IDENTIFICATION
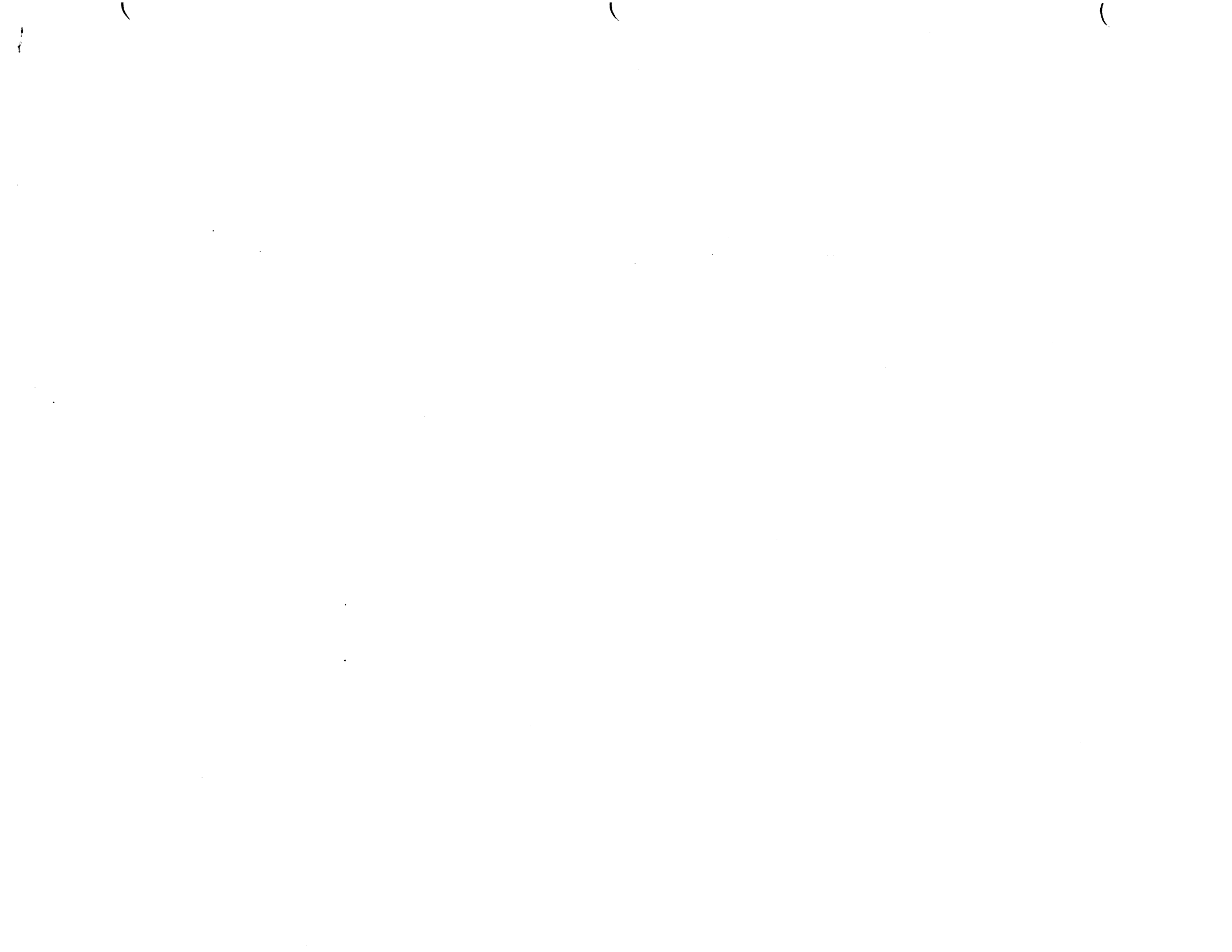----------------

PRODUCT CODE: MAINDEC-8E-D0CC-D

PRODUCT NAME: 8E ADDER TESTS

DATE CREATED: SEPT. 1, 1971

MAINTAINER: DIAGNOSTIC GROUP

AUTHOR: M. DAVIS = J. VROBEL

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, Q0BA

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
XXXXXXXXXXX X XXXXXXXXXXX X XXXXXXXXXXX

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 XXXXXXXXXXX

AAAA IS THE STARTING ADDRESS OF THE TEST THAT FAILED
X   XXXXXXXXXXX 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
XXXXXXXXXXX XXXXXXXXXXX X XXXXXXXXXXX

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
XXXXXXXXXXX XXXXXXXXXXX X XXXXXXXXXXX X XXXXXXXXXXX

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 SR03=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,

```
                        /
                        /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            TEMP1=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     A1ORA2,  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     AHFLG,   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    SIMRO1, 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    SIMRO2, 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   SIMRO3,  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   SIMRO4,  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
1241  3451              DCA I   XSROT       /SET UP FOR ERROR RETURN
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 RIL 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     AD1                /ADDRESS=RET1
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   7430             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   7200             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
2452    3472                DCA I   XSTA2           /INSTRUCTION=JMS ,+1
2453    7240                CLA CMA                 /LOC,=7777
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 PCT
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 PCT
3217   5620              JMP I   .+1                      /NO, GO TO NEXT TEST
3220   3400              RNAD1
3221   4446     FCTOK,   JMS I   XPRINT
3222   5732              OK3=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    RNAD1,    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
3425    1043              TAD     RANDC              /AC=0
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                     /HALT WITH ADDRESS OF RNAD1 IN AC
3511  5647              JMP I     RN1ER


                       /
                       /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
```

)   )   )

```
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
```

```
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
```

```
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   7602              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 K0170               /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        OH1,  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
```

)   )   )

```
5276    0440
5277    2405
5300    2324
5301    4061
5302    4006
5303    0111
5304    1405
5305    0400
5306    3736        EM11,   TEXT    /**     RANDOM ADD TEST 2 FAILED/
5307    4040
5310    4040
5311    4022
5312    0116
5313    0417
5314    1540
5315    0104
5316    0440
5317    2405
5320    2324
5321    4062
5322    4006
5323    0111
5324    1405
5325    0400
5326    3736        EM12,   TEXT    /**     RANDOM RAR TEST FAILED/
5327    4040
5330    4040
5331    4022
5332    0116
5333    0417
5334    1540
5335    2201
5336    2240
5337    2405
5340    2324
5341    4006
5342    0111
5343    1405
5344    0400
5345    3736        EM13,   TEXT    /**     RANDOM RAL TEST FAILED/
5346    4040
5347    4040
5350    4022
5351    0116
5352    0417
5353    1540
5354    2201
5355    1440
5356    2405
5357    2324
5360    4006
5361    0111
5362    1405
5363    0400
5364    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
                        S
```

```
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  11111000
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
```

Symbol	Value	Symbol	Value	Symbol	Value	Symbol	Value
A1	3263	DH5	5350	FCT12	2667	K0010	0113
A1ORA2	0027	DH6	5365	FCT2	2043	K0020	0112
A2	3264	EM1	5420	FCT3	2076	K0040	0111
ABNOT	3754	EM10	5566	FCT4	2200	K0070	0173
AD1	2127	EM11	5606	FCT5	2232	K0077	1645
AD10	2715	EM12	5626	FCT6	2270	K0100	0110
AD11	2716	EM13	5645	FCT7	2400	K0170	4775
AD12	2717	EM14	5664	FCT8	2436	K0200	0107
AD2	2130	EM15	5703	FCT9	2472	K0400	0106
AD3	2131	EM2	5441	FCTHLT	3207	K0700	3266
AD4	2324	EM3	5462	FCTOK	3221	K1000	0105
AD5	2325	EM4	5503	FLDCHK	4600	K2000	0104
AD6	2326	EM5	5524	FLDCNT	0176	K212	1650
AD7	2526	EM6	5545	FLDDF	4643	K215	1651
AD8	2527	ENCAR	0244	FLDEX	4627	K240	0076
AD9	2530	ENCAR1	0253	FLDFND	4631	K252	4776
ADA1	0021	ENDBSW	1277	FLDFRM	4712	K260	0077
ADA2	0022	ENDFCT	3200	FLDGO	4714	K261	0100
ADD	0274	ENDROT	1303	FLDHR	4760	K336	1647
ADDERR	0400	ENRN	4566	FLDNO	4752	K4000	0103
ADHLT	0556	EROUT1	3744	FLDNUM	0174	K6000	0101
ADOUT	3227	ERROR1	0377	FLDRM1	4717	K6060	3267
ADPRT	0417	ERROR2	1046	FLDSAV	0175	KCDF	4772
ADT	0551	ERROT	1026	FLDSW	4550	KCR	4774
AHFLG	0035	FCL1	2023	GOTEST	0177	KLF	4773
AHOUT	0467	FCL10	2612	HALT2	3027	KSTOP	4771
ALTIBT	3616	FCL11	2644	HALTA	0497	KXXXX	0170
ANEG	3747	FCL12	2677	HALTB	1063	LPCR	4741
APOS	3746	FCL2	2056	HLTA	0404	LINK1	0032
ARG1	0023	FCL3	2107	HLTB	1052	LINK2	0034
ARG2	0024	FCL4	2213	INS1	0136	LINKR	0044
ASTRK	4731	FCL5	2246	INS10	0146	LINKRC	0045
BIN	0155	FCL6	2302	INS11	0147	LNKOUT	0504
BKMES	5755	FCL7	2412	INS12	0150	LOOP	3046
BNEG	3751	FCL8	2450	INS13	0151	LOOP1	0552
BPOS	3750	FCL9	2503	INS14	0152	M4	1070
BSW	7002	FCS1	2005	INS15	0153	M40	1646
BSWTAB	1660	FCS10	2601	INS16	2133	MASK	3752
CAF	6007	FCS11	2635	INS2	2132	MODNEG	3632
CARRY	0030	FCS12	2670	INS3	0137	MOVMSK	3667
CBTST1	3640	FCS2	2044	INS4	0140	MQA	7501
CBTST2	3654	FCS3	2077	INS5	0141	MQL	7421
CHAR	0036	FCS4	2201	INS6	0142	MTP	1643
CNTR1	0020	FCS5	2233	INS7	0143	N1BIT	1244
COMROT	1000	FCS6	2271	INS8	0144	NBIT	1207
CRLF	5743	FCS7	2401	INS9	0145	NERROP	0067
DATE	5745	FCS8	2437	K0	0171	NEWLNK	1044
DATER	3037	FCS9	2473	K0001	0116	NLOOP	3054
DH1	5200	FCT	2000	K0002	0115	NMASK	3753
DH2	5245	FCT1	2004	K0003	3542	NOTAC	3755
DH3	5274	FCT10	2600	K0004	0114	NXBIT	0527
DH4	5317	FCT11	2634	K0007	0172	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	ROTONE	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	3093		
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	XFLOCK	4572		

ERRORS DETECTED: 0

LINKS GENERATED: 3

RUN-TIME: 32 SECONDS

3K CORE USED

)   )   )