVE LINK AND AC
                      /
                      /EXPECTED RESULTS ARE AC=0, LINK=1
                      /
2030  7430            SZL
2031  7440            SZA
2032  4465            JMS I   XDATER          /COMPUTATION ERROR HAS OCCURED
2033  7410            SKP
2034  4466            JMS I   XHALT2          /TEST FOR HALT
2035  4467            JMS I   XLOOP           /TEST FOR LOOP
2036  5223            JMP     FCL1
2037  7200            CLA
2040  1123            TAD     SEQ2            /ADDRESS OF NEXT TEST
2041  3154            DCA     SEQ
2042  5554            JMP I   SEQ             /GO TO NEXT TEST


                      /
                      /
                      /FALSE CARRY TEST#2
                      /
2043  7300    FCT2,   CLA CLL
```

```
                        /
                        /PLACE INSTRUCTIONS AND DATA IN TEST ADDRESSES
                        /
2044  7340    FCS2,     CLA CLL CMA             /DATA=7777
2045  3471              DCA I   XSTA1           /LOC,=7776
2046  1136              TAD     INS1            /INSTRUCTION=TAD ,=1
2047  3472              DCA I   XSTA2           /LOC,=7777
2050  1137              TAD     INS3            /INSTRUCTION=IAC
2051  3000              DCA     TSTA3           /LOC,=0000
2052  1141              TAD     INS5            /INSTRUCTION=JMP I ,+1
2053  3001              DCA     TSTA4           /LOC,=0001
2054  1330              TAD     AD2             /ADDRESS=RET2
2055  3002              DCA     TSTA5           /LOC,=0002
                        /
                        /EXECUTE INSTRUCTIONS PREVIOUSLY ASSEMBLED IN TEST
                        /ADDRESSES
                        /
2056  7300    FCL2,     CLA CLL
2057  5472              JMP I   XSTA2
2060  7000    RET2,     NOP
2061  7000              NOP
2062  4464              JMS I   XAVREG          /SAVE AC AND LINK
                        /
                        /EXPECTED RESULTS ARE AC=0, LINK=1
                        /
2063  7438              SZL
2064  7440              SZA
2065  4465              JMS I   XDATER
2066  7410              SKP
2067  4466              JMS I   XHALT2
2070  4467              JMS I   XLOOP
2071  5256              JMP     FCL2
2072  7300              CLA
2073  1124              TAD     SEQ3
2074  3154              DCA     SEQ
2075  5554              JMP I   SEQ


                        /
                        /
                        /FALSE CARRY TEST #3
                        /
2076  7300    FCT3,     CLA CLL
                        /
                        /
                        /
2077  1137    FCS3,     TAD     INS3            /INSTRUCTION=IAC
2100  3471              DCA I   XSTA1           /LOC,=7776
2101  1333              TAD     INS16           /INSTRUCTION=TAD I 21
2102  3472              DCA I   XSTA2           /LOC,=7777
2103  1152              TAD     INS14           /INSTRUCTION=JMP I ,+1
2104  3000              DCA     TSTA3           /LOC,=0000
2105  1331              TAD     AD3             /ADDRESS=RET3
2106  3001              DCA     TSTA4           /LOC,=0001
                        /
```

```
                        /
                        /
                        /
2107  7300    FCL3,     CLA CLL
2110  5471              JMP I   XSTA1
2111  7000    RET3,     NOP
2112  7000              NOP
2113  4464              JMS I   XAVREG
                        /
                        /
                        /
2114  7430              SZL
2115  7440              SZA
2116  4465              JMS I   XDATER
2117  7410              SKP
2120  4466              JMS I   XHALT2
2121  4467              JMS I   XLOOP
2122  5307              JMP     FCL3
2123  7200              CLA
2124  1125              TAD     SEQ4
2125  3154              DCA     SEQ
2126  5554              JMP I   SEQ
2127  2025    AD1,      RET1
2130  2060    AD2,      RET2
2131  2111    AD3,      RET3
2132  1003    INS2,     1003            /=TAD ,+3 IN 0000
2133  1421    INS16,    1421


      2200    PAGE
                        /
                        /
                        /FALSE CARRY TEST #4
                        /
2200  7300    FCT4,     CLA CLL
                        /
                        /
                        /
2201  7340    FCS4,     CLA CLL CMA             /DATA=7777
2202  3471              DCA I   XSTA1           /LOC,=7776
2203  1136              TAD     INS1            /INSTRUCTION=TAD ,+1
2204  3472              DCA I   XSTA2           /LOC,=7777
2205  1142              TAD     INS6            /INSTRUCTION=CMA CML RAR
2206  3000              DCA     TSTA3           /LOC,=0000
2207  1141              TAD     INS5            /INSTRUCTION=JMP I ,+1
2210  3001              DCA     TSTA4           /LOC,=0001
2211  1324              TAD     AD4             /ADDRESS=RET4
2212  3002              DCA     TSTA5           /LOC,=0002
                        /
                        /
                        /
                        /
2213  7340    FCL4,     CLA CLL CMA
```

```
2214  5472          JMP I   XSTA2
2215  7000  RET4,   NOP
2216  7000          NOP
2217  4464          JMS I   XAVREG
                    /
                    /
                    /
2220  7430          SZL
2221  7440          SZA
2222  4465          JMS I   XDATER
2223  7410          SKP
2224  4466          JMS I   XHALT2
2225  4467          JMS I   XLOOP
2226  5213          JMP     FCL4
2227  1126          TAD     SEQ5
2230  3154          DCA     SEQ
2231  5554          JMP I   SEQ


                    /
                    /
                    /FALSE CARRY TEST #5
                    /
2232  7300  FCT5,   CLA CLL
                    /
                    /
                    /
2233  7300  FCS5,   CLA CLL
2234  1143          TAD     INS7            /INSTRUCTION=ISZ ,+1
2235  3472          DCA I   XSTA2           /LOC,=7777
2236  1137          TAD     INS3            /INSTRUCTION=IAC
2237  3000          DCA     TSTA3           /LOC,=0000
2240  1137          TAD     INS3            /INSTRUCTION=IAC
2241  3001          DCA     TSTA4           /LOC,=0001
2242  1151          TAD     INS13           /INSTRUCTION=JMP I ,+1
2243  3002          DCA     TSTA5           /LOC,=0002
2244  1325          TAD     AD5             /ADDRESS=RET5
2245  3003          DCA     TSTA6           /LOC,=0003
                    /
                    /
                    /
                    /
2246  7340  FCL5,   CLA CLL CMA
2247  3471          DCA I   XSTA1
2250  7040          CMA
2251  5472          JMP I   XSTA2
2252  7000  RET5,   NOP
2253  7000          NOP
2254  4464          JMS I   XAVREG
                    /
                    /
                    /
2255  7430          SZL
2256  7440          SZA
2257  4465          JMS I   XDATER
```

```
2260  7410          SKP
2261  4466          JMS I   XHALT2
2262  4467          JMS I   XLOOP
2263  5246          JMP     FCL5
2264  7200          CLA
2265  1127          TAD     SEQ6
2266  3154          DCA     SEQ
2267  5554          JMP I   SEQ


                    /
                    /
                    /FALSE CARRY TEST #6
                    /
2270  7300  FCT6,   CLA CLL
                    /
2271  7300  FCS6,   CLA CLL
2272  1144          TAD     INS8          /INSTRUCTION=ISZ ,+1
2273  3472          DCA I   XSTA2         /LOC,=7777
2274  1137          TAD     INS3          /INSTRUCTION=IAC
2275  3001          DCA     TSTA4         /LOC,=0001
2276  1151          TAD     INS13         /INSTRUCTION=JMP I ,+1
2277  3002          DCA     TSTA5         /LOC,=0002
2300  1326          TAD     AD6           /ADDRESS=RET6
2301  3003          DCA     TSTA6         /LOC,=0003
                    /
                    /
                    /
                    /
2302  7340  FCL6,   CLA CLL CMA
2303  3000          DCA     TSTA3
2304  7240          CLA CMA
2305  5472          JMP I   XSTA2
2306  7000  RET6,   NOP
2307  7000          NOP
2310  4464          JMS I   XAVREG
                    /
                    /
                    /
2311  7430          SZL
2312  7440          SZA
2313  4465          JMS I   XDATER
2314  7410          SKP
2315  4466          JMS I   XHALT2
2316  4467          JMS I   XLOOP
2317  5302          JMP     FCL6
2320  7200          CLA
2321  1130          TAD     SEQ7
2322  3154          DCA     SEQ
2323  5554          JMP I   SEQ
2324  2215  AD4,    RET4
2325  2252  AD5,    RET5
2326  2306  AD6,    RET6
```

```
2400                PAGE

                    /
                    /
                    /FALSE CARRY TEST#7
                    /
2400  7300  FCT7,  CLA CLL
                    /
                    /
                    /
2401  7300  FCS7,  CLA CLL
2402  1145          TAD     INS9          /INSTRUCTION=ISZ I TSTIND
2403  3472          DCA I   XSTA2         /LOC,=7777
2404  1137          TAD     INS3          /INSTRUCTION=IAC
2405  3001          DCA     TSTA4         /LOC,=0001
2406  1151          TAD     INS13         /INSTRUCTION=JMP I .+1
2407  3002          DCA     TSTA5         /LOC,=0002
2410  1326          TAD     AD7           /ADDRESS=RET7
2411  3003          DCA     TSTA6         /LOC,=0003
                    /
                    /
                    /
2412  7340  FCL7,  CLA CLL CMA
2413  3010          DCA     TSTIND
2414  7040          CMA
2415  3000          DCA     TSTA3
2416  7040          CMA
2417  5472          JMP I   XSTA2
2420  7000  RET7,  NOP
2421  7000          NOP
2422  4464          JMS I   XAVREG
                    /
                    /
                    /
2423  7430          SZL
2424  7440          SZA
2425  4465          JMS I   XDATER
2426  7410          SKP
2427  4466          JMS I   XHALT2
2430  4467          JMS I   XLOOP
2431  5212          JMP     FCL7
2432  7200          CLA
2433  1131          TAD     SEQ8
2434  3154          DCA     SEQ
2435  5554          JMP I   SEQ

                    /
                    /
                    /FALSE CARRY TEST #8
                    /
2436  7300  FCT8,  CLA CLL
                    /
                    /
                    /
2437  7300  FCS8,  CLA CLL
2440  1137          TAD     INS3          /INSTRUCTION=IAC
```

```
2441  3000            DCA     TSTA3           /LOC,=0000
2442  1137            TAD     INS3            /INSTRUCTION=IAC
2443  3001            DCA     TSTA4           /LOC,=0001
2444  1140            TAD     INS4            /INSTRUCTION=JMP I ,+2
2445  3002            DCA     TSTA5           /LOC,=0002
2446  1327            TAD     AD8             /ADDRESS=RET8
2447  3004            DCA     TSTA7           /LOC,=0004
                      /
                      /
                      /
2450  7300    FCL8,   CLA CLL
2451  1146            TAD     INS10           /INSTRUCTION=JMS ,+1
2452  3472            DCA I   XSTA2           /LOC,=7777
2453  7240            CLA CMA
2454  5472            JMP I   XSTA2
2455  7000    RET8,   NOP
2456  7000            NOP
                      /
                      /
                      /
2457  7430            SZL
2460  7440            SZA
2461  4465            JMS I   XDATER
2462  7410            SKP
2463  4466            JMS I   XHALT2
2464  4467            JMS I   XLOOP
2465  5250            JMP     FCL8
2466  7200            CLA
2467  1132            TAD     SEQ9
2470  3154            DCA     SEQ
2471  5554            JMP I   SEQ


                      /
                      /
                      /FALSE CARRY TEST #9
                      /
2472  7300    FCT9,   CLA CLL
                      /
                      /
                      /
2473  7340    FCS9,   CLA CLL CMA             /DATA=7777
2474  3471            DCA I   XSTA1           /LOC,=7776
2475  1137            TAD     INS3            /INSTRUCTION=IAC
2476  3000            DCA     TSTA3           /LOC,=0000
2477  1141            TAD     INS5            /INSTRUCTION=JMP I ,+1
2500  3001            DCA     TSTA4           /LOC,=0001
2501  1330            TAD     AD9             /ADDRESS=RET9
2502  3002            DCA     TSTA5           /LOC,=0002
                      /
                      /
                      /
2503  7300    FCL9,   CLA CLL
2504  1147            TAD     INS11           /INSTRUCTION=JMS I ,+1
```

```
2505  3472          DCA I   XSTA2
2506  7240          CLA CMA
2507  5472          JMP I   XSTA2
2510  7000  RET9,   NOP
2511  7000          NOP
2512  4464          JMS I   XAVREG
                    /
                    /
                    /
2513  7430          SZL
2514  7440          SZA
2515  4465          JMS I   XDATER
2516  7410          SKP
2517  4466          JMS I   XHALT2
2520  4467          JMS I   XLOOP
2521  5303          JMP     FCL9
2522  7200          CLA
2523  1133          TAD     SEQ10
2524  3154          DCA     SEQ
2525  5554          JMP I   SEQ
2526  2420  AD7,    RET7
2527  2455  AD8,    RET8
2530  2510  AD9,    RET9


      2600  PAGE
                    /
                    /
                    /
                    /FALSE CARRY TEST #10
                    /
2600  7300  FCT10,  CLA CLL
                    /
                    /
                    /
2601  7300  FCS10,  CLA CLL
2602  1150          TAD     INS12           /INSTRUCTION=JMS I TSTIND
2603  3472          DCA I   XSTA2           /LOC,=7777
2604  1137          TAD     INS3            /INSTRUCTION=IAC
2605  3001          DCA     TSTA4           /LOC,=0001

2606  1151          TAD     INS13           /INSTRUCTION=JMP I .+1
2607  3002          DCA     TSTA5           /LOC,=0002
2610  1315          TAD     AD10            /ADDRESS=RET10
2611  3003          DCA     TSTA6           /LOC,=0003
                    /
                    /
                    /
2612  7340  FCL10,  CLA CLL CMA
2613  3010          DCA     TSTIND
2614  7040          CMA
2615  5472          JMP I   XSTA2
2616  7000  RET10,  NOP
2617  7000          NOP
```

```
2620  4464          JMS I   XAVREG
                    /
                    /
                    /
2621  7430          SZL
2622  7440          SZA
2623  4465          JMS I   XDATER
2624  7410          SKP
2625  4466          JMS I   XHALT2
2626  4467          JMS I   XLOOP
2627  5212          JMP     FCL10
2630  7200          CLA
2631  1134          TAD     SEQ11
2632  3154          DCA     SEQ
2633  5554          JMP I   SEQ


                    /
                    /
                    /FALSE CARRY TEST #11
                    /
2634  7300  FCT11,  CLA CLL
                    /
                    /
                    /
2635  7300  FCS11,  CLA CLL
2636  1137          TAD     INS3            /INSTRUCTION=IAC
2637  3000          DCA     TSTA3           /LOC,=0000
2640  1141          TAD     INS5            /INSTRUCTION=JMP I .+1
2641  3001          DCA     TSTA4           /ADDRESS=0001
2642  1316          TAD     AD11            /ADDRESS=RET11
2643  3002          DCA     TSTA5           /LOC,=0002
                    /
                    /
                    /
2644  7300  FCL11,  CLA CLL
2645  1153          TAD     INS15           /INSTRUCTION=JMS ,
2646  3472          DCA I   XSTA2           /LOC,=7777
2647  7240          CLA CMA
2650  5472          JMP I   XSTA2
2651  7000  RET11,  NOP
2652  7000          NOP
2653  4464          JMS I   XAVREG
                    /
                    /
                    /
2654  7430          SZL
2655  7440          SZA
2656  4465          JMS I   XDATER
2657  7410          SKP
2660  4466          JMS I   XHALT2
2661  4467          JMS I   XLOOP
2662  5244          JMP     FCL11
2663  7200          CLA
2664  1135          TAD     SEQ12
```

```
2665  3154            DCA     SEQ
2666  5554            JMP I   SEQ


                      /
                      /
                      /FALSE CARRY TEST #12
                      /
2667  7300  FCT12,   CLA CLL
                      /
                      /
                      /
2670  7300  FCS12,   CLA CLL
2671  1137            TAD     INS3            /INSTRUCTION=IAC
2672  3472            DCA I   XSTA2           /LOC,=7777
2673  1152            TAD     INS14           /INSTRUCTION=JMP I ,+1
2674  3000            DCA     TSTA3           /LOC,=0000
2675  1317            TAD     AD12            /ADDRESS=RET12
2676  3001            DCA     TSTA4           /LOC,=0001
                      /
                      /
                      /
                      /
2677  7340  FCL12,   CLA CLL CMA
2700  5472            JMP I   XSTA2
2701  7000  RET12,   NOP
2702  7000            NOP
2703  4464            JMS I   XAVREG
                      /
                      /
                      /
2704  7430            SZL
2705  7440            SZA
2706  4465            JMS I   XDATER
2707  7410            SKP
2710  4466            JMS I   XHALT2
2711  4467            JMS I   XLOOP
2712  5277            JMP     FCL12
2713  5714            JMP I   ,+1
2714  3200            ENDFCT
2715  2616  AD10,     RET10
2716  2651  AD11,     RET11
2717  2701  AD12,     RET12


      3000  PAGE
                      /(TAPE 3)
                      /COMPARE TWO NUMBERS: W1*NOT(W2)+W2*NOT(W1)=0, W1=W2
                      /
3000  0000  SAMEAS,   0
3001  7340            CLA CLL CMA
3002  0040            AND     W2
3003  7040            CMA
```

```
3004  0037            AND     W1
3005  7640            SZA CLA                 /W1*NOT(W2)=0
3006  5600            JMP I   SAMEAS          /W1*NOT(W2)NOT 0, ERROR
3007  7040            CMA
3010  0037            AND     W1
3011  7040            CMA
3012  0040            AND     W2
3013  7640            SZA CLA                 /W2*NOT(W1)=0
3014  5600            JMP I   SAMEAS          /W2*NOT(W1) NOT 0, ERROR
3015  2200            ISZ     SAMEAS
3016  5600            JMP I   SAMEAS          /W1=W2
                      /
                      /SAVE AC AND LINK
                      /
3017  0000  SAVREG,   0
3020  3025            DCA     TEMPAC
3021  7430            SZL
3022  7040            CMA
3023  3026            DCA     TEMPL
3024  7040            CMA
3025  0025            AND     TEMPAC
3026  5617            JMP I   SAVREG
                      /
                      /HALT ON ERROR,  DISPLAY ADDRESS OF FAILED TEST IN AC
                      /
3027  0000  HALT2,    0
3030  7604            LAS
3031  0103            AND     SR00            /TEST SR00
3032  7640            SZA CLA                 /SUPPRESS HALT IF SR00=1
3033  5627            JMP I   HALT2
3034  1154            TAD     SEQ             /PUT ADDRESS OF FAILED TEST IN
3035  7402            HLT                     /AC AND STOP
3036  5627            JMP I   HALT2           /CONTINUE TESTING


                      /
                      /
                      /DATA ERROR HAS OCCURED
                      /
3037  0000  DATER,    0
3040  7604            LAS
3041  0104            AND     SR01                    /TEST SR01
3042  7450            SNA                     /SUPPRESS ERROR TYPE IF SR01=1
3043  4256            JMS     TYPS2           /SET UP FOR ERROR TYPE
3044  2237            ISZ     DATER
3045  5637            JMP I   DATER
                      /
                      /
                      /
                      /
                      /
                      /LOOP ON DATA ERROR
                      /
3046  0000  LOOP,     0
3047  7604            LAS
```

```
3050  0105          AND     SR02                    /TEST SR02
3051  7650          SNA CLA                         /LOOP IF SR02=1
3052  5254          JMP     NLOOP                   /DO NOT LOOP
3053  5646          JMP I   LOOP
3054  2246  NLOOP,  ISZ     LOOP
3055  5646          JMP I   LOOP

                    /
                    /TYPE DATA ERROR MESSAGE
                    /
3056  0000  TYPS2,  0
3057  4446          JMS I   XPRINT
3060  5744          DATE-1                          /TYPE "DATA ERROR"
3061  1037          TAD     W1
3062  4673          JMS I   XADOUT                  /TYPE TEST ADDRESS
3063  7340          CLA CLL CMA
3064  0025          AND     TEMPAC
3065  3037          DCA     WD1
3066  0026          AND     TEMPL
3067  3040          DCA     WD2
3070  4460          JMS I   XLNKOU                  /OUTPUT RECEIVED LINK
3071  4461          JMS I   XWDOUT                  /OUTPUT RECEIVED AC
3072  5656          JMP I   TYPS2
3073  3227  XADOUT,  ADOUT
                    /
                    /END OF PASS
                    /
      3200  PAGE
3200  7300  ENDFCT,  CLA CLL
3201  2020          ISZ     CNTR1                   /INCREMENT PASS COUNT
3202  5224          JMP     OUT                     /PASS NOT COMPLETE
3203  7604          LAS
3204  0115          AND     SR10                    /TEST SR10
3205  7650          SNA CLA                         /IS SR10=1
3206  5221          JMP     FCTOK                   /NO, TYPE FCT
3207  7604  FCTHLT,  LAS
3210  0114          AND     SR09                    /TEST SR09
3211  7640          SZA CLA                         /IS SR09=1
3212  7402          HLT                             /YES, HALT
3213  7604          LAS
3214  0116          AND     SR11                    /TEST SR11
3215  7640          SZA CLA                         /IS SR11=1
3216  5224          JMP     OUT                     /YES, LOOP ON FCT
3217  5620          JMP I   .+1                     /NO, GO TO NEXT TEST
3220  3400          RNAD1
3221  4446  FCTOK,   JMS I   XPRINT
3222  5732          OKS-1
3223  5207          JMP     FCTHLT
3224  1122  OUT,     TAD     SEQ1
3225  3154          DCA     SEQ
3226  5554          JMP I   SEQ


                    /
                    /
```

```
                        /CONVERT ADDRESS TO ASCII AND OUTPUT
                        /
3227  0000    ADOUT,    0
3230  3037              DCA     TEMP1
3231  1037              TAD     TEMP1
3232  0172              AND     K0007
3233  3264              DCA     A2
3234  1037              TAD     TEMP1
3235  7006              RTL
3236  7004              RAL
3237  0266              AND     K0700
3240  1264              TAD     A2
3241  1267              TAD     K6060
3242  3264              DCA     A2
3243  1037              TAD     TEMP1
3244  7012              RTR
3245  7012              RTR
3246  7012              RTR
3247  0172              AND     K0007
3250  3263              DCA     A1
3251  1037              TAD     TEMP1
3252  7012              RTR
3253  7010              RAR
3254  0266              AND     K0700
3255  1263              TAD     A1
3256  1267              TAD     K6060
3257  3263              DCA     A1
3260  4446              JMS I   XPRINT
3261  3262              A1-1
3262  5627              JMP I   ADOUT
3263  0000    A1,       0
3264  0000    A2,       0
3265  4000              4000
3266  0700    K0700,    0700
3267  6060    K6060,    6060

                        /MULTIPLE ADDITIONS OF RANDOM NUMBER AND ITS TWO'S COMPLEMENT
      3400      PAGE
3400  7300    RNADI,    CLA CLL
3401  4473              JMS I   XRAND           /GENERATE RANDOM NUMBERS
3402  7300              CLA CLL
3403  1041              TAD     RANDA
3404  1043              TAD     RANDC           /AC=0
3405  1043              TAD     RANDC
3406  1041              TAD     RANDA           /AC=0
3407  1041              TAD     RANDA
3410  1041              TAD     RANDA
3411  1043              TAD     RANDC
3412  1043              TAD     RANDC           /AC=0
3413  1041              TAD     RANDA
3414  1041              TAD     RANDA
3415  1043              TAD     RANDC
3416  1041              TAD     RANDA
3417  1043              TAD     RANDC
3420  1043              TAD     RANDC           /AC=0
```

```
3421 1041          TAD     RANDA
3422 1041          TAD     RANDA
3423 1043          TAD     RANDC
3424 1043          TAD     RANDC          /AC=0
3425 1043          TAD     RANDC
3426 1041          TAD     RANDA
3427 1043          TAD     RANDC
3430 1041          TAD     RANDA          /AC=0
3431 1041          TAD     RANDA
3432 1041          TAD     RANDA
3433 1043          TAD     RANDC
3434 1043          TAD     RANDC          /AC=0
3435 7000          NOP
3436 4464          JMS I   XAVREG         /SAVE AC AND LINK
3437 7430          SZL                    /IS LINK=1, AND AC=0
3440 7440          SZA
3441 4646          JMS I   XRN1ER         /ERROR, AC NOT 0, OR LINK NOT 1 OR BOTH
3442 4467          JMS I   NERROP         /RESULTS OK
3443 5202          JMP     RNAD1+2
3444 5645          JMP I   .+1
3445 3600          RNAD2

3446 3447  XRN1ER, RN1ER


           /
           /RANDOM ADD TEST 1 ERROR HANDLER
           /
3447 0000  RN1ER,  0
3450 7604          LAS
3451 0104          AND     SR01           /TEST SR01
3452 7640          SZA CLA                /IS SR01=1
3453 5302          JMP     SKHLT          /YES, SUPPRESS ERROR TYPEOUT
3454 4446          JMS I   XPRINT         /TYPE "RANDOM ADD TEST1 FAILED"
3455 5565          EM10-1
3456 4446          JMS I   XPRINT         /TYPE "RANDA, RANDC, RESULT"
3457 5316          DH4-1
3460 7340          CLA CLL CMA
3461 0041          AND     RANDA
3462 3037          DCA     WD1
3463 4461          JMS I   XWDOUT         /OUTPUT RANDA
3464 7340          CLA CLL CMA
3465 0043          AND     RANDC
3466 3037          DCA     WD1
3467 4461          JMS I   XWDOUT         /OUTPUT RANDC
3470 7340          CLA CLL CMA
3471 0025          AND     TEMPAC
3472 3037          DCA     WD1
3473 7040          CMA
3474 0026          AND     TEMPL
3475 3040          DCA     WD2
3476 4460          JMS I   XLNKOU         /OUTPUT RESULTANT LINK
3477 4461          JMS I   XWDOUT         /OUTPUT RESULTANT AC
3500 4446          JMS I   XPRINT
3501 5742          CRLF-1
```

```
3502  7604    SKHLT,  LAS
3503  0103            AND     SR00            /TEST SR00
3504  7640            SZA CLA                 /IS SR00=1
3505  5647            JMP I   RN1ER           /YES, SUPPRESS ERROR HALT
3506  7300            CLA CLL
3507  1247            TAD     RN1ER
3510  7402            HLT
3511  5647            JMP I   RN1ER           /HALT WITH ADDRESS OF RNAD1 IN AC

                      /
                      /RANDOM NUMBER GENERATOR
                      /
3512  0000    RANDOM, 0
3513  7300            CLA CLL
3514  1041            TAD     RANDA
3515  7004            RAL
3516  7430            SZL
3517  1342            TAD     K0003
3520  3041            DCA     RANDA
3521  1041            TAD     RANDA
3522  7041            CIA
3523  3043            DCA     RANDC
3524  7100            CLL
3525  1341            TAD     R2A
3526  7004            RAL
3527  7430            SZL
3530  1342            TAD     K0003
3531  3341            DCA     R2A
3532  7430            SZL
3533  7040            CMA
3534  3044            DCA     LINKR
3535  1044            TAD     LINKR
3536  7040            CMA
3537  3045            DCA     LINKRC
3540  5712            JMP I   RANDOM
3541  0001    R2A,    1
3542  0003    K0003,  3

                      /ADDITION OF RANDOM NUMBER AND MODIFIED
                      /COMPLEMENT TO PRODUCE ONE KNOWN BIT
                      /SET IN AC
                      /
                      /

      3600    PAGE
3600  7340    RNAD2,  CLA CLL CMA
3601  0041            AND     RANDA           /GET RANDOM NUMBER
3602  3346            DCA     APOS            /STORE IT
3603  7040            CMA
3604  0041            AND     RANDA
3605  7040            CMA
3606  3347            DCA     ANEG            /ONE'S COMPLIMENT OF RANDOM NUMBER
```

```
3607  7040            CMA
3610  0103            AND     K4000           /GET MASK
3611  3352            DCA     MASK
3612  7040  NXTBT,    CMA
3613  0352            AND     MASK
3614  7040            CMA
3615  3353            DCA     NMASK           /COMPLIMENT MASK
3616  7040  ALT1BT,   CMA
3617  0346            AND     APOS            /GET RANDOM NUMBER
3620  0352            AND     MASK            /TEST SIGN BIT
3621  7440            SZA                     /IS NUMBER NEGATIVE
3622  5232            JMP     MODNEG          /YES, MODIFY COMPLIMENT OF NUMBER
3623  7040            CMA
3624  0346            AND     APOS            /GET RANDOM NUMBER
3625  4301            JMS     XOR1            /MODIFY WITH MASK
3626  7040            CMA
3627  0347            AND     ANEG            /GET COMPLIMENT OF RANDOM NUMBER
3630  3351            DCA     BNEG            /AND USE AS IS
3631  5240            JMP     CBTST1
3632  7240  MODNEG,   CMA CLA                 /MODIFY NEGATIVE NUMBER
3633  0347            AND     ANEG            /GET COMPLEMENT OF RANDOM NUMBER
3634  4315            JMS     XOR2            /MODIFY WITH MASK
3635  7040            CMA
3636  0346            AND     APOS            /GET RANDOM NUMBER
3637  3351            DCA     BNEG            /AND USE AS IS
3640  7340  CBTST1,   CLA CLL CMA
3641  0350            AND     BPOS            /LOAD AC WITH MODIFIED ARGUMENT
3642  1351            TAD     BNEG            /ADD UNMODIFIED ARGUMENT
3643  7430            SZL                     /DID CARRY PROPIGATE INTO LINK
3644  7001            IAC                     /NO, INCREMENT NUMBER
3645  4464            JMS I   XAVREG          /SAVE AC
3646  4463            JMS I   XAMEA           /COMPARE MODIFIED BIT AND MASK
3647  7410            SKP
3650  4756            JMS I   XRN2ER          /AC AND MASK DIFFERENT, ERROR
3651  4467            JMS I   NERROP          /NO ERROR, AC AND MASK THE SAME
3652  5240            JMP     CBTST1          /RETURN HERE FOR LOOPING
3653  5254            JMP     CBTST2

3654  7340  CBTST2,   CLL CLA CMA
3655  0351            AND     BNEG            /LOAD AC WITH UNMODIFIED ARGUMENT
3656  1350            TAD     BPOS            /ADD MODIFIED ARGUMENT
3657  7430            SZL                     /DID CARRY PROPIGATE INTO LINK
3660  7001            IAC                     /NO, INCREMENT NUMBER
3661  4464            JMS I   XAVREG          /SAVE AC
3662  4463            JMS I   XAMEA           /COMPARE AC AND MASK
3663  7410            SKP
3664  4756            JMS I   XRN2ER          /AC AND MASK NOT THE SAME, ERROR
3665  4467            JMS I   NERROP          /NOERROR, AC AND MASK THE SAME
3666  5254            JMP     CBTST2          /RETURN HERE FOR LOOPING
                      /SHIFT MASK ONE PLACE TO RIGHT
3667  7340  MOVMSK,   CLA CLL CMA
3670  0352            AND     MASK
3671  7010            RAR
3672  3352            DCA     MASK
```

```
3673  7420          SNL                     /HAVE ALL BITS BEEN TESTED
3674  5212          JMP     NXTBT           /NO, CONTINUE
3675  4467          JMS I   NERROP          /YES, TEST FOR LOOP ON RNAD2
3676  5200          JMP     RNAD2
3677  5700          JMP I   .+1
3700  4200          RARR
3701  0000  XOR1,    0
3702  0353          AND     NMASK
3703  7040          CMA
3704  3354          DCA     ABNOT
3705  7040          CMA
3706  0347          AND     ANEG
3707  0352          AND     MASK
3710  7040          CMA
3711  0354          AND     ABNOT
3712  7040          CMA
3713  3350          DCA     BPOS
3714  5701          JMP I   XOR1
3715  0000  XOR2,    0
3716  0352          AND     MASK
3717  7040          CMA
3720  3354          DCA     ABNOT
3721  7040          CMA
3722  0346          AND     APOS
3723  0353          AND     NMASK
3724  7040          CMA
3725  0354          AND     ABNOT
3726  3350          DCA     BPOS
3727  5715          JMP I   XOR2


3730  0000  SAMEA,  0
3731  7040          CMA
3732  3355          DCA     NOTAC
3733  7040          CMA
3734  0025          AND     TEMPAC
3735  0353          AND     NMASK
3736  7440          SZA
3737  5344          JMP     EROUT1
3740  7040          CMA
3741  0352          AND     MASK
3742  0355          AND     NOTAC
3743  7440          SZA
3744  2330  EROUT1, ISZ     SAMEA
3745  5730          JMP I   SAMEA
3746  0000  APOS,    0
3747  0000  ANEG,    0
3750  0000  BPOS,    0
3751  0000  BNEG,    0
3752  0000  MASK,    0
3753  0000  NMASK,   0
3754  0000  ABNOT,   0
3755  0000  NOTAC,   0
3756  4000  XRN2ER,  RN2ER
```

```
                4000    PAGE
                        /
                        /ERROR HANDLER FOR RANDOM ADD TEST 2,
                        /
4000  0000      RN2ER,  0
4001  7604              LAS
4002  0104              AND     SR01            /TEST SR01
4003  7640              SZA CLA                 /IS SR01 = 1
4004  5233              JMP     SHLT            /YES SUPPRESS ERROR TYPEOUT
4005  4446              JMS I   XPRINT          /NO, TYPE "RANDOM ADD TEST 2 FAILED"
4006  5605              EM11-1
4007  4446              JMS I   XPRINT          /TYPE ARG1, ARG2, ARG1+ARG2, EXPECTED
4010  5364              DH6-1
4011  7340              CLA CLL CMA
4012  0777              AND     BPOS            /OUTPUT ARG1
4013  3037              DCA     WD1
4014  4461              JMS I   XWDOUT
4015  7040              CMA
4016  0776              AND     BNEG            /OUTPUT ARG2
4017  3037              DCA     WD1
4020  4461              JMS I   XWDOUT
4021  7040              CMA
4022  0775              AND     MASK            /OUTPUT EXPECTED RESULT
4023  3037              DCA     WD1
4024  4461              JMS I   XWDOUT
4025  7040              CMA
4026  0025              AND     TEMPAC          /OUTPUT RESULTANT AC
4027  3037              DCA     WD1
4030  4461              JMS I   XWDOUT
4031  4446              JMS I   XPRINT
4032  5742              CRLF-1
4033  7604      SHLT,   LAS
4034  0103              AND     SR00            /TEST SR00
4035  7640              SZA CLA                 /IS SR00 = 1
4036  5600              JMP I   RN2ER           /YES, DO NOT HALT
4037  7300              CLA CLL                 /NO, HALT WITH ADDRESS IN AC
4040  1200              TAD     RN2ER
4041  7402              HLT
4042  5600              JMP I   RN2ER


                        /ROTATE RANDOM NUMBER RIGHT USING RAR

4175  3752
4176  3751
4177  3750
                4200    PAGE
4200  7300      RARR,   CLA CLL
```

```
4201  1044          TAD     LINKR           /GET LINK TO BE ROTATED
4202  7440          SZA
4203  7220          CLA CML
4204  1041          TAD     RANDA           /GET NUMBER TO BE ROTATED
4205  7010          RAR
4206  7010          RAR
4207  7010          RAR
4210  7010          RAR
4211  7010          RAR
4212  7010          RAR
4213  7010          RAR
4214  7010          RAR
4215  7010          RAR
4216  7010          RAR
4217  7010          RAR
4220  7010          RAR
4221  7010          RAR
4222  7010          RAR
4223  7010          RAR
4224  7010          RAR
4225  7010          RAR
4226  7010          RAR
4227  7010          RAR
4230  7010          RAR
4231  7010          RAR
4232  7010          RAR
4233  7010          RAR
4234  7010          RAR
4235  7010          RAR
4236  7010          RAR
4237  7000          NOP
4240  7000          NOP
4241  4464          JMS I   XAVREG          /SAVE AC AND LINK
4242  1043          TAD     RANDC           /ADD COMPLEMENT OF NUMBER TO AC
4243  7640          SZA CLA                 /ARE THEY EQUAL
4244  5250          JMP     .+4             /NO, ERROR
4245  1044          TAD     LINKR
4246  3037          DCA     WD1
4247  1026          TAD     TEMPL
4250  3040          DCA     WD2
4251  4462          JMS I   XAMEAS          /ARE LINKS THE SAME
4252  4735          JMS I   XRARR           /NO, ERROR
4253  4467          JMS I   NERROP          /TEST FOR LOOPING
4254  5200          JMP     RARR            /LOOP ON RARR

                    /ROTATE RANDOM NUMBER LEFT USING RAL
4255  7300    RALR, CLA CLL
4256  1044          TAD     LINKR           /GET LINK TO BE ROTATED
4257  7440          SZA
4260  7220          CLA CML
4261  1041          TAD     RANDA           /GET NUMBER TO BE ROTATED
4262  7004          RAL
4263  7004          RAL
4264  7004          RAL
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4265  7004            RAL
4266  7004            RAL
4267  7004            RAL
4270  7004            RAL
4271  7004            RAL
4272  7004            RAL
4273  7004            RAL
4274  7004            RAL
4275  7004            RAL
4276  7004            RAL
4277  7004            RAL
4300  7004            RAL
4301  7004            RAL
4302  7004            RAL
4303  7004            RAL
4304  7004            RAL
4305  7004            RAL
4306  7004            RAL
4307  7004            RAL
4310  7004            RAL
4311  7004            RAL
4312  7004            RAL
4313  7004            RAL
4314  7000            NOP
4315  7000            NOP
4316  4464            JMS I   XAVREG          /SAVE AC AND LINK
4317  1043            TAD     RANDC           /ADD COMPLIMENT OF ORIGINAL NUMBER TO AC
4320  7440            SZA                     /ARE THEY THE SAME
4321  5325            JMP     .+4             /NO, ERROR
4322  1044            TAD     LINKR
4323  3037            DCA     WD1
4324  1026            TAD     TEMPL
4325  3040            DCA     WD2
4326  4462            JMS I   XAMEAS          /COMPARE ORIGINAL AND ROTATED LINKS
4327  4734            JMS I   XRALR          /LINKS NOT THE SAME, ERROR
4330  4467            JMS I   NERROP
4331  5255            JMP     RALR
4332  5733            JMP I   .+1
4333  4400            RTLR
4334  5013    XRALR,  RALER
4335  5000    XRARR,  RARER


                /ROTATE RANDOM NUMBER LEFT USING RTL

      4400      PAGE
4400  7300      RTLR,   CLA CLL
4401  1044              TAD     LINKR         /GET LINK TO BE ROTATED
4402  7440              SZA
4403  7220              CLA CML
4404  1041              TAD     RANDA         /GET NUMBER TO BE ROTATED
4405  7006              RTL
4406  7006              RTL
4407  7006              RTL
4410  7006              RTL
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4411  7006            RTL
4412  7006            RTL
4413  7006            RTL
4414  7006            RTL
4415  7006            RTL
4416  7006            RTL
4417  7006            RTL
4420  7006            RTL
4421  7006            RTL
4422  7006            RTL
4423  7006            RTL
4424  7006            RTL
4425  7006            RTL
4426  7006            RTL
4427  7006            RTL
4430  7006            RTL
4431  7006            RTL
4432  7006            RTL
4433  7006            RTL
4434  7006            RTL
4435  7006            RTL
4436  7006            RTL
4437  7000            NOP
4440  7000            NOP
4441  4464            JMS I   XAVREG          /SAVE AC AND LINK
4442  1043            TAD     RANDC           /ADD COMPLEMENT OF ORIGINAL NUMBER TO AC
4443  7440            SZA                     /ARE THEY THE SAME
4444  5250            JMP     .+4             /NO, ERROR
4445  1044            TAD     LINKR
4446  3037            DCA     WD1
4447  1026            TAD     TEMPL
4450  3040            DCA     WD2
4451  4462            JMS I   XAMEAS          /COMPARE ORIGINAL AND ROTATED LINKS
4452  4771            JMS I   XRTLR          /LINKS NOT THE SAME, ERRROR
4453  4467            JMS I   NERROP
4454  5200            JMP     RTLR

                      /ROTATE RANDOM NUMBER RIGHT USING RTR

4455  7300    RTRR,   CLA CLL
4456  1044            TAD     LINKR           /GET LINK TO BE ROTATED
4457  7440            SZA
4460  7220            CLA CML
4461  1041            TAD     RANDA           /GET NUMBER TO BE ROTAED
4462  7012            RTR
4463  7012            RTR
4464  7012            RTR
4465  7012            RTR
4466  7012            RTR
4467  7012            RTR
4470  7012            RTR
4471  7012            RTR
4472  7012            RTR
4473  7012            RTR
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4474  7012            RTR
4475  7012            RTR
4476  7012            RTR
4477  7012            RTR
4500  7012            RTR
4501  7012            RTR
4502  7012            RTR
4503  7012            RTR
4504  7012            RTR
4505  7012            RTR
4506  7012            RTR
4507  7012            RTR
4510  7012            RTR
4511  7012            RTR
4512  7012            RTR
4513  7012            RTR
4514  7000            NOP
4515  7000            NOP
4516  4464            JMS I   XAVREG          /SAVE AC AND LINK
4517  1043            TAD     RANDC           /ADD COMPLEMENT OF ORIGINAL NUMBER TO AC
4520  7440            SZA                   /ARE THEY THE SAME
4521  5325            JMP     .+4             /NO, ERROR
4522  1044            TAD     LINKR
4523  3037            DCA     WD1
4524  1026            TAD     TEMPL
4525  3040            DCA     WD2
4526  4462            JMS I   XAMEAS          /ARE LINKS THE SAME
4527  4770            JMS I   XRTRR           /NO, ERROR
4530  4467            JMS I   NERROP
4531  5255            JMP     RTRR


4532  2020            ISZ     CNTR1           /INCREMENT PASS COUNTER
4533  5366            JMP     ENRN            /NOT END OF PASS
4534  7604            LAS
4535  0115            AND     SR10            /TEST SR10
4536  7650            SNA CLA                 /IS SR10=1
4537  5363            JMP     RNDOK           /NO, TYPE RANDOM
4540  7604    RNDHLT, LAS
4541  0114            AND     SR09            /TEST SR09
4542  7640            SZA CLA                 /IS SR09=1
4543  7402            HLT                     /YES, HALT AT END OF RANDOM
4544  7604            LAS
4545  0116            AND     SR11            /TEST SR11
4546  7640            SZA CLA               /IS SR11=1
4547  5366            JMP     ENRN            /YES, LOOP ON RANDOM TESTS
4550  7604    FLDSW,  LAS
4551  0173            AND K0070
4552  7110            RAR CLL
4553  7012            RTR
4554  3175            DCA FLDSAV              /SAVE THE SWITCHES
4555  7604            LAS
4556  0107            AND SR04                /MASK FIELD RELOCATION SWITCH
4557  7640            SZA CLA
```

```
4560  5772            JMP I XFLDCK            /GOT FIELD RELOCATION SWITCH AND GO
4561  5762            JMP I   .+1             /NO, GO TO SIMULATED ADDITION TEST
4562  0200            RSIMAD
4563  4446  RNDOK,   JMS I   XPRINT
4564  5735            OK4-1
4565  5340            JMP     RNDHLT
4566  5767  ENRN,     JMP I   .+1
4567  3400            RNAD1
4570  5026  XRTRR,    RTRER
4571  5041  XRTLR,    RTLER
4572  4600  XFLDCK,   FLDCHK
                      /
      4600            PAGE
                      /
                      /ROUTINE TO SORT AND COMPARE RELOCATION INFORMATION
                      /
4600  4231  FLDCHK,   JMS FLDFND              /YES, FIND NUMBER OF FIELDS PRESENT
4601  4264            JMS RELOC               /RELOCATE TO NEXT BANK PRESENT OR BANK 0
4602  7346            CLA CLL CMA RTL         /AC TO 7775
4603  4341            JMS LFCR                /PRINT SOME CR-LF
4604  4331            JMS ASTRK               /PRINT SOME ********
4605  4352            JMS FLDNO               /PRINT AMOUNT OF MEMORY
4606  4446            JMS I XPRINT    /PRINT " EXTENDED BANKS OF MEMORY TO BANK "
4607  5755            BKMES           /TEXT FOR  EXTENDED BANKS OF MEMORY TO BANK
4610  4360            JMS FLDHR               /PRINT NEW FIELD
4611  4331            JMS ASTRK               /PRINT SOME *******
4612  7344            CLA CLL CMA RAL         /AC TO 7776
4613  4341            JMS LFCR                /PRINT SOME CR - LF
4614  1175            TAD FLDSAV
4615  7041            CIA
4616  1174            TAD FLDNUM
4617  7650            SNA CLA                 /COMPARE SWITCHES
4620  5223            JMP .+3
4621  7402            HLT CLA
4622  5770            JMP I XFLDSW            /TRY IT AGAIN
4623  1314            TAD FLDGO
4624  1115            TAD K0002
4625  3226            DCA .+1
4626  0000            0000                    /MODIFIED FOR NEW FIELD
4627  5630  FLDEX,    JMP I .+1
4630  0200            RSIMAD                  /START POINTER
                      /
                      /ROUTINE TO DETERMINE NUMBER OF BANKS OF MEM.
                      /
4631  0000  FLDFND,   0
4632  7300            CLA CLL
4633  3174            DCA FLDNUM
4634  1371            TAD KSTOP
4635  3176            DCA FLDCNT              /JUST A COUNTER
4636  6201            CDF     0               /TO FIELD 0
4637  3571            DCA I K0
4640  1372            TAD KCDF
4641  1113            TAD K0010
4642  3243            DCA FLDDF
4643  0000  FLDDF,    0                       /MODIFIED BY TEST
```

```
4644  7340            CLA CLL CMA
4645  3571            DCA I K0                /TRY EXTENDED FIELD
4646  1571            TAD I K0
4647  7650            SNA CLA                 /SAME IF FIELD PRESENT
4650  5255            JMP .+5                 /DATA BAD OR FIELD NOT THERE
4651  2174            ISZ FLDNUM              /UPDATE FIELD COUNT
4652  1243            TAD FLDDF               /GET LAST FIELD CDF
4653  2176            ISZ FLDCNT              /STOP AFTER 7
4654  5241            JMP FLDDF .-2           /TRY NEXT FIELD
4655  7300            CLA CLL
4656  6201            CDF     0               /BACK TO FIELD 0
4657  1571            TAD I K0
4660  7650            SNA CLA                 /DID FIELD 0 CHANGE
4661  5631            JMP I FLDFND            /FIELD 0 O'K', EXIT
4662  7602            HLT CLA                 /FIELD ERROR
4663  5274            JMP FLDFND .+1          /TRY AGAIN
                /
                /ROUTINE TO MOVE PROGRAM TO NEXT FIELD OR FIELD 0
                /
4664  0000    RELOC,  0
4665  7300            CLA CLL
4666  3176            DCA FLDCNT
4667  6224            RIF                     /GET CURRENT FIELD
4670  1113            TAD K0010               /UPDATE TO NEXT FIELD
4671  0375            AND K0070               /MASK 6-8
4672  3312            DCA FLDFRM              /NEW FIELD POINTER
4673  7301            CLA CLL IAC
4674  1174            TAD FLDNUM
4675  7004            RAL
4676  7006            RTL                     /MOVE TO 6-8
4677  7041            CIA
4700  1312            TAD FLDFRM
4701  7620            SNL CLA                 /COMPARE TO FIELDS PRESENT
4702  1312            TAD FLDFRM              /YES, GOOD FIELD
4703  1372            TAD KCDF                /GO BACK TO FIELD 0
4704  3314            DCA FLDGO               /SET POINTER FOR NEW FIELD
4705  6224            RIF                     /WHERE IS PROGRAM
4706  1372            TAD KCDF
4707  3312            DCA FLDFRM              /SET POINTER FOR FIELD JUST TESTED
4710  1312            TAD FLDFRM
4711  3317            DCA FLDRM1              /SAME MOVE
4712  0000    FLDFRM, 0000                    /MODIFIED TO CURRENT FIELD
4713  1576            TAD I FLDCNT            /GET DATA WORD
4714  0000    FLDGO,  0000
4715  3576            DCA I FLDCNT            /STORE DATA
4716  1576            TAD I FLDCNT
4717  0000    FLDRM1, 0000
4720  7041            CIA
4721  1576            TAD I FLDCNT            /THIS THE GOOD ONE
4722  7650            SNA CLA                 /DID DATA CHANGE
4723  5326            JMP .+3                 /DATA O.K.
4724  7602            HLT CLA                 /RELOCATION ERROR
4725  5312            JMP FLDFRM              /TRY SAME WORD AGAIN
4726  2176            ISZ FLDCNT              /UPDATE TO NEXT ADDRESS
4727  5312            JMP FLDFRM              /TRANSFER NEXT WORD
```

```
4730  5664              JMP I RELOC             /CORE LOADED EXIT
                      /
4731  0000    ASTRK,    0
4732  1371              TAD KSTOP
4733  3176              DCA FLDCNT
4734  1376              TAD K252                /GET ASTRK CHAR,
4735  4447              JMS I XTYPE
4736  2176              ISZ FLDCNT
4737  5334              JMP .-3
4740  5731              JMP I ASTRK
                      /
4741  0000    LFCR,     0
4742  3176              DCA FLDCNT
4743  1374              TAD KCR
4744  4447              JMS I XTYPE
4745  1373              TAD KLF
4746  4447              JMS I XTYPE
4747  2176              ISZ FLDCNT
4750  5343              JMP .-5
4751  5741              JMP I LFCR
                      /
4752  0000    FLDNO,    0
4753  1174              TAD FLDNUM
4754  0172              AND K0007
4755  1077              TAD K260
4756  4447              JMS I XTYPE
4757  5752              JMP I FLDNO
                      /
4760  0000    FLDHR,    0
4761  1314              TAD FLDGO
4762  0173              AND K0070
4763  7010              RAR
4764  7012              RTR
4765  1077              TAD K260
4766  4447              JMS I XTYPE
4767  5760              JMP I FLDHR
                      /
4770  4550    XFLDSW,   FLDSW
4771  7771    KSTOP,    7771
4772  6201    KCDF,     6201
4773  0212    KLF,      0212
4774  0215    KCR,      0215
4775  0170    K0170,    0170
4776  0252    K252,     0252
                      /
      5000              PAGE
                      /
5000  0000    RARER,    0
5001  7604              LAS
5002  0104              AND     SR01
5003  7640              SZA CLA
5004  5210              JMP     .+4
5005  4446              JMS I   XPRINT
5006  5625              EM12-1
5007  4264              JMS     ROPRT
```

```
5010  7300          CLA CLL
5011  1200          TAD     RARER
5012  5253          JMP     ROHLT

5013  0000  RALER,  0
5014  7604          LAS
5015  0104          AND     SR01
5016  7640          SZA CLA
5017  5223          JMP     .+4
5020  4446          JMS I   XPRINT
5021  5644          EM13-1
5022  4264          JMS     ROPRT
5023  7300          CLA CLL
5024  1213          TAD     RALER
5025  5253          JMP     ROHLT
5026  0000  RTRER,  0
5027  7604          LAS
5030  0104          AND     SR01
5031  7640          SZA CLA
5032  5236          JMP     .+4
5033  4446          JMS I   XPRINT
5034  5663          EM14-1
5035  4264          JMS     ROPRT
5036  7300          CLA CLL
5037  1226          TAD     RTRER
5040  5253          JMP     ROHLT
5041  0000  RTLER,  0
5042  7604          LAS
5043  0104          AND     SR01
5044  7640          SZA CLA
5045  5251          JMP     .+4
5046  4446          JMS I   XPRINT
5047  5702          EM15-1
5050  4264          JMS     ROPRT
5051  7300          CLA CLL
5052  1241          TAD     RTLER
5053  3263  ROHLT,  DCA     ROBACK
5054  7604          LAS
5055  0103          AND     SR00
5056  7640          SZA CLA
5057  5262          JMP     .+3
5060  1263          TAD     ROBACK
5061  7402          HLT
5062  5663          JMP I   ROBACK
5063  0000  ROBACK, 0

5064  0000  ROPRT,  0
5065  4446          JMS I   XPRINT
5066  5347          DH5-1
5067  7340          CLA CLL CMA
5070  0044          AND     LINKR
5071  3040          DCA     WD2
```

```
5072  7040          CMA
5073  0041          AND     RANDA
5074  3037          DCA     WD1
5075  4460          JMS I   XLNKOU
5076  4461          JMS I   XWDOUT
5077  7040          CMA
5100  0026          AND     TEMPL
5101  3040          DCA     WD2
5102  4460          JMS I   XLNKOU
5103  7040          CMA
5104  0025          AND     TEMPAC
5105  3037          DCA     WD1
5106  4461          JMS I   XWDOUT
5107  4446          JMS I   XPRINT
5110  5742          CRLF=1
5111  5664          JMP I   ROPRT

                    /

      5200    PAGE
5200  3736    DH1,  TEXT    /** ARG1          ARG2          SIMULATED       ARG1*ARG2     ARG2*ARG1**/
5201  4040
5202  4001
5203  2207
5204  6140
5205  4040
5206  4040
5207  4040
5210  4040
5211  0122
5212  0762
5213  4040
5214  4040
5215  4040
5216  4040
5217  4023
5220  1115
5221  2514
5222  0124
5223  0504
5224  4040
5225  4040
5226  4040
5227  4001
5230  2207
5231  6153
5232  0122
5233  0762
5234  4040
5235  4040
5236  4001
5237  2207
5240  6253
5241  0122
```

```
5242  0761
5243  3736
5244  0000
5245  3736    DH2,    TEXT    /**     ORIGINAL        SIMULATED       ACTUAL**/
5246  4040
5247  4040
5250  4017
5251  2211
5252  0711
5253  1601
5254  1440
5255  4040
5256  4040
5257  4023
5260  1115
5261  2514
5262  0124
5263  0504
5264  4040
5265  4040
5266  4040
5267  4001
5270  0324
5271  2501
5272  1437
5273  3600
5274  3736    DH3,    TEXT    /**RANDA         RANDC           RESULT**/
5275  2201
5276  1604
5277  0140
5300  4040
5301  4040
5302  4040
5303  4022
5304  0116
5305  0403
5306  4040
5307  4040
5310  4040
5311  4040
5312  2205
5313  2325
5314  1424
5315  3736
5316  0000
5317  3736    DH4,    TEXT    /**RANDA         BPOS            BNEG            RESULT**/
5320  2201
5321  1604
5322  0140
5323  4040
5324  4040
5325  4040
5326  4002
5327  2017
5330  2340
```

```
5331  4040
5332  4040
5333  4040
5334  4040
5335  0216
5336  0507
5337  4040
5340  4040
5341  4040
5342  4040
5343  4022
5344  0523
5345  2514
5346  2437
5347  3600
5350  3736    DH5,    TEXT    /**ORIGINAL      ACTUAL**/
5351  1722
5352  1107
5353  1116
5354  0114
5355  4040
5356  4040
5357  4040
5360  0103
5361  2425
5362  0114
5363  3736
5364  0000
5365  3736    DH6,    TEXT    /**    ARG1        ARG2       EXPECTED      ACTUAL**/
5366  4040
5367  4040
5370  0122
5371  0761
5372  4040
5373  4040
5374  4040
5375  4040
5376  4001
5377  2207
5400  6240
5401  4040
5402  4040
5403  4040
5404  0530
5405  2005
5406  0324
5407  0504
5410  4040
5411  4040
5412  4040
5413  0103
5414  2425
5415  0114
5416  3736
5417  0000
```

```
5420  3736    EM1,    TEXT    /**     SIMULATED ADD TEST FAILED/
5421  4040
5422  4040
5423  4023
5424  1115
5425  2514
5426  0124
5427  0504
5430  4001
5431  0404
5432  4024
5433  0523
5434  2440
5435  0601
5436  1114
5437  0504
5440  0000
5441  3736    EM2,    TEXT    /**     SIMULATED RAL TEST FAILED/
5442  4040
5443  4040
5444  4023
5445  1115
5446  2514
5447  0124
5450  0504
5451  4022
5452  0114
5453  4024
5454  0523
5455  2440
5456  0601
5457  1114
5460  0504
5461  0000
5462  3736    EM3,    TEXT    /**     SIMULATED RAR TEST FAILED/
5463  4040
5464  4040
5465  4023
5466  1115
5467  2514
5470  0124
5471  0504
5472  4022
5473  0122
5474  4024
5475  0523
5476  2440
5477  0601
5500  1114
5501  0504
5502  0000
5503  3736    EM4,    TEXT    /**     SIMULATED RTL TEST FAILED/
5504  4040
5505  4040
5506  4023
```

```
5507  1115
5510  2514
5511  0124
5512  0504
5513  4022
5514  2414
5515  4024
5516  0523
5517  2440
5520  0601
5521  1114
5522  0504
5523  0000
5524  3736    EM5,    TEXT    /**     SIMULATED RTR TEST FAILED/
5525  4040
5526  4040
5527  4023
5530  1115
5531  2514
5532  0124
5533  0504
5534  4022
5535  2422
5536  4024
5537  0523
5540  2440
5541  0601
5542  1114
5543  0504
5544  0000
5545  3736    EM6,    TEXT    /**     SIMULATED BSW TEST FAILED/
5546  4040
5547  4040
5550  4023
5551  1115
5552  2514
5553  0124
5554  0504
5555  4002
5556  2327
5557  4024
5560  0523
5561  2440
5562  0601
5563  1114
5564  0504
5565  0000
5566  3736    EM10,   TEXT    /**     RANDOM ADD TEST 1 FAILED/
5567  4040
5570  4040
5571  4022
5572  0116
5573  0417
5574  1540
5575  0104
```

```
5420  3736    EM1,    TEXT    /**     SIMULATED ADD TEST FAILED/
5421  4040
5422  4040
5423  4023
5424  1115
5425  2514
5426  0124
5427  0504
5430  4001
5431  0404
5432  4024
5433  0523
5434  2440
5435  0601
5436  1114
5437  0504
5440  0000
5441  3736    EM2,    TEXT    /**     SIMULATED RAL TEST FAILED/
5442  4040
5443  4040
5444  4023
5445  1115
5446  2514
5447  0124
5450  0504
5451  4022
5452  0114
5453  4024
5454  0523
5455  2440
5456  0601
5457  1114
5460  0504
5461  0000
5462  3736    EM3,    TEXT    /**     SIMULATED RAR TEST FAILED/
5463  4040
5464  4040
5465  4023
5466  1115
5467  2514
5470  0124
5471  0504
5472  4022
5473  0122
5474  4024
5475  0523
5476  2440
5477  0601
5500  1114
5501  0504
5502  0000
5503  3736    EM4,    TEXT    /**     SIMULATED RTL TEST FAILED/
5504  4040
5505  4040
5506  4023
```

```
5507  1115
5510  2514
5511  0124
5512  0504
5513  4022
5514  2414
5515  4024
5516  0523
5517  2440
5520  0601
5521  1114
5522  0504
5523  0000
5524  3736    EM5,    TEXT    /**     SIMULATED RTR TEST FAILED/
5525  4040
5526  4040
5527  4023
5530  1115
5531  2514
5532  0124
5533  0504
5534  4022
5535  2422
5536  4024
5537  0523
5540  2440
5541  0601
5542  1114
5543  0504
5544  0000
5545  3736    EM6,    TEXT    /**     SIMULATED BSW TEST FAILED/
5546  4040
5547  4040
5550  4023
5551  1115
5552  2514
5553  0124
5554  0504
5555  4002
5556  2327
5557  4024
5560  0523
5561  2440
5562  0601
5563  1114
5564  0504
5565  0000
5566  3736    EM10,   TEXT    /**     RANDOM ADD TEST 1 FAILED/
5567  4040
5570  4040
5571  4022
5572  0116
5573  0417
5574  1540
5575  0104
```

```
5076  0440
5077  2405
5100  2324
5101  4061
5102  4006
5103  0111
5104  1405
5105  0400
5106  3736    EM11,   TEXT    /**     RANDOM ADD TEST 2 FAILED/
5107  4040
5110  4040
5111  4022
5112  0116
5113  0417
5114  1540
5115  0104
5116  0440
5117  2405
5120  2324
5121  4062
5122  4006
5123  0111
5124  1405
5125  0400
5126  3736    EM12,   TEXT    /**     RANDOM RAR TEST FAILED/
5127  4040
5130  4040
5131  4022
5132  0116
5133  0417
5134  1540
5135  2201
5136  2240
5137  2405
5140  2324
5141  4006
5142  0111
5143  1405
5144  0400
5145  3736    EM13,   TEXT    /**     RANDOM RAL TEST FAILED/
5146  4040
5147  4040
5150  4022
5151  0116
5152  0417
5153  1540
5154  2201
5155  1440
5156  2405
5157  2324
5160  4006
5161  0111
5162  1405
5163  0400
5164  3736    EM14,   TEXT    /**     RANDOM RTL TEST FAILED/
```

```
5665  4040
5666  4040
5667  4022
5670  0116
5671  0417
5672  1540
5673  2224
5674  1440
5675  2405
5676  2324
5677  4006
5700  0111
5701  1405
5702  0400
5703  3736    EM15,   TEXT    /**     RANDOM RTR TEST FAILED/
5704  4040
5705  4040
5706  4022
5707  0116
5710  0417
5711  1540
5712  2224
5713  2240
5714  2405
5715  2324
5716  4006
5717  0111
5720  1405
5721  0400
5722  3736    OK1,    TEXT    /**SIMAD/
5723  2311
5724  1501
5725  0400
5726  3736    OK2,    TEXT    /**SIMROT/
5727  2311
5730  1522
5731  1724
5732  0000
5733  3736    OK3,    TEXT    /**FCT/
5734  0603
5735  2400
5736  3736    OK4,    TEXT    /**RANDOM/
5737  2201
5740  1604
5741  1715
5742  0000
5743  3736    CRLF,   TEXT    /**/
5744  0000
5745  3736    DATE,   TEXT    /** DATA ERROR**/
5746  4004
5747  0124
5750  0140
5751  0522
5752  2217
5753  2237
```

```
5754  3600

5755  7777  BKMES,  7777          /TEXT FOR EXTENDED BANKS OF MEMORY TO BANK
5756  4005          4005
5757  3024          3024
5760  0516          0516
5761  0405          0405
5762  0440          0440
5763  0201          0201
5764  1613          1613
5765  2340          2340
5766  1706          1706
5767  4015          4015
5770  0515          0515
5771  1722          1722
5772  3140          3140
5773  2417          2417
5774  4002          4002
5775  0116          0116
5776  1340          1340
5777  0000          0000
                    /
                    /
                    /RESTORE BINARY LOADER AND START LOADER
                    /
      7600  *7600
7600  7300          CLA CLL
7601  1155          TAD     BIN
7602  3377          DCA     TSTA2
7603  5377          JMP     TSTA2
                    $
```

```
0000  11111000 11100000 11111111 11111111 11111111 11111111 11111111 11111111
0100  11111111 11111111 11111111 11111111 11111111 11111111 11111111 11111111

0200  11111111 11111111 11111111 11111111 11111111 11111111 11111111 11111111
0300  11111111 11111111 11111111 11111111 11111111 11111111 11111111 11111111

0400  11111111 11111111 11111111 11111111 11111111 11111111 11111111 11111111
0500  11111111 11111111 11111111 11111111 11111111 11111111 11111111 11100001

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 11111110

1200  11111111 11111111 11111111 11111111 11111111 11111111 11111111 11111111
1300  11111111 11111111 11111111 11111111 11111000 00000000 00000000 00000000

1400  11111111 11111111 11111111 11111111 11111111 11111000 00000000 00000000
1500  00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000

1600  11111111 11111111 11111111 11111111 11111111 11111111 11111111 11110000
1700  00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000

2000  11111111 11111111 11111111 11111111 11111111 11111111 11111111 11111111
2100  11111111 11111111 11111111 11110000 00000000 00000000 00000000 00000000

2200  11111111 11111111 11111111 11111111 11111111 11111111 11111111 11111111
2300  11111111 11111111 11111110 00000000 00000000 00000000 00000000 00000000

2400  11111111 11111111 11111111 11111111 11111111 11111111 11111111 11111111
2500  11111111 11111111 11111111 10000000 00000000 00000000 00000000 00000000

2600  11111111 11111111 11111111 11111111 11111111 11111111 11111111 11111111
2700  11111111 11111111 00000000 00000000 00000000 00000000 00000000 00000000

3000  11111111 11111111 11111111 11111111 11111111 11111111 11111111 11110000
3100  00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000

3200  11111111 11111111 11111111 11111111 11111111 11111111 11111111 00000000
3300  00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000

3400  11111111 11111111 11111111 11111111 11111111 11111111 11111111 11111111
3500  11111111 11111111 11111111 11111111 11100000 00000000 00000000 00000000

3600  11111111 11111111 11111111 11111111 11111111 11111111 11111111 11111111
3700  11111111 11111111 11111111 11111111 11111111 11111110 00000000 00000000
```

```
4000  11111111  11111111  11111111  11111111  11100000  00000000  00000000  00000000
4100  00000000  00000000  00000000  00000000  00000000  00000000  00000000  00000111

4200  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
4300  11111111  11111111  11111111  11111100  00000000  00000000  00000000  00000000

4400  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
4500  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11100000

4600  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
4700  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111110

5000  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
5100  11111111  11000000  00000000  00000000  00000000  00000000  00000000  00000000

5200  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
5300  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111

5400  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
5500  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111

5600  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
5700  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111

6000
6100

6200
6300

6400
6500

6600
6700

7000
7100

7200
7300

7400
7500

7600  11110000  00000000  00000000  00000000  00000000  00000000  00000000  00000000
7700  00000000  00000000  00000000  00000000  00000000  00000000  00000000  00000111
```

```
A1          3263
A10RA2      0027
A2          3264
ABNOT       3754
AD1         2127
AD10        2715
AD11        2716
AD12        2717
AD2         2130
AD3         2131
AD4         2324
AD5         2325
AD6         2326
AD7         2526
AD8         2527
AD9         2530
ADA1        0021
ADA2        0022
ADD         0274
ADDERR      0400
ADHLT       0556
ADOUT       3227
ADPRT       0417
ADT         0551
AHFLG       0035
AHOUT       0467
ALTIBT      3616
ANEG        3747
APOS        3746
ARG1        0023
ARG2        0024
ASTRK       4731
BIN         0155
BKMES       5755
BNEG        3751
BPOS        3750
BSW         7002
BSWTAB      1660
CAF         6007
CARRY       0030
CBTST1      3640
CBTST2      3654
CHAR        0036
CNTR1       0020
COMROT      1000
CRLF        5743
DATE        5745
DATER       3037
DH1         5200
DH2         5245
DH3         5274
DH4         5317
DH5         5350
DH6         5365
EM1         5420
EM10        5566
EM11        5606
EM12        5626
EM13        5645
EM14        5664
EM15        5703
EM2         5441
EM3         5462
EM4         5503
EM5         5524
EM6         5545
ENCAR       0244
ENCAR1      0253
ENDBSW      1277
ENDFCT      3200
ENDROT      1303
ENRN        4566
EROUT1      3744
ERROR1      0377
ERROR2      1046
ERROT       1026
FCL1        2023
FCL10       2612
FCL11       2644
FCL12       2677
FCL2        2056
FCL3        2107
FCL4        2213
FCL5        2246
FCL6        2302
FCL7        2412
FCL8        2450
FCL9        2503
FCS1        2005
FCS10       2601
FCS11       2635
FCS12       2670
FCS2        2044
FCS3        2077
FCS4        2201
FCS5        2233
FCS6        2271
FCS7        2401
FCS8        2437
FCS9        2473
FCT         2000
FCT1        2004
FCT10       2600
FCT11       2634
FCT12       2667
FCT2        2043
FCT3        2076
FCT4        2200
FCT5        2232
FCT6        2270
FCT7        2400
FCT8        2436
FCT9        2472
FCTHLT      3207
FCTOK       3221
FLDCHK      4600
FLDCNT      0176
FLDDF       4643
FLDEX       4627
FLDFND      4631
FLDFRM      4712
FLDGO       4714
FLDHR       4760
FLDNO       4752
FLDNUM      0174
FLDRM1      4717
FLDSAV      0175
FLDSW       4550
GOTEST      0177
HALT2       3027
HALTA       0477
HALTB       1063
HLTA        0404
HLTB        1052
INS1        0136
INS10       0146
INS11       0147
INS12       0150
INS13       0151
INS14       0152
INS15       0153
INS16       2133
INS2        2132
INS3        0137
INS4        0140
INS5        0141
INS6        0142
INS7        0143
INS8        0144
INS9        0145
K0          0171
K0001       0116
K0002       0115
K0003       3542
K0004       0114
K0007       0172
K0010       0113
K0020       0112
K0040       0111
K0070       0173
K0077       1645
K0100       0110
K0170       4775
K0200       0107
K0400       0106
K0700       3266
K1000       0105
K2000       0104
K212        1650
K215        1651
K240        0076
K252        4776
K260        0077
K261        0100
K336        1647
K4000       0103
K6000       0101
K6060       3267
KCDF        4772
KCR         4774
KLF         4773
KSTOP       4771
KXXXX       0190
LPCR        4741
LINK1       0032
LINK2       0034
LINKR       0044
LINKRC      0045
LNKOUT      0504
LOOP        3046
LOOP1       0552
M4          1070
M40         1646
MASK        3752
MODNEG      3632
MOVMSK      3667
MQA         7501
MQL         7421
MSP         1643
N1BIT       1244
NBIT        1207
NERROP      0067
NEWLNK      1044
NLOOP       3054
NMASK       3753
NOTAC       3755
NXBIT       0527
NXTADD      0365
```

NXTBT	3612	RNDHLT	4540	SIMRTL	0653	XFLDSW	4770
NXTCAR	0234	RNDOK	4563	SIMRTR	0700	XHALT2	0066
NXTROT	1031	ROBACK	5063	SKHLT	3502	XLNKOV	0060
OK1	5722	ROHLT	5053	SP1	0545	XLOOP	0067
OK2	5726	ROPRT	5064	SR00	0103	XLOOP1	0075
OK3	5733	ROTDNE	1323	SR01	0104	XLOOP2	0074
OK4	5736	ROTHLT	1327	SR02	0105	XM2	1450
OR1	1225	ROTPRT	1071	SR03	0106	XM3	1451
OUT	3224	RRAC	0031	SR04	0107	XM4	1452
OUT1	0520	RRAL	0605	SR05	0110	XM5	1453
OUT1A	0542	RRAR	0632	SR06	0111	XM6	1454
POINT1	0011	RRLNK	0033	SR07	0112	XNXTAD	0416
POINT2	0012	RRTL	0657	SR08	0113	XNXTRO	0057
PRINT	1600	RRTR	0704	SR09	0114	XOR1	3701
R1	1400	RSIMAD	0200	SR10	0115	XOR2	3715
R2	1410	RTLER	5041	SR11	0116	XORALL	0260
R2A	3541	RTLR	4400	SROTAL	1200	XPRINT	0046
R3	1420	RTLTAB	1160	SROTOK	1342	XR1	0752
R4	1430	RTRER	5026	START	0156	XR2	0753
R5	1440	RTRR	4455	SUM1	0031	XR3	0754
RAC	0023	RTRTAB	1141	SUM2	0033	XR4	0755
RALER	5013	SADOK	0570	TEMP1	0037	XR5	0756
RALR	4255	SAMEA	3730	TEMPAC	0025	XRALR	4334
RALTAB	0757	SAMEAS	3000	TEMPL	0026	XRALTA	0052
RANDA	0041	SAVREG	3017	TSTA0	7775	XRAND	0073
RANDB	0042	SBSW	1236	TSTA1	7776	XRARR	4335
RANDC	0043	SEQ	0154	TSTA2	7777	XRARTA	0102
RANDOM	3512	SEQ1	0122	TSTA3	0000	XRHD	0050
RARER	5000	SEQ10	0133	TSTA4	0001	XRN1ER	3446
RARR	4200	SEQ11	0134	TSTA5	0002	XRN2ER	3756
RBSW	0731	SEQ12	0135	TSTA6	0003	XROTDN	0777
RELOC	4664	SEQ2	0123	TSTA7	0004	XRTLR	4571
RET1	2025	SEQ3	0124	TSTIND	0010	XRTLTA	0053
RET10	2616	SEQ4	0125	TYBIT	0540	XRTRR	4570
RET11	2651	SEQ5	0126	TYLNK	0513	XRTRTA	0054
RET12	2701	SEQ6	0127	TYPE	1652	XSBSW	0776
RET2	2060	SEQ7	0130	TYPS2	3056	XSROT	0051
RET3	2111	SEQ8	0131	TYPSET	1617	XSTA0	0070
RET4	2215	SEQ9	0132	W1	0037	XSTA1	0071
RET5	2252	SHLT	4033	W2	0040	XSTA2	0072
RET6	2306	SIMAC	0025	WD1	0037	XTYPE	0047
RET7	2420	SIMAD	0204	WD2	0040	XWDOUT	0061
RET8	2455	SIMBSW	0725	WDOUT	0523		
RET9	2510	SIMLNK	0026	XADD	0415		
RHD	1133	SIMR	0577	XADOUT	3073		
RHFLG	0035	SIMRAL	0601	XAMEA	0063		
RHOUT	1131	SIMRAR	0626	XAMEAS	0062		
RLNK	0024	SIMRO1	0600	XAVREG	0064		
RN1ER	3447	SIMRO2	0625	XBSWTA	0055		
RN2ER	4000	SIMRO3	0652	XCOMRO	0056		
RNAD1	3400	SIMRO4	0677	XDATER	0065		
RNAD2	3600	SIMRO5	0724	XFLDCK	4572		

ERRORS DETECTED: 0

LINKS GENERATED: 3

RUN-TIME: 32 SECONDS

3K CORE USED