```
          IDENTIFICATION
          --------------

PRODUCT CODE:           MAINDEC-08-DHKAA-A-D

                        (REPLACES MAINDEC-8E-DØCC-D)

PRODUCT NAME:           8E ADDER TESTS

DATE CREATED:           MARCH 28, 1973

MAINTAINER:             DIAGNOSTIC GROUP

AUTHOR:                 JOHN 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 ØØØØ-6ØØØ AND UTILIZES LOCATIONS 7775-7777 AS A TEST AREA,

2,3 PRELIMINARY PROGRAMS

MAINDEC-8E-DØAA, DØBA

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

SRØØ=1	SUPPRESS HALT ON ERROR
SRØ1=1	SUPPRESS ERROR TYPEOUT
SRØ2=1	LOOP ON ERROR
SRØ3=1	FAST TEST
SRØ4=Ø	LOOP IN CURRENT MEMORY BANK
SRØ4=1	RELOCATE TO NEXT EXISTING BANK
SRØ6-Ø8	AMOUNT OF EXTENDED BANKS OF MEMORY
SRØ9=1	HALT AT END OF TEST
SR1Ø=1	SUPPRESS END OF TEST TYPEOUT
SR11=1	LOOP ON PRESENT TEST

4,2 STARTING ADDRESSES

NORMAL STARTING ADDRESS-Ø2ØØ
RESTORE LOADERS-76ØØ

4,3 OPERATOR ACTION

4,3,1 SET SR=0200

4,3,2 PRESS ADDR LOAD SWITCH

4,3,3 SET SR=ØØØØ

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 ØØØØ. 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 17Ø, AND PROCEED AS IN 4,, BUT WITH SR=Ø4ØØ INSTEAD OF ØØØØ IN 4,3,3

5,2 TO RESTORE AND START BINARY LOADER, STOP PROGRAM, LOAD ADDRESS 76ØØ AND START COMPUTER,

5,3 RELOCATION ADDER TEST

IF SRØ4=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 SRØ6-Ø8 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 SRØ6-Ø8 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
(LINK AND AC)
(ARG1+ARG2 IS THE RESULT OF ADDING ARG2 TO ARG1
(ARG1 IS IN AC INITIALLY)

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

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

6.1.2 SIMULATED ROTATE TEST

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

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

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

6.1.3 FALSE CARRY TEST

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

```
        DATA ERROR
AAAA   . X XXXXXXXXXXXX
```

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

NOTE: EACH FALSE CARRY TEST EXPECTS LINK=1 AND AC=Ø AS A RESULT.

6.1.4 RANDOM ADD TEST 1

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

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

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

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

6.1.5 RANDOM ADD TEST 2

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

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

6.1.6 RANDOM ROTATE TESTS

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

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

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
5Ø2	SIMAD
1Ø66	SIMROT (WITH LOCATION OF SPECIFIC TEST IN AC)
3Ø35	FCT (WITH LOCATION OF SPECIFIC TEST IN AC)
351Ø	RNAD1
4Ø41	RNAD2
5Ø61	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 SRØØ=1 TO SUPPRESS ERROR HALT
SET SRØ1=1 TO SUPPRESS ERROR TYPEOUT
SET SRØ2=2 TO LOOP
DEPRESS CONT

6,3,2 PROGRAM MODIFICATION

THERE ARE NOPS IN EACH TEST PROVIDED TO ALLOW THE OPERATOR TO SET UP LOOPS TIGHTER THAN THOSE AVAILABLE IN 6.3.1.

7. RESTRICTIONS

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

8, EXECUTION TIME

TIME DEPENDENT ON AMOUNT OF MEMORY, FOR EACH BANK
APPROXIMATELY 35 MINUTES, IF SRØ3=1, AND KXXXX=7777(SEE 5,1)
ONE PASS TAKES APPROXIMATELY 4Ø SECONDS,

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

SIMAD
SIMROT
FCT
RANDOM

9, PROGRAM DESCRIPTION

9,1 SIMULATED ADDITION TEST

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

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

9,2 SIMULATED ROTATE TESTS

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

9,3 FALSE CARRY TEST

VARIOUS COMBINATIONS OF INSTRUCTIONS AND DATA ARE USED TO DETECT EITHER FALSE CARRIES, OR MISSINGCARRIES, 9,4 RANDOM ADD TEST 1

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

9,5 RANDOM ADD TEST 2

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

9,6 RANDOM ROTATE TEST

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

9,6 RELOCATION ADDER TEST

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

10, LISTING

```
                        /
                        /8E ADDER TESTS
                        /
                        /INSTRUCTION DEFINITIONS
                        /
      75Ø1    MQA=75Ø1
      7421    MQL=7421
      7ØØ2    BSW=7ØØ2
      6ØØ7    CAF=6ØØ7
                        /
                        /SWITCH REGISTER MASK BITS
                        /
      Ø1Ø3    SRØØ=K4ØØØ
      Ø1Ø4    SRØ1=K2ØØØ
      Ø1Ø5    SRØ2=K1ØØØ
      Ø1Ø6    SRØ3=KØ4ØØ
      Ø1Ø7    SRØ4=KØ2ØØ
      Ø11Ø    SRØ5=KØ1ØØ
      Ø111    SRØ6=KØØ4Ø
      Ø112    SRØ7=KØØ2Ø
      Ø113    SRØ8=KØØ1Ø
      Ø114    SRØ9=KØØØ4
      Ø115    SR1Ø=KØØØ2
      Ø116    SR11=KØØØ1
                        /
                        /LOCATION EQUIVALENCIES
                        /
      ØØ23    RAC=ARG1                 /AC TO BE ROTATED
      ØØ24    RLNK=ARG2                /LINK TO BE ROTATED
      ØØ31    RRAC=SUM1                /AC AFTER REAL ROTATE
      ØØ33    RRLNK=SUM2               /LINK AFTER REAL ROTATE
      ØØ25    TEMPAC=SIMAC             /TEMPORARY AC STORAGE
      ØØ26    TEMPL=SIMLNK             /TEMPORARY LINK STORAGE
      ØØ37    TEMP1=WD1                /TEMPORARY DATA STORAGE
      ØØ37    W1=WD1                   /    "        "     "
      ØØ4Ø    W2=WD2                   /    "        "     "
      ØØ35    RHFLG=AHFLG              /ROTATE TEST ERROR HEADER FLAG
      ØØ67    NERROP=XLOOP

      7775    *7775
7775  ØØØØ    TSTAØ,  Ø
7776  ØØØØ    TSTA1,  Ø
7777  ØØØØ    TSTA2,  Ø

      ØØØØ    *ØØØØ
ØØØØ  ØØØØ    TSTA3,  Ø
ØØØ1  5ØØ1    TSTA4,  JMP     .
ØØØ2  ØØØ2    TSTA5,  2
ØØØ3  ØØØ3    TSTA6,  3
ØØØ4  ØØØØ    TSTA7,  Ø


      ØØ1Ø    *1Ø
                /
```

```
                        /INDEX REGISTERS
                        /
 ØØ1Ø  ØØØØ     TSTIND, Ø
 ØØ11  ØØØØ     POINT1, Ø
 ØØ12  ØØØØ     POINT2, Ø

       ØØ2Ø     *2Ø
 ØØ2Ø  ØØØØ     CNTR1,  Ø
 ØØ21  ØØ22     ADA1,   ADA2
 ØØ22  7777     ADA2,   7777
                        /
                        /SIMULATION VARIABLES
                        /
 ØØ23  ØØØØ     ARG1,   Ø
 ØØ24  ØØØØ     ARG2,   Ø
 ØØ25  ØØØØ     SIMAC,  Ø
 ØØ26  ØØØØ     SIMLNK, Ø
 ØØ27  ØØØØ     A1ORA2, Ø
 ØØ3Ø  ØØØØ     CARRY,  Ø
 ØØ31  ØØØØ     SUM1,   Ø
 ØØ32  ØØØØ     LINK1,  Ø
 ØØ33  ØØØØ     SUM2,   Ø
 ØØ34  ØØØØ     LINK2,  Ø


                        /
                        /MESSAGE OUTPUT VARIABLES
                        /
 ØØ35  ØØØØ     AHFLG,  Ø
 ØØ36  ØØØØ     CHAR,   Ø
 ØØ37  ØØØØ     WD1,    Ø
 ØØ4Ø  ØØØØ     WD2,    Ø
                        /
                        /RANDOM VARIABLES
                        /
 ØØ41  ØØ37     RANDA,  37
 ØØ42  ØØØØ     RANDB,  Ø
 ØØ43  ØØØØ     RANDC,  Ø
 ØØ44  ØØØØ     LINKR,  Ø
 ØØ45  ØØØØ     LINKRC, Ø



                        /
                        /INDIRECT POINTERS
                        /

 ØØ46  16ØØ     XPRINT, PRINT           /CHARACTER STRING TYPE
 ØØ47  1652     XTYPE,  TYPE            /CHARACTER TYPE
 ØØ5Ø  1133     XRHD,   RHD             /TYPE ROTATE ERROR HEADER
 ØØ51  12ØØ     XSROT,  SROTAL          /COMMON ROTATE SIMULATOR
 ØØ52  Ø756     XRALTA, RALTAB-1        /RAL MASK TABLE
 ØØ53  1157     XRTLTA, RTLTAB-1        /RTL MASK TABLE
 ØØ54  114Ø    XRTRTA, RTRTAB-1        /RTR MASK TABLE
 ØØ55  1657    XBSWTA, BSWTAB-1        /BYTE SWAP MASK TABLE
 ØØ56  1ØØØ    XCOMRO, COMROT          /ROTATE COMPARISON FOR SIMULATION
 ØØ57  1Ø31    XNXTRO, NXTROT          /ROTATE SETUP FOR SIMULATION
 ØØ6Ø  Ø5Ø4    XLNKOU, LNKOUT          /TYPE LINK
 ØØ61  Ø523    XWDOUT, WDOUT           /TYPE DATA WORD
 ØØ62  3ØØØ    XAMEAS, SAMEAS          /COMPARE DATA
 ØØ63  373Ø    XAMEA,  SAMEA
 ØØ64  3Ø17    XAVREG, SAVREG          /SAVE AC AND LINK
 ØØ65  3Ø37    XDATER, DATER           /DATA ERROR HANDLER FOR FCT
 ØØ66  3Ø27    XHALT2, HALT2           /DATA ERROR HALT FOR FCT
 ØØ67  3Ø46    XLOOP,  LOOP            /LOOP ON TEST
 ØØ7Ø  7775    XSTAØ,  TSTAØ
 ØØ71  7776    XSTA1,  TSTA1
 ØØ72  7777    XSTA2,  TSTA2
 ØØ73  3512    XRAND,  RANDOM          /RANDOM NUMBER GENERATOR
 ØØ74  Ø41Ø    XLOOP2, HLTA+4
 ØØ75  Ø552    XLOOP1, LOOP1
                       /
                       /WIDELY USED CONSTANTS
                       /
 ØØ76  Ø24Ø    K24Ø,   24Ø
 ØØ77  Ø26Ø    K26Ø,   26Ø
 Ø1ØØ  Ø261    K261,   261
 Ø1Ø1  6ØØØ    K6ØØØ,  6ØØØ

 Ø1Ø2  Ø1Ø2    XRARTA, .
 Ø1Ø3  4ØØØ    K4ØØØ,  4ØØØ
 Ø1Ø4  2ØØØ    K2ØØØ,  2ØØØ
 Ø1Ø5  1ØØØ    K1ØØØ,  1ØØØ
 Ø1Ø6  Ø4ØØ    KØ4ØØ,  4ØØ
 Ø1Ø7  Ø2ØØ    KØ2ØØ,  2ØØ
 Ø11Ø  Ø1ØØ    KØ1ØØ,  1ØØ
 Ø111  ØØ4Ø    KØØ4Ø,  4Ø
 Ø112  ØØ2Ø    KØØ2Ø,  2Ø
 Ø113  ØØ1Ø    KØØ1Ø,  1Ø
 Ø114  ØØØ4    KØØØ4,  4
 Ø115  ØØØ2    KØØØ2,  2
 Ø116  ØØØ1    KØØØ1,  1
 Ø117  ØØØØ            Ø
 Ø12Ø  4ØØØ            4ØØØ
 Ø121  ØØØ1            1

                       /
                       /
                       /TEST POINTERS FOR FCT
                       /
 Ø122  2ØØ4    SEQ1,   FCT1
 Ø123  2Ø43    SEQ2,   FCT2
 Ø124  2Ø76    SEQ3,   FCT3
 Ø125  22ØØ    SEQ4,   FCT4
 Ø126  2232    SEQ5,   FCT5
 Ø127  227Ø    SEQ6,   FCT6
 Ø13Ø  24ØØ    SEQ7,   FCT7
 Ø131  2436    SEQ8,   FCT8
 Ø132  2472    SEQ9,    FCT9
 Ø133  26ØØ    SEQ1Ø,   FCT1Ø
 Ø134  2634    SEQ11,   FCT11
 Ø135  2667    SEQ12,   FCT12
                        /
                        /
                        /SETUP INSTRUCTIONS FOR FCT
                        /
 Ø136  1376    INS1,    1376                    /=TAD .-1 IN 7777
 Ø137  7ØØ1    INS3,    7ØØ1                    /=IAC
 Ø14Ø  54Ø4    INS4,    54Ø4                    /=JMP I .+2 IN ØØØ2
 Ø141  54Ø2    INS5,    54Ø2                    /=JMP I .+1 IN ØØØ1
 Ø142  7Ø7Ø    INS6,    7Ø7Ø                    /=CMA CML RAR
 Ø143  2376    INS7,    2376                    /=ISZ .-1 IN 7777
 Ø144  2ØØØ    INS8,    2ØØØ                    /=ISZ .+1 IN 7777
 Ø145  241Ø    INS9,    241Ø                    /=ISZ I TSTIND
 Ø146  4ØØØ    INS1Ø,   4ØØØ                    /=JMS .+1 IN 7777
 Ø147  4776    INS11,   4776                    /=JMS I .-1 IN 7777
 Ø15Ø  441Ø    INS12,   441Ø                    /=JMS I TSTIND
 Ø151  54Ø3    INS13,   54Ø3                    /=JMP I .+1 IN ØØØ2
 Ø152  54Ø1    INS14,   54Ø1                    /=JMP I .+1 IN ØØØØ
 Ø153  4377    INS15,   4377                    /=JMS . IN 7777
 Ø154  2ØØ4    SEQ,     FCT1
 Ø155  53Ø1    BIN,     53Ø1

                        /
                        /TEST FOR FAST TAD SIMULATION
                        /
 Ø156  6ØØ7    START,   CAF                     /CLEAR ALL FLAGS
 Ø157  76Ø4             LAS                     /GET SWITCHES
 Ø16Ø  Ø1Ø6             AND     SRØ3            /TEST SRØ3
 Ø161  765Ø             SNA CLA                 /IS SRØ3=1
 Ø162  5177             JMP     GOTEST          /DO TEST WITH ALL NUMBERS
 Ø163  724Ø             CLA CMA
 Ø164  Ø17Ø             AND     KXXXX           /YES, START AT XXXX
 Ø165  3Ø24             DCA     ARG2
 Ø166  5567             JMP I   .+1
 Ø167  Ø2Ø2             RSIMAD+2
 Ø17Ø  ØØØØ    KXXXX,   Ø               /INSERT DESIRED STARTING VALUE FOR ARG2 HERE
 Ø171  ØØØØ    KØ,      ØØØØ
 Ø172  ØØØ7    KØØØ7,   ØØØ7
 Ø173  ØØ7Ø    KØØ7Ø,   ØØ7Ø
 Ø174  ØØØØ    FLDNUM,  Ø
 Ø175  ØØØØ    FLDSAV,  Ø
 Ø176  ØØØØ    FLDCNT,  Ø
       Ø177    *177
 Ø177  741Ø    GOTEST,  SKP                     /SKIP JMP TO START

                        /
                        /
                        /SIMULATED ADDITION TEST
                        /
       Ø2ØØ    *2ØØ
 Ø2ØØ  5156    RSIMAD,  JMP     START           /GO TO FAST TEST CHECK
 Ø2Ø1  3Ø24             DCA     ARG2
```

```
Ø2Ø2  3Ø23                DCA     ARG1              /CLEAR SIMULATION VARIABLES
Ø2Ø3  3Ø35                DCA     AHFLG             /CLEAR ERROR MESSAGE FLAG
                          /
                          /
                          /SIMULATE ADDITION BY SIMULATED GENERATEION OF SUM
                          /AND CARRY BITS
                          /
                          /
                          /FORM OR OF ARG1 WITH ARG2
                          /
Ø2Ø4  734Ø       SIMAD,   CLA CLL CMA
Ø2Ø5  ØØ23                AND     ARG1              /LOAD AC WITH ARG1
Ø2Ø6  7421                MQL                       /PLACE IN MQ
Ø2Ø7  7Ø4Ø                CMA
Ø21Ø  ØØ24                AND     ARG2              /LOAD AC WITH ARG2
Ø211  75Ø1                MQA                       /FORM ARG1 OR ARG2
Ø212  3Ø27                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)
                          /
Ø213  75Ø1                MQA                       /GET ARG1 FROM MQ
Ø214  7Ø4Ø                CMA                       /FORM NOTARG1
Ø215  ØØ24                AND     ARG2              /AND WITH ARG2 TO GET ARG2 AND NOTARG1
Ø216  7421                MQL                       /SAVE IN MQ
Ø217  7Ø4Ø                CMA
Ø22Ø  ØØ24                AND     ARG2              /LOAD AC WITH ARG2
Ø221  7Ø4Ø                CMA                       /FORM NOTARG2
Ø222  ØØ23                AND     ARG1              /AND WITH ARG1 TO GET ARG1 AND NOTARG2
Ø223  75Ø1                MQA                       /OR WITH ARG2 AND NOTARG1
Ø224  3Ø25                DCA     SIMAC             /TO GET ARG1 XOR ARG2
Ø225  3Ø26                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
                          /
Ø226  7Ø4Ø                CMA
Ø227  ØØ23                AND     ARG1              /LOAD AC WITH ARG1
Ø23Ø  ØØ24                AND     ARG2              /AND WITH ARG2
Ø231  745Ø                SNA                       /ARE THERE ANY CARRIES
Ø232  5274                JMP     ADD               /NO, TERMINATE SIMULATION
                          /
                          /GENERATE CARRIES
                          /
Ø233  7421                MQL                       /SAVE FIRST CARRIES
Ø234  7521       NXTCAR,  MQA MQL                   /GET CARRIES FROM MQ
Ø235  ØØ27                AND     A1ORA2            /AND WITH A1ORA2 TO SEE IF MORE CAPRIES ARE GENERATED
Ø236  745Ø                SNA                       /ARE THERE ANY MORE CARRIES
Ø237  5244                JMP     ENCAR             /NO, END SIMULATION OF CARRIES
Ø24Ø  71Ø4                CLL RAL                   /PROPIGATE CARRIES
```

```
 Ø241  7521           MQA MQL                /GET PREVIOUS CARRIES FROM MQ, SAVE NEW CARRIES
 Ø242  7501           MQA                    /OR NEW CARRIES WITH PREVIOUS CARRIES
 Ø243  5234           JMP     NXTCAR         /CONTINUE
                      /
                      /TEST FOR CARRY INTO LINK
                      /
 Ø244  7501   ENCAR,  MQA                    /GET CARRIES
 Ø245  ØØ27           AND     A1ORA2         /AND WITH A1ORA2
 Ø246  Ø1Ø3           AND     K4ØØØ          /TEST BIT ØØ
 Ø247  745Ø           SNA                    /IS BIT ØØ 1
 Ø25Ø  5253           JMP     ENCAR1         /NO, CARRIES DID NOT PROPIGATE INTO LINK
 Ø251  3026           DCA     SIMLNK         /YES, SAVE CARRY INTO LINK
 Ø252  526Ø           JMP     XORALL         /COMPLETE SIMULATION
 Ø253  713Ø   ENCAR1, CLL CML RAR            /SET AC=4ØØØ
 Ø254  ØØ23           AND     ARG1           /AND WITH ARG1
 Ø255  ØØ24           AND     ARG2           /AND WITH ARG2 TO SEE IF ORIGINAL
 Ø256  744Ø           SZA                    /NUMBERS GENERATED CARRY INTO LINK
 Ø257  3026           DCA     SIMLNK         /SAVE SIMULATED LINK


                      /
                      /FORM XOR OF ARG1, ARG2 AND CARRIES
                      /TO GET FINAL SIMULATED SUM
                      /
 Ø26Ø  7501   XORALL, MQA                    /SAVE SIMULATED CARRIES
 Ø261  303Ø           DCA     CARRY
 Ø262  7501           MQA
 Ø263  7040           CMA
 Ø264  ØØ25           AND     SIMAC          /FORM A1ORA2 AND NOTCARRY
 Ø265  7421           MQL                    /SAVE IN MQ
 Ø266  7040           CMA
 Ø267  ØØ25           AND     SIMAC
 Ø27Ø  7040           CMA
 Ø271  ØØ3Ø           AND     CARRY          /FORM CARRY AND NOTA1ORA2
 Ø272  7501           MQA                    /OR WITH CONTENTS OF MQ
 Ø273  3025           DCA     SIMAC          /TO GET FINAL SIMULATED SUM
                      /
                      /
                      /PERFORM ADDITIONS ARG1+ARG2 AND ARG2+ARG1
 Ø274  734Ø   ADD,    CLA CLL CMA
 Ø275  ØØ23           AND     ARG1           /LOAD AC WITH ARG1
 Ø276  1024           TAD     ARG2           /ADD ARG2
 Ø277  7ØØØ           NOP
 Ø3ØØ  3031           DCA     SUM1           /SAVE RESULT
 Ø3Ø1  7Ø1Ø           RAR
 Ø3Ø2  3032           DCA     LINK1          /SAVE LINK
 Ø3Ø3  7Ø4Ø           CMA
 Ø3Ø4  ØØ24           AND     ARG2           /LOAD AC WITH ARG2
 Ø3Ø5  1023           TAD     ARG1           /ADD ARG1
 Ø3Ø6  7ØØØ           NOP
 Ø3Ø7  3Ø33           DCA     SUM2           /SAVE RESULT
 Ø31Ø  7Ø1Ø           RAR
 Ø311  3034           DCA     LINK2          /SAVE LINK
 Ø312  7ØØØ           NOP
                      /
```

```
                        /
                        /COMPARE RESULTS OF REAL ADDS
                        /IF A=B, A XOR B=Ø, THIS IS USED TO COMPARE RESULTS
                        /
Ø313  734Ø              CLA CLL CMA
Ø314  ØØ31              AND     SUM1            /GET RESULT OF ARG1+ARG2
Ø315  7Ø4Ø              CMA                     /COMPLEMENT
Ø316  ØØ33              AND     SUM2            /AND RESULTS OF ARG2+ARG1
Ø317  744Ø              SZA                     /IS SUM2 AND NOTSUM1=Ø
Ø32Ø  5377              JMP     ERROR1          /NO, ERROR
Ø321  7Ø4Ø              CMA
Ø322  ØØ33              AND     SUM2            /LOAD AC WITH RESULTS OF ARG2+ARG1
Ø323  7Ø4Ø              CMA                     /COMPLEMENT
Ø324  ØØ31              AND     SUM1            /AND WITH SUM1
Ø325  744Ø              SZA                     /IS SUM1 AND NOTSUM2=Ø
Ø326  5377              JMP     ERROR1          /NO, ERROR

                        /
                        /
                        /COMPARE REAL AND SIMULATED ADDS
                        /
Ø327  734Ø              CLA CLL CMA
Ø33Ø  ØØ31              AND     SUM1            /LOAD AC WITH RESULTS OF ARG1+ARG2
Ø331  7Ø4Ø              CMA                     /COMPLEMENT
Ø332  ØØ25              AND     SIMAC           /AND WITH RESULTS OF SIMULATION
Ø333  744Ø              SZA                     /IS SIMAC AND NOTSUM1=Ø
Ø334  5377              JMP     ERROR1          /NO, ERROR
Ø335  7Ø4Ø              CMA
Ø336  ØØ25              AND     SIMAC           /LOAD AC WITH SIMULATION RESULTS
Ø337  7Ø4Ø              CMA                     /COMPLEMENT
Ø34Ø  ØØ31              AND     SUM1            /AND WITH RESULTS OF ARG1+ARG2
Ø341  744Ø              SZA                     /IS SUM1 AND NOTSIMAC=Ø
Ø342  5377              JMP     ERROR1          /NO, ERROR


                        /
                        /COMPARE LINKS GENERATED BY REAL ADDS
                        /
Ø343  734Ø              CLA CLL CMA
Ø344  ØØ32              AND     LINK1           /GET LINK FROM ARG1+ARG2
Ø345  7ØØ4              RAL
Ø346  724Ø              CLA CMA
Ø347  ØØ34              AND     LINK2           /GET LINK FROM ARG2+ARG1
Ø35Ø  764Ø              SZA CLA
Ø351  7Ø2Ø              CML
Ø352  743Ø              SZL                     /ARE THEY THE SAME
Ø353  5377              JMP     ERROR1          /NO, ERROR


                        /
                        /
                        /COMPARE LINKS GENERATED BY REAL AND SIMULATED ADDS
                        /
Ø354  734Ø              CLA CLL CMA
Ø355  ØØ32              AND     LINK1           /GET LINK FROM ARG1+ARG2
```

```
 Ø356  7ØØ4              RAL
 Ø357  724Ø              CLA CMA
 Ø36Ø  ØØ26              AND     SIMLNK          /GET LINK FROM SIMULATION
 Ø361  764Ø              SZA CLA
 Ø362  7Ø2Ø              CML
 Ø363  743Ø              SZL                     /ARE THEY THE SAME
 Ø364  5377              JMP     ERROR1          /NO, ERROR

                         /
                         /
                         /SET UP FOR NEXT ADDITION
                         /
 Ø365  5474    NXTADD,   JMP I   XLOOP2          /TEST FOR SIMULATION WITH SAME DATA
 Ø366  2Ø23              ISZ     ARG1            /INCREMENT ARG1
 Ø367  52Ø4              JMP     SIMAD           /GO TO SIMULATION
 Ø37Ø  2Ø24              ISZ     ARG2            /INCREMENT ARG2
 Ø371  741Ø              SKP                     /GO TO SIMULATION
 Ø372  5475              JMP I   XLOOP1          /TEST FOR TRANSFER TO NEXT TEST
 Ø373  724Ø              CLA CMA
 Ø374  ØØ24              AND     ARG2            /TRANSFER ARG2 TO ARG1
 Ø375  3Ø23              DCA     ARG1
 Ø376  52Ø4              JMP     SIMAD           /CONTINUE SIMULATION
       Ø377    *377
 Ø377  7ØØØ    ERROR1,   NOP
                         /
                         /
                         /ERROR HANDLER FOR ADDITION TEST
       Ø4ØØ    *4ØØ      /
 Ø4ØØ  76Ø4    ADDERR,   LAS                     /GET SWITCHES
 Ø4Ø1  Ø1Ø4              AND     SRØ1            /TEST SRØ1
 Ø4Ø2  765Ø              SNA CLA                 /SUPPRESS TYPEOUT IF SRØ1=1
 Ø4Ø3  4217              JMS     ADPRT           /TYPE ERROR MESSAGE
 Ø4Ø4  76Ø4    HLTA,     LAS
 Ø4Ø5  Ø1Ø3              AND     SRØØ
 Ø4Ø6  765Ø              SNA CLA                 /HALT IF SRØØ=Ø
 Ø4Ø7  4277              JMS     HALTA           /HALT WITH ADDRESS OF TEST IN AC
 Ø41Ø  76Ø4              LAS
 Ø411  Ø1Ø5              AND     SRØ2            /TEST SRØ2
 Ø412  764Ø              SZA CLA                 /LOOP WITH SAME DATA IF SRØ2=1
 Ø413  5615              JMP I   XADD            /LOOP WITH SAME DATA
 Ø414  5616              JMP I   XNXTAD
 Ø415  Ø274    XADD,     ADD
 Ø416  Ø366    XNXTAD,   NXTADD+1

                         /
                         /TYPE ERROR MESSAGE FOR ADDITION TEST
                         /
 Ø417  ØØØØ    ADPRT,    Ø
 Ø42Ø  734Ø              CLA CLL CMA
 Ø421  ØØ35              AND     AHFLG           /GET FLAG FOR ERROR MESSAGE HEADER TYPEOUT
 Ø422  765Ø              SNA CLA                 /HAS HEADER FOR TEST BEEN TYPED
 Ø423  4267              JMS     AHOUT           /NO TYPE HEADER
 Ø424  7Ø4Ø              CMA
 Ø425  ØØ23              AND     ARG1
 Ø426  3Ø37              DCA     WD1
 Ø427  4323              JMS     WDOUT            /OUTPUT ARG1
 Ø43Ø  7Ø4Ø              CMA
 Ø431  ØØ24              AND     ARG2
 Ø432  3Ø37              DCA     WD1
 Ø433  4323              JMS     WDOUT            /OUTPUT ARG2
 Ø434  7Ø4Ø              CMA
 Ø435  ØØ26              AND     SIMLNK
 Ø436  3Ø4Ø              DCA     WD2
 Ø437  7Ø4Ø              CMA
 Ø44Ø  ØØ25              AND     SIMAC
 Ø441  3Ø37              DCA     WD1
 Ø442  43Ø4              JMS     LNKOUT           /OUTPUT SIMULATED LINK
 Ø443  4323              JMS     WDOUT            /OUTPUT SIMULATED SUM
 Ø444  7Ø4Ø              CMA
 Ø445  ØØ32              AND     LINK1
 Ø446  3Ø4Ø              DCA     WD2
 Ø447  7Ø4Ø              CMA
 Ø45Ø  ØØ31              AND     SUM1
 Ø451  3Ø37              DCA     WD1
 Ø452  43Ø4              JMS     LNKOUT           /OUTPUT LINK1
 Ø453  4323              JMS     WDOUT            /OUTPUT SUM1
 Ø454  7Ø4Ø              CMA
 Ø455  ØØ34              AND     LINK2
 Ø456  3Ø4Ø              DCA     WD2
 Ø457  7Ø4Ø              CMA
 Ø46Ø  ØØ33              AND     SUM2
 Ø461  3Ø37              DCA     WD1
 Ø462  43Ø4              JMS     LNKOUT           /OUTPUT LINK2
 Ø463  4323              JMS     WDOUT            /OUTPUT SUM2
 Ø464  4446              JMS I   XPRINT
 Ø465  5742              CRLF-1
 Ø466  52Ø4              JMP     HLTA             /TEST FOR HALT
                         /
                         /TYPE HEADER FOR ADDITION TEST ERROR MESSAGE
                         /
 Ø467  ØØØØ     AHOUT,   Ø
 Ø47Ø  4446              JMS I   XPRINT           /TYPE "SIMULATED ADD TEST FAILED
 Ø471  5417              EM1-1
 Ø472  4446              JMS I   XPRINT           /TYPE ARG1, ARG2, SIMULATED, ARG1+ARG2, ARG2+ARG1
 Ø473  5177              DH1-1
 Ø474  724Ø              CLA CMA                  /SET ADD TEST HEADER FLAG
 Ø475  3Ø35              DCA     AHFLG            /TO PREVENT MULTIPLE HEADER TYPEOUTS
 Ø476  5667              JMP I   AHOUT
                         /
                         /HALT WITH ADDRESS OF TEST IN AC
                         /
 Ø477  ØØØØ     HALTA,   Ø
 Ø5ØØ  724Ø              CLA CMA
 Ø5Ø1  Ø351              AND     ADT
 Ø5Ø2  74Ø2              HLT                      /HALT WITH ADDRESS OF ADDITION TEST IN AC
 Ø5Ø3  5677              JMP I   HALTA
                         /
                         /
                         /TYPE LINK
```

```
                          /
 Ø5Ø4  ØØØØ    LNKOUT,    Ø
 Ø5Ø5  734Ø               CLA CLL CMA
 Ø5Ø6  ØØ4Ø               AND     WD2
 Ø5Ø7  764Ø               SZA CLA
 Ø51Ø  532Ø               JMP     OUT1
 Ø511  7Ø4Ø               CMA
 Ø512  ØØ77               AND     K26Ø
 Ø513  4447    TYLNK,     JMS I   XTYPE
 Ø514  7Ø4Ø               CMA
 Ø515  ØØ76               AND     K24Ø
 Ø516  4447               JMS I   XTYPE
 Ø517  57Ø4               JMP I   LNKOUT
 Ø52Ø  7Ø4Ø    OUT1,      CMA
 Ø521  Ø1ØØ               AND     K261
 Ø522  5313               JMP     TYLNK
                          /
                          /TYPE DATA WORD
                          /
 Ø523  ØØØØ    WDOUT,     Ø
 Ø524  734Ø               CLA CLL CMA
 Ø525  Ø1Ø2               AND     XRARTA
 Ø526  3Ø11               DCA     POINT1
 Ø527  7Ø4Ø    NXBIT,     CMA
 Ø53Ø  Ø411               AND I   POINT1
 Ø531  745Ø               SNA
 Ø532  5345               JMP     SP1
 Ø533  ØØ37               AND     WD1
 Ø534  764Ø               SZA CLA
 Ø535  5342               JMP     OUT1A
 Ø536  7Ø4Ø               CMA
 Ø537  ØØ77               AND     K26Ø


 Ø54Ø  4447    TYBIT,     JMS I   XTYPE
 Ø541  5327               JMP     NXBIT
 Ø542  7Ø4Ø    OUT1A,     CMA
 Ø543  Ø1ØØ               AND     K261
 Ø544  534Ø               JMP     TYBIT
 Ø545  7Ø4Ø    SP1,       CMA
 Ø546  ØØ76               AND     K24Ø
 Ø547  4447               JMS I   XTYPE
 Ø55Ø  5723               JMP I   WDOUT
 Ø551  Ø2Ø4    ADT,       SIMAD
                          /
                          /
                          /END OF SIMULATED ADD TEST
                          /
 Ø552  76Ø4    LOOP1,     LAS
 Ø553  Ø115               AND     SR1Ø            /TEST SR1Ø
 Ø554  765Ø               SNA CLA                 /IS SR1Ø=1
 Ø555  537Ø               JMP     SADOK           /NO, TYPE END OF TEST MESSAGE
 Ø556  76Ø4    ADHLT,     LAS
 Ø557  Ø114               AND     SRØ9            /TEST SRØ9
 Ø56Ø  7640              SZA CLA                  /IS SRØ9=1
 Ø561  7402              HLT                      /YES, HALT AT END OF TEST
 Ø562  7604              LAS
 Ø563  Ø116              AND     SR11             /TEST SR11
 Ø564  765Ø              SNA CLA                  /IS SR11=1
 Ø565  5377              JMP     SIMR             /NO, GO TO@NEXT TEST
 Ø566  5767              JMP I   .+1              /REPEAT SIMAD
 Ø567  Ø204              SIMAD
 Ø57Ø  4446     SADOK,   JMS I   XPRINT
 Ø571  5721              OK1-1
 Ø572  5356              JMP     ADHLT
       Ø577     *577
 Ø577  7ØØØ     SIMR,    NOP


                         /
                         /
                         /TEST ROTATION BY COMPARISON OF REAL AND SIMULATED
                         /ROTATES
                         /
       Ø6ØØ     *6ØØ
 Ø6ØØ  4752     SIMRO1,  JMS I   XR1              /SET UP FOR RAL TEST
                         /
                         /TEST RAL
                         /
 Ø6Ø1  7340     SIMRAL,  CLA CLL CMA
 Ø6Ø2  ØØ52              AND     XRALTA           /GET MASK TABLE FOR
 Ø6Ø3  3Ø12              DCA     POINT2           /SIMULATED RAL
 Ø6Ø4  4451              JMS I   XSROT            /SIMULATE RAL
 Ø6Ø5  7340     RRAL,    CLA CLL CMA
 Ø6Ø6  ØØ24              AND     RLNK             /SET UP TO DO REAL ROTATES
 Ø6Ø7  7640              SZA CLA
 Ø61Ø  7Ø2Ø              CML
 Ø611  7Ø4Ø              CMA
 Ø612  ØØ23              AND     RAC
 Ø613  7ØØ4              RAL                      /DO REAL RAL
 Ø614  7ØØØ              NOP
 Ø615  3Ø31              DCA     RRAC             /SAVE ROTATED ACCUMULATOR
 Ø616  743Ø              SZL
 Ø617  7Ø4Ø              CMA
 Ø62Ø  3Ø33              DCA     RRLNK            /SAVE ROTATED LINK
 Ø621  4456              JMS I   XCOMRO           /COMPARE ROTATES
 Ø622  52Ø5              JMP     RRAL             /RETURN HERE FOR LOOP ON ERROR
 Ø623  4457              JMS I   XNXTRO           /SET UP FOR NEXT ROTATE
 Ø624  52Ø1              JMP     SIMRAL           /CONTINUE RAL TEST


 Ø625  4753     SIMRO2,  JMS I   XR2
                         /
                         /TEST RAR
                         /
 Ø626  7340     SIMRAR,  CLA CLL CMA
 Ø627  Ø1Ø2              AND     XRARTA           /GET MASK TABLE FOR
 Ø63Ø  3Ø12             DCA      POINT2          /SIMULATED RAR
 Ø631  4451             JMS I    XSROT           /SIMULATED RAR
 Ø632  734Ø    RRAR,    CLA CLL  CMA
 Ø633  ØØ24             AND      RLNK            /SET UP TP DO REAL RAR
 Ø634  764Ø             SZA CLA
 Ø635  7Ø2Ø             CML
 Ø636  7Ø4Ø             CMA
 Ø637  ØØ23             AND      RAC
 Ø64Ø  7Ø1Ø             RAR                      /DO REAL RAR
 Ø641  7ØØØ             NOP
 Ø642  3Ø31             DCA      RRAC            /SAVE ROTATED ACCUMULATOR
 Ø643  743Ø             SZL
 Ø644  7Ø4Ø             CMA
 Ø645  3Ø33             DCA      RRLNK           /SAVE ROTATED LINK
 Ø646  4456             JMS I    XCOMRO          /COMPARE ROTATES
 Ø647  5232             JMP      RRAR            /RETURN HERE FOR LOOP ON ERROR
 Ø65Ø  4457             JMS I    XNXTRO          /SET UP FOR NEXT ROTATE
 Ø651  5226             JMP      SIMRAR          /CONTINUE RAR TEST


 Ø652  4754    SIMRO3,  JMS I    XR3
                        /
                        /TEST RTL
                        /
 Ø653  734Ø    SIMRTL,  CLA CLL  CMA
 Ø654  ØØ53             AND      XRTLTA          /GET MASK TABLE FOR
 Ø655  3Ø12             DCA      POINT2          /SIMULATED RTL
 Ø656  4451             JMS I    XSROT           /SIMULATE RTL
 Ø657  734Ø    RRTL,    CLA CLL  CMA
 Ø66Ø  ØØ24             AND      RLNK            /SET UP TO DO REAL ROTATE
 Ø661  764Ø             SZA CLA
 Ø662  7Ø2Ø             CML
 Ø663  7Ø4Ø             CMA
 Ø664  ØØ23             AND      RAC
 Ø665  7ØØ6             RTL                      /DO REAL ROTATE
 Ø666  7ØØØ             NOP
 Ø667  3Ø31             DCA      RRAC            /SAVE ROTATED ACCUMULATOR
 Ø67Ø  743Ø             SZL
 Ø671  7Ø4Ø             CMA
 Ø672  3Ø33             DCA      RRLNK           /SAVE ROTATED LINK
 Ø673  4456             JMS I    XCOMRO          /COMPARE ROTATES
 Ø674  5257             JMP      RRTL            /RETURN HERE FOR LOOP ON ERROR
 Ø675  4457             JMS I    XNXTRO          /SET UP TO DO NEXT ROTATE
 Ø676  5253             JMP      SIMRTL          /CONTINUE RTL TEST


 Ø677  4755    SIMRO4,  JMS I    XR4
                        /
                        /TEST RTR
                        /
 Ø7ØØ  734Ø    SIMRTR,  CLA CLL  CMA
 Ø7Ø1  ØØ54             AND      XRTRTA          /GET MASK TABLE FOR
 Ø7Ø2  3Ø12             DCA      POINT2          /SIMULATED RTR
```

```
Ø7Ø3  4451            JMS I   XSROT           /SIMULATE RTR
Ø7Ø4  734Ø    RRTR,   CLA CLL CMA
Ø7Ø5  ØØ24            AND     RLNK            /SET UP TO DO REAL ROTATE
Ø7Ø6  764Ø            SZA CLA
Ø7Ø7  7Ø2Ø            CML
Ø71Ø  7Ø4Ø            CMA
Ø711  ØØ23            AND     RAC
Ø712  7Ø12            RTR                     /DO REAL ROTATE
Ø713  7ØØØ            NOP
Ø714  3Ø31            DCA     RRAC            /SAVE ROTATED ACCUMULATOR
Ø715  743Ø            SZL
Ø716  7Ø4Ø            CMA
Ø717  3Ø33            DCA     RRLNK           /SAVE ROTATED LINK
Ø72Ø  4456            JMS I   XCOMRO          /COMPARE ROTATES
Ø721  53Ø4            JMP     RRTR            /RETURN HERE FOR LOOP ON ERROR
Ø722  4457            JMS I   XNXTRO          /SET UP TO DO NEXT ROTATE
Ø723  53ØØ            JMP     SIMRTR          /CONTINUE RTR TEST


Ø724  4756    SIMRO5, JMS I   XR5
                      /
                      /TEST BYTE SWAP
                      /
Ø725  734Ø    SIMBSW, CLA CLL CMA
Ø726  ØØ55            AND     XBSWTA          /GET MASK TABLE FOR
Ø727  3Ø12            DCA     POINT2          /SIMULATED BSW
Ø73Ø  4776            JMS I   XSBSW           /SIMULATE BSW
Ø731  734Ø    RBSW,   CLA CLL CMA
Ø732  ØØ24            AND     RLNK                    /SET UP FOR REAL BSW
Ø733  764Ø            SZA CLA
Ø734  7Ø2Ø            CML
Ø735  7Ø4Ø            CMA
Ø736  ØØ23            AND     RAC
Ø737  7ØØ2            BSW                     /DO REAL BSW
Ø74Ø  7ØØØ            NOP
Ø741  3Ø31            DCA     RRAC            /SAVE ROTATED ACCUMULATOR
Ø742  743Ø            SZL
Ø743  7Ø4Ø            CMA
Ø744  3Ø33            DCA     RRLNK           /SAVE ROTATED LINK
Ø745  4456            JMS I   XCOMRO          /COMPARE ROTATES
Ø746  5331            JMP     RBSW            /RETURN HERE FOR LOOP ON ERROR
Ø747  4457            JMS I   XNXTRO          /SET UP FOR NEXT ROTATE
Ø75Ø  5325            JMP     SIMBSW          /CONTINUE BSW TEST
Ø751  5777            JMP I   XROTDN          /END OF ROTATE SIMULATION TESTS

Ø752  14ØØ    XR1,    R1
Ø753  141Ø    XR2,    R2
Ø754  142Ø    XR3,    R3
Ø755  143Ø    XR4,    R4
Ø756  144Ø    XR5,    R5
Ø757  ØØØ1    RALTAB, 1
Ø76Ø  ØØØ2            2
Ø761  ØØØ4            4
Ø762  ØØ1Ø            1Ø
```

```
 Ø763  ØØ2Ø            2Ø
 Ø764  ØØ4Ø            4Ø
 Ø765  Ø1ØØ            1ØØ
 Ø766  Ø2ØØ            2ØØ
 Ø767  Ø4ØØ            4ØØ
 Ø77Ø  1ØØØ            1ØØØ
 Ø771  2ØØØ            2ØØØ
 Ø772  4ØØØ            4ØØØ
 Ø773  ØØØØ            Ø
 Ø774  ØØØ1            1
 Ø775  4ØØØ            4ØØØ
 Ø776  1236   XSBSW,   SBSW
 Ø777  1323   XROTDN,  ROTDNE



                       /
                       /(TAPE 2)
                       /COMPARE RESULTS OF REAL AND SIMULATED ROTATES
                       /
       1ØØØ   *1ØØØ
 1ØØØ  ØØØØ   COMROT,  Ø
                       /
                       /COMPARE ROTATED ACCUMULATORS
                       /
 1ØØ1  734Ø            CLA CLL CMA
 1ØØ2  ØØ25            AND     SIMAC          /GET SIMULATED ROTATED ACCUMULATOR
 1ØØ3  7Ø4Ø            CMA                    /COMPLEMENT
 1ØØ4  ØØ31            AND     RRAC           /AND WITH REAL ROTATED ACCUMULATOR
 1ØØ5  744Ø            SZA                    /IS NOTSIMAC AND RRAC=Ø
 1ØØ6  5226            JMP     ERROT          /NO, ERROR
 1ØØ7  7Ø4Ø            CMA
 1Ø1Ø  ØØ31            AND     RRAC           /GET REAL ROTATED ACCUMULATOR
 1Ø11  7Ø4Ø            CMA                    /COMPLEMENT
 1Ø12  ØØ25            AND     SIMAC          /AND WITH SIMULATED ROTATED ACCUMULATOR
 1Ø13  744Ø            SZA                    /IS SIMAC AND NOTRRAC=Ø
 1Ø14  5226            JMP     ERROT          /NO, ERROR
                       /
                       /COMPARE ROTATED LINKS
                       /
 1Ø15  734Ø            CLA CLL CMA
 1Ø16  ØØ26            AND     SIMLNK         /GET SIMULATED LINK
 1Ø17  764Ø            SZA CLA
 1Ø2Ø  7Ø2Ø            CML
 1Ø21  7Ø4Ø            CMA
 1Ø22  ØØ33            AND     RRLNK          /GET REAL ROTATED LINK
 1Ø23  744Ø            SZA
 1Ø24  7Ø2Ø            CML
 1Ø25  743Ø            SZL                    /ARE THEY THE SAME
 1Ø26  5246   ERROT,   JMP     ERROR2         /NO, ERROR
 1Ø27  22ØØ            ISZ     COMROT         /RETURN HERE IF NO LOOP ON ERROR
 1Ø3Ø  56ØØ            JMP I   COMROT
                       /
```

```
                        /
                        /SET UP TO DO NEXT ROTATE
                        /
1Ø31  ØØØØ    NXTROT, Ø
1Ø32  734Ø            CLA CLL CMA
1Ø33  ØØ24            AND     RLNK            /GET LINK OF WORD TO BE ROTATED
1Ø34  764Ø            SZA CLA                 /IS IT Ø
1Ø35  5244            JMP     NEWLNK          /NO, CLEAR IT
1Ø36  7Ø4Ø            CMA                     /YES, SET IT
1Ø37  3Ø24            DCA     RLNK
1Ø4Ø  2Ø23            ISZ     RAC             /INCREMENT NUMBER TO BE ROTATED
1Ø41  5631            JMP I   NXTROT          /CONTINUE SIMULATION OF PRESENT ROTATE INSTRUCTION
1Ø42  2231            ISZ     NXTROT          /PRESENT SIMULATION DONE
1Ø43  5631            JMP I   NXTROT          /GO TO NEXT TEST
1Ø44  3Ø24    NEWLNK, DCA     RLNK
1Ø45  5631            JMP I   NXTROT



                        /
                        /
                        /ERROR HANDLER FOR ROTATE TEST
                        /
1Ø46  76Ø4    ERROR2, LAS
1Ø47  Ø1Ø4            AND     SRØ1            /TEST SRØ1
1Ø5Ø  765Ø            SNA CLA                 /IS SRØ1=1
1Ø51  4271            JMS     ROTPRT          /NO, TYPE ERROR MESSAGE
1Ø52  76Ø4    HLTB,   LAS
1Ø53  Ø1Ø3            AND     SRØØ            /TEST SRØØ
1Ø54  765Ø            SNA CLA                 /IS SRØØ=1
1Ø55  5263            JMP     HALTB           /NO, HALT WITH ADDRESS OF TEST IN AC
1Ø56  76Ø4            LAS
1Ø57  Ø1Ø5            AND     SRØ2            /TEST SRØ2
1Ø6Ø  765Ø            SNA CLA                 /IS SRØ2=1
1Ø61  5227            JMP     ERROT+1         /NO, GO TO NEW DATA
1Ø62  523Ø            JMP     ERROT+2         /YES, LOOP WITH SAME DATA
1Ø63  734Ø    HALTB,  CLA CLL CMA
1Ø64  Ø451            AND I   XSROT
1Ø65  127Ø            TAD     M4
1Ø66  74Ø2            HLT
1Ø67  5256            JMP     HLTB+4
1Ø7Ø  7774    M4,     -4



                        /
                        /ERROR TYPEOUT FOR SIMULATED ROTATE TEST ERRORS
                        /
1Ø71  ØØØØ    ROTPRT, Ø
1Ø72  734Ø            CLA CLL CMA
1Ø73  ØØ35            AND     RHFLG           /GET ROTATE TEST HEADER FLAG
1Ø74  765Ø            SNA CLA                 /HAS HEADER BEEN TYPED
1Ø75  4331            JMS     RHOUT           /NO, TYPE HEADER
1Ø76  7Ø4Ø            CMA
1Ø77  ØØ23            AND     RAC
```

```
   11ØØ  3Ø37            DCA     WD1
   11Ø1  7Ø4Ø            CMA
   11Ø2  ØØ24            AND     RLNK
   11Ø3  3Ø4Ø            DCA     WD2
   11Ø4  446Ø            JMS I   XLNKOU         /OUTPUT ORIGINAL LINK
   11Ø5  4461            JMS I   XWDOUT         /OUTPUT ORIGINAL WORD
   11Ø6  7Ø4Ø            CMA
   11Ø7  ØØ25            AND     SIMAC
   111Ø  3Ø37            DCA     WD1
   1111  7Ø4Ø            CMA
   1112  ØØ26            AND     SIMLNK
   1113  3Ø4Ø            DCA     WD2
   1114  446Ø            JMS I   XLNKOU         /OUTPUT SIMULATED ROTATED LINK
   1115  4461            JMS I   XWDOUT         /OUTPUT SIMULATED ROTATED WORD
   1116  7Ø4Ø            CMA
   1117  ØØ31            AND     RRAC
   112Ø  3Ø37            DCA     WD1
   1121  7Ø4Ø            CMA
   1122  ØØ33            AND     RRLNK
   1123  3Ø4Ø            DCA     WD2
   1124  446Ø            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
   113Ø  5671            JMP I   ROTPRT

                         /
                         /OUTPUT HEADER FOR ROTATE ERROR MESSAGE
                         /
   1131  ØØØØ    RHOUT,  Ø
   1132  4446            JMS I   XPRINT         /TYPE SIMULATED XXX TEST FAILED
   1133  ØØØØ    RHD,    Ø                      /WHERE XXX IS THE INSTRUCTION THAT FAILED
   1134  4446            JMS I   XPRINT         /TYPE ORIGINAL, SIMULATED ACTUAL
   1135  5244            DH2-1
   1136  724Ø            CLA CMA
   1137  3Ø35            DCA     RHFLG
   114Ø  5731            JMP I   RHOUT


   1141  2ØØØ    RTRTAB, 2ØØØ
   1142  Ø4ØØ            4ØØ
   1143  Ø1ØØ            1ØØ
   1144  ØØ2Ø            2Ø
   1145  ØØØ4            4
   1146  ØØØ1            1
   1147  4ØØØ            4ØØØ
   115Ø  1ØØØ            1ØØØ
   1151  Ø2ØØ            2ØØ
   1152  ØØ4Ø            4Ø
   1153  ØØ1Ø            1Ø
   1154  ØØØ2            2
   1155  ØØØØ            Ø
   1156  2ØØØ            2ØØØ
   1157  ØØØ2            2
```

```
116Ø  ØØØ2    RTLTAB, 2
1161  ØØ1Ø            1Ø
1162  ØØ4Ø            4Ø
1163  Ø2ØØ            2ØØ
1164  1ØØØ            1ØØØ
1165  4ØØØ            4ØØØ
1166  ØØØ1            1
1167  ØØØ4            4
117Ø  ØØ2Ø            2Ø
1171  Ø1ØØ            1ØØ
1172  Ø4ØØ            4ØØ
1173  2ØØØ            2ØØØ
1174  ØØØØ            Ø
1175  ØØØ2            2
1176  2ØØØ            2ØØØ


                      /
                      /
                      /ROTATION SIMULATOR COMMON ROUTINE
                      /ROTATE FUNCTION SIMULATED DEPENDS
                      /UPON MASK TABLE SELECTED
                      /
      12ØØ    *12ØØ
12ØØ  ØØØØ    SROTAL, Ø
12Ø1  73ØØ            CLA CLL
12Ø2  3Ø25            DCA     SIMAC           /CLEAR SIMULATION ARGUMENTS
12Ø3  3Ø26            DCA     SIMLNK
12Ø4  7Ø4Ø            CMA
12Ø5  Ø412            AND I   POINT2          /GET FIRST MASK BIT FROM TABLE
12Ø6  3Ø37            DCA     WD1
12Ø7  7Ø4Ø    NBIT,   CMA
121Ø  Ø412            AND I   POINT2          /GET MASK BIT FROM TABLE
1211  745Ø            SNA                     /IS IT Ø
1212  53Ø3            JMP     ENDROT          /YES, FINISH SIMULATION
1213  3Ø4Ø            DCA     WD2
1214  7Ø4Ø            CMA
1215  ØØ23            AND     RAC             /LOAD AC WITH WORD TO BE ROTATED
1216  ØØ37            AND     WD1             /TEST BIT TO BE ROTATED
1217  744Ø            SZA                     /IS IS Ø
122Ø  4225            JMS     OR1             /NO, PLACE BIT INTO NEW POSITION
1221  7Ø4Ø            CMA
1222  ØØ4Ø            AND     WD2             /BIT TO BE ROTATED
1223  3Ø37            DCA     WD1             /BECOMES NEW MASK
1224  52Ø7            JMP     NBIT            /CONTINUE SIMULATION
                      /
                      /OR BITS TO FORM PARTIALLY ROTATED WORD
                      /
1225  ØØØØ    OR1,    Ø
1226  724Ø            CLA CMA
1227  ØØ4Ø            AND     WD2             /GET BIT TO BE INSERTED
123Ø  7421            MQL                     /SAVE IN MQ
1231  7Ø4Ø            CMA
```

```
  1232  ØØ25                AND     SIMAC             /GET SIMULATED ROTATED WORD
  1233  75Ø1                MQA                       /OR BIT INTO POSITION
  1234  3Ø25                DCA     SIMAC             /SAVE PARTIALLY ROTATED WORD
  1235  5625                JMP I   OR1



                            /
                            /SIMULATE BYTE SWAP
                            /
  1236  ØØØØ      SBSW,     Ø
  1237  734Ø                CLA CLL CMA
  124Ø  Ø236                AND     SBSW              /SET UP FOR ERROR RETURN
  1241  3451                DCA I   XSROT
  1242  3Ø25                DCA     SIMAC             /CLEAR SIMULATION ARGUMENTS
  1243  3Ø26                DCA     SIMLNK
  1244  7Ø4Ø      N1BIT,    CMA
  1245  Ø412                AND I   POINT2            /GET MASK FROM TABLE
  1246  745Ø                SNA                       /IS IT Ø
  1247  5277                JMP     ENDBSW            /YES, FINISH SIMULATION
  125Ø  3Ø37                DCA     WD1
  1251  7Ø4Ø                CMA
  1252  Ø412                AND I   POINT2
  1253  3Ø4Ø                DCA     WD2
  1254  7Ø4Ø                CMA
  1255  ØØ23                AND     RAC               /GET WORD TO BE ROTATED
  1256  ØØ37                AND     WD1               /TEST BIT TO BE ROTATED
  1257  744Ø                SZA                       /IS IT Ø
  126Ø  4225                JMS     OR1               /NO, PLACE BIT IN NEW POSITION
  1261  7Ø4Ø                CMA
  1262  ØØ37                AND     WD1               /INTERCHANGE MASK AND BIT TO BE ROTATED
  1263  7421                MQL
  1264  7Ø4Ø                CMA
  1265  ØØ4Ø                AND     WD2
  1266  3Ø37                DCA     WD1
  1267  75Ø1                MQA
  127Ø  3Ø4Ø                DCA     WD2
  1271  7Ø4Ø                CMA
  1272  ØØ23                AND     RAC               /GET WORD TO BE ROTATED
  1273  ØØ37                AND     WD1               /TEST BIT TO BE ROTATED
  1274  744Ø                SZA                       /IS IT Ø
  1275  4225                JMS     OR1               /NO, PLACE BIT IN NEW POSITION
  1276  5244                JMP     N1BIT             /CONTINUE SIMULATION
  1277  734Ø      ENDBSW,   CLA CLL CMA
  13ØØ  ØØ24                AND     RLNK
  13Ø1  3Ø26                DCA     SIMLNK
  13Ø2  5636                JMP I   SBSW


                            /
                            /
                            /END OF ROTATE, SHIFT LINK
                            /
  13Ø3  734Ø      ENDROT,   CLA CLL CMA
```

```
 1304  Ø412            AND I   POINT2         /GET BIT TO BE ROTATED FROM LINK
 1305  3Ø4Ø            DCA     WD2
 1306  7Ø4Ø            CMA
 1307  Ø116            AND     KØØØ1          /GET MASK FOR LINK
 131Ø  ØØ24            AND     RLNK           /TEST LINK
 1311  744Ø            SZA                    /IS LINK Ø
 1312  4225            JMS     OR1            /PLACE LINK IN NEW POSITION
 1313  7Ø4Ø            CMA
 1314  Ø412            AND I   POINT2         /GET MASK FOR BIT TO BE ROTATED INTO LINK
 1315  ØØ23            AND     RAC            /TEST BIT IN WORD TO BE ROTATED INTO LINK
 1316  744Ø            SZA                    /IS IT Ø
 1317  724Ø            CLA CMA                /NO, SET LINK=1
 132Ø  Ø116            AND     KØØØ1
 1321  3Ø26            DCA     SIMLNK
 1322  56ØØ            JMP I   SROTAL
                       /
 1323  76Ø4    ROTDNE, LAS
 1324  Ø115            AND     SR1Ø           /TEST SR1Ø
 1325  765Ø            SNA CLA                /IS SR1Ø=1
 1326  5342            JMP     SROTOK         /NO, TYPE "SIMROT"
 1327  76Ø4    ROTHLT, LAS
 133Ø  Ø114            AND     SRØ9           /TEST SRØ9
 1331  764Ø            SZA CLA                /IS SRØ9=1
 1332  74Ø2            HLT                    /YES, HALT AT END OF ROTATE TESTS
 1333  76Ø4            LAS
 1334  Ø116            AND     SR11           /TEST SR11
 1335  765Ø            SNA CLA                /IS SR11=1
 1336  574Ø            JMP I   .+2            /NO, GO TO NEXT TEST
 1337  5741            JMP I   .+2            /YES, REPEAT ROTATE TESTS
 134Ø  2ØØØ            FCT
 1341  Ø6ØØ            SIMRO1
 1342  4446    SROTOK, JMS I   XPRINT
 1343  5725            OK2=1
 1344  5327            JMP     ROTHLT


                       /
                       /
                       /SET UP FOR ROTATE TESTS
                       /
       14ØØ    PAGE
 14ØØ  ØØØØ    R1,     Ø
 14Ø1  734Ø            CLA CLL CMA
 14Ø2  Ø25Ø            AND     XM2            /SET UP HEADER
 14Ø3  345Ø            DCA I   XRHD           /FOR RAL TEST ERROR MESSAGE
 14Ø4  3Ø35            DCA     RHFLG          /CLEAR ROTATE HEADER FLAG
 14Ø5  3Ø24            DCA     RLNK
 14Ø6  3Ø23            DCA     RAC
 14Ø7  56ØØ            JMP I   R1
 141Ø  ØØØØ    R2,     Ø
 1411  734Ø            CLA CLL CMA
 1412  Ø251            AND     XM3            /SET UP HEADER
 1413  345Ø            DCA I   XRHD           /FOR RAR TEST ERROR MESSAGE
 1414  3Ø35            DCA     RHFLG
```

```
  1415  3Ø24            DCA      RLNK
  1416  3Ø23            DCA      RAC
  1417  561Ø            JMP I    R2
  142Ø  ØØØØ   R3,      Ø
  1421  734Ø            CLA CLL CMA
  1422  Ø252            AND      XM4             /SET UP HEADER
  1423  345Ø            DCA I    XRHD            /FOR RTR TEST ERROR MESSAGE
  1424  3Ø35            DCA      RHFLG
  1425  3Ø24            DCA      RLNK
  1426  3Ø23            DCA      RAC
  1427  562Ø            JMP I    R3
  143Ø  ØØØØ   R4,      Ø
  1431  734Ø            CLA CLL CMA
  1432  Ø253            AND      XM5             /SET UP HEADER
  1433  345Ø            DCA I    XRHD            /FOR RTL TEST ERROR MESSAGE
  1434  3Ø35            DCA      RHFLG
  1435  3Ø24            DCA      RLNK
  1436  3Ø23            DCA      RAC
  1437  563Ø            JMP I    R4
  144Ø  ØØØØ   R5,      Ø
  1441  734Ø            CLA CLL CMA
  1442  Ø254            AND      XM6             /SET UP HEADER
  1443  345Ø            DCA I    XRHD            /FOR BSW TEST ERROR MESSAGE
  1444  3Ø35            DCA      RHFLG
  1445  3Ø24            DCA      RLNK
  1446  3Ø23            DCA      RAC
  1447  564Ø            JMP I    R5
  145Ø  544Ø   XM2,     EM2-1
  1451  5461   XM3,     EM3-1
  1452  55Ø2   XM4,     EM4-1
  1453  5523   XM5,     EM5-1
  1454  5544   XM6,     EM6-1

                        /
                        /
                        /CHARACTER STRING TYPE ROUTINE
                        /←=RETURN, ↑=LINE FEED
        16ØØ   PAGE
  16ØØ  ØØØØ   PRINT,   Ø
  16Ø1  73ØØ            CLA CLL
  16Ø2  16ØØ            TAD I    PRINT
  16Ø3  3Ø11            DCA      POINT1
  16Ø4  22ØØ            ISZ      PRINT
  16Ø5  1411            TAD I    POINT1
  16Ø6  3Ø36            DCA      CHAR
  16Ø7  1Ø36            TAD      CHAR
  161Ø  7Ø12            RTR
  1611  7Ø12            RTR
  1612  7Ø12            RTR
  1613  4217            JMS      TYPSET
  1614  1Ø36            TAD      CHAR
  1615  4217            JMS      TYPSET
  1616  52Ø5            JMP      PRINT+5
  1617  ØØØØ   TYPSET,  Ø
  162Ø  Ø245            AND      KØØ77
```

```
 1621  745Ø             SNA
 1622  56ØØ             JMP I   PRINT
 1623  1246             TAD     M4Ø
 1624  751Ø             SPA
 1625  523Ø             JMP     .+3
 1626  1Ø76             TAD     K24Ø
 1627  5243             JMP     MTP
 163Ø  7ØØ1             IAC
 1631  744Ø             SZA
 1632  5235             JMP     .+3
 1633  1251             TAD     K215
 1634  5243             JMP     MTP
 1635  7ØØ1             IAC
 1636  744Ø             SZA
 1637  5242             JMP     .+3
 164Ø  125Ø             TAD     K212
 1641  5243             JMP     MTP
 1642  1247             TAD     K336
 1643  4447   MTP,      JMS I   XTYPE
 1644  5617             JMP I   TYPSET
 1645  ØØ77   KØØ77,    ØØ77
 1646  774Ø   M4Ø,      774Ø
 1647  Ø336   K336,     Ø336
 165Ø  Ø212   K212,     Ø212
 1651  Ø215   K215,     Ø215
 1652  ØØØØ   TYPE,     Ø
 1653  6Ø46             TLS
 1654  6Ø41             TSF
 1655  5254             JMP     .-1
 1656  72ØØ             CLA
 1657  5652             JMP I   TYPE


 166Ø  ØØØ1   BSWTAB,   1
 1661  Ø1ØØ             1ØØ
 1662  ØØØ2             2
 1663  Ø2ØØ             2ØØ
 1664  ØØØ4             4
 1665  Ø4ØØ             4ØØ
 1666  ØØ1Ø             1Ø
 1667  1ØØØ             1ØØØ
 167Ø  ØØ2Ø             2Ø
 1671  2ØØØ             2ØØØ
 1672  ØØ4Ø             4Ø
 1673  4ØØØ             4ØØØ
 1674  ØØØØ             Ø

       2ØØØ   PAGE
 2ØØØ  73ØØ   FCT,      CLA CLL
 2ØØ1  1122             TAD     SEQ1
 2ØØ2  3154             DCA     SEQ
 2ØØ3  3Ø2Ø             DCA     CNTR1

                        /
                        /
                        /FALSE CARRY TEST#1
                        /
 2ØØ4  73ØØ     FCT1,   CLA CLL
                        /
                        /PLACE INSTRUCTIONS AND DATA IN TEST ADDRESSES
                        /
 2ØØ5  73ØØ     FCS1,   CLA CLL                 /DATA=ØØØØ
 2ØØ6  3471             DCA I   XSTA1           /LOC,=7776
 2ØØ7  1136             TAD     INS1            /INSTRUCTION=TAD ,-1
 2Ø1Ø  3472             DCA I   XSTA2           /LOC,=7777
 2Ø11  1332             TAD     INS2            /INSTRUCTION=TAD ,+3
 2Ø12  3ØØØ             DCA     TSTA3           /LOC,=ØØØØ
 2Ø13  1137             TAD     INS3            /INSTRUCTION=IAC
 2Ø14  3ØØ1             DCA     TSTA4           /LOC,=ØØØ1
 2Ø15  114Ø             TAD     INS4            /INSTRUCTION=JMP I ,+2
 2Ø16  3ØØ2             DCA     TSTA5           /LOC,=ØØØ2
 2Ø17  724Ø             CLA CMA                 /DATA=7777
 2Ø2Ø  3ØØ3             DCA     TSTA6           /LOC,=ØØØ3
 2Ø21  1327             TAD     AD1             /ADDRESS=RET1
 2Ø22  3ØØ4             DCA     TSTA7           /LOC,=ØØØ4
                        /
                        /EXECUTE INSTRUCTIONS PREVIOUSLY ASSEMBLED IN TEST
                        /ADDRESSES
                        /

 2Ø23  73ØØ     FCL1,   CLA CLL
 2Ø24  5472             JMP I   XSTA2
 2Ø25  7ØØØ     RET1,   NOP                     /PROVIDED FOR PROGRAM MODIFICATION
 2Ø26  7ØØØ             NOP
 2Ø27  4464             JMS I   XAVREG          /SAVE LINK AND AC
                        /
                        /EXPECTED RESULTS ARE AC=Ø, LINK=1
                        /
 2Ø3Ø  743Ø             SZL
 2Ø31  744Ø             SZA
 2Ø32  4465             JMS I   XDATER          /COMPUTATION ERROR HAS OCCURED
 2Ø33  741Ø             SKP
 2Ø34  4466             JMS I   XHALT2          /TEST FOR HALT
 2Ø35  4467             JMS I   XLOOP           /TEST FOR LOOP
 2Ø36  5223             JMP     FCL1
 2Ø37  72ØØ             CLA
 2Ø4Ø  1123             TAD     SEQ2            /ADDRESS OF NEXT TEST
 2Ø41  3154             DCA     SEQ
 2Ø42  5554             JMP I   SEQ             /GO TO NEXT TEST


                        /
                        /
                        /FALSE CARRY TEST#2
                        /
 2Ø43  73ØØ     FCT2,   CLA CLL
                        /
                        /PLACE INSTRUCTIONS AND DATA IN TEST ADDRESSES
                        /
```

```
  2Ø44  734Ø    FCS2,    CLA CLL CMA            /DATA=7777
  2Ø45  3471             DCA I   XSTA1          /LOC,=7776
  2Ø46  1136             TAD     INS1           /INSTRUCTION=TAD ,-1
  2Ø47  3472             DCA I   XSTA2          /LOC,=7777
  2Ø5Ø  1137             TAD     INS3           /INSTRUCTION=IAC
  2Ø51  3ØØØ             DCA     TSTA3          /LOC,=ØØØØ
  2Ø52  1141             TAD     INS5           /INSTRUCTION=JMP I .+1
  2Ø53  3ØØ1             DCA     TSTA4          /LOC,=ØØØ1
  2Ø54  133Ø             TAD     AD2            /ADDRESS=RET2
  2Ø55  3ØØ2             DCA     TSTA5          /LOC,=ØØØ2
                         /
                         /EXECUTE INSTRUCTIONS PREVIOUSLY ASSEMBLED IN TEST
                         /ADDRESSES
                         /
  2Ø56  73ØØ    FCL2,    CLA CLL
  2Ø57  5472             JMP I   XSTA2
  2Ø6Ø  7ØØØ    RET2,    NOP
  2Ø61  7ØØØ             NOP
  2Ø62  4464             JMS I   XAVREG         /SAVE AC AND LINK
                         /
                         /EXPECTED RESULTS ARE AC=Ø, LINK=1
                         /
  2Ø63  743Ø             SZL
  2Ø64  744Ø             SZA
  2Ø65  4465             JMS I   XDATER
  2Ø66  741Ø             SKP
  2Ø67  4466             JMS I   XHALT2
  2Ø7Ø  4467             JMS I   XLOOP
  2Ø71  5256             JMP     FCL2
  2Ø72  72ØØ             CLA
  2Ø73  1124             TAD     SEQ3
  2Ø74  3154             DCA     SEQ
  2Ø75  5554             JMP I   SEQ


                         /
                         /
                         /FALSE CARRY TEST #3
                         /
  2Ø76  73ØØ    FCT3,    CLA CLL
                         /
                         /
                         /
  2Ø77  1137    FCS3,    TAD     INS3           /INSTRUCTION=IAC
  21ØØ  3471             DCA I   XSTA1          /LOC,=7776
  21Ø1  1333             TAD     INS16          /INSTRUCTION=TAD I 21
  21Ø2  3472             DCA I   XSTA2          /LOC,=7777
  21Ø3  1152             TAD     INS14          /INSTRUCTION=JMP I .+1
  21Ø4  3ØØØ             DCA     TSTA3          /LOC,=ØØØØ
  21Ø5  1331             TAD     AD3            /ADDRESS=RET3
  21Ø6  3ØØ1             DCA     TSTA4          /LOC,=ØØØ1
                         /
                         /
                         /
                         /
  21Ø7  73ØØ     FCL3,    CLA CLL
  211Ø  5471              JMP I   XSTA1
  2111  7ØØØ     RET3,    NOP
  2112  7ØØØ              NOP
  2113  4464              JMS I   XAVREG
                          /
                          /
                          /
  2114  743Ø              SZL
  2115  744Ø              SZA
  2116  4465              JMS I   XDATER
  2117  741Ø              SKP
  212Ø  4466              JMS I   XHALT2
  2121  4467              JMS I   XLOOP
  2122  53Ø7              JMP     FCL3
  2123  72ØØ              CLA
  2124  1125              TAD     SEQ4
  2125  3154              DCA     SEQ
  2126  5554              JMP I   SEQ
  2127  2Ø25     AD1,     RET1
  213Ø  2Ø6Ø     AD2,     RET2
  2131  2111     AD3,     RET3
  2132  1ØØ3     INS2,    1ØØ3                /=TAD .+3 IN ØØØØ
  2133  1421     INS16,   1421


        22ØØ     PAGE
                          /
                          /
                          /FALSE CARRY TEST #4
                          /
  22ØØ  73ØØ     FCT4,    CLA CLL
                          /
                          /
                          /
  22Ø1  734Ø     FCS4,    CLA CLL CMA                /DATA=7777
  22Ø2  3471              DCA I   XSTA1              /LOC,=7776
  22Ø3  1136              TAD     INS1               /INSTRUCTION=TAD .-1
  22Ø4  3472              DCA I   XSTA2              /LOC,=7777
  22Ø5  1142              TAD     INS6               /INSTRUCTION=CMA CML RAR
  22Ø6  3ØØØ              DCA     TSTA3              /LOC,=ØØØØ
  22Ø7  1141              TAD     INS5               /INSTRUCTION=JMP I .+1
  221Ø  3ØØ1              DCA     TSTA4              /LOC,=ØØØ1
  2211  1324              TAD     AD4                /ADDRESS=RET4
  2212  3ØØ2              DCA     TSTA5              /LOC,=ØØØ2
                          /
                          /
                          /
                          /
  2213  734Ø     FCL4,    CLA CLL CMA
  2214  5472              JMP I   XSTA2
  2215  7ØØØ     RET4,    NOP
  2216  7ØØØ              NOP
```

```
 2217  4464           JMS I   XAVREG
                      /
                      /
                      /
 222Ø  743Ø           SZL
 2221  744Ø           SZA
 2222  4465           JMS I   XDATER
 2223  741Ø           SKP
 2224  4466           JMS I   XHALT2
 2225  4467           JMS I   XLOOP
 2226  5213           JMP     FCL4
 2227  1126           TAD     SEQ5
 223Ø  3154           DCA     SEQ
 2231  5554           JMP I   SEQ


                      /
                      /
                      /FALSE CARRY TEST #5
                      /
 2232  73ØØ   FCT5,   CLA CLL
                      /
                      /
                      /
 2233  73ØØ   FCS5,   CLA CLL
 2234  1143           TAD     INS7              /INSTRUCTION=ISZ ,-1
 2235  3472           DCA I   XSTA2             /LOC,=7777
 2236  1137           TAD     INS3              /INSTRUCTION=IAC
 2237  3ØØØ           DCA     TSTA3             /LOC,=ØØØØ
 224Ø  1137           TAD     INS3              /INSTRUCTION=IAC
 2241  3ØØ1           DCA     TSTA4             /LOC,=ØØØ1
 2242  1151           TAD     INS13             /INSTRUCTION=JMP I .+1
 2243  3ØØ2           DCA     TSTA5             /LOC,=ØØØ2
 2244  1325           TAD     AD5               /ADDRESS=RET5
 2245  3ØØ3           DCA     TSTA6             /LOC,=ØØØ3
                      /
                      /
                      /
                      /
 2246  734Ø   FCL5,   CLA CLL CMA
 2247  3471           DCA I   XSTA1
 225Ø  7Ø4Ø           CMA
 2251  5472           JMP I   XSTA2
 2252  7ØØØ   RET5,   NOP
 2253  7ØØØ           NOP
 2254  4464           JMS I   XAVREG
                      /
                      /
                      /
 2255  743Ø           SZL
 2256  744Ø           SZA
 2257  4465           JMS I   XDATER
 226Ø  741Ø           SKP
 2261  4466           JMS I   XHALT2
 2262  4467           JMS I   XLOOP
 2263  5246             JMP     FCL5
 2264  72ØØ             CLA
 2265  1127             TAD     SEQ6
 2266  3154             DCA     SEQ
 2267  5554             JMP I   SEQ


                        /
                        /
                        /FALSE CARRY TEST #6
                        /
 227Ø  73ØØ     FCT6,   CLA CLL
                        /
 2271  73ØØ     FCS6,   CLA CLL
 2272  1144             TAD     INS8            /INSTRUCTION=ISZ ,+1
 2273  3472             DCA I   XSTA2           /LOC,=7777
 2274  1137             TAD     INS3            /INSTRUCTION=IAC
 2275  3ØØ1             DCA     TSTA4           /LOC,=ØØØ1
 2276  1151             TAD     INS13           /INSTRUCTION=JMP I .+1
 2277  3ØØ2             DCA     TSTA5           /LOC,=ØØØ2
 23ØØ  1326             TAD     AD6             /ADDRESS=RET6
 23Ø1  3ØØ3             DCA     TSTA6           /LOC,=ØØØ3
                        /
                        /
                        /
                        /
 23Ø2  734Ø     FCL6,   CLA CLL CMA
 23Ø3  3ØØØ             DCA     TSTA3
 23Ø4  724Ø             CLA CMA
 23Ø5  5472             JMP I   XSTA2
 23Ø6  7ØØØ     RET6,   NOP
 23Ø7  7ØØØ             NOP
 231Ø  4464             JMS I   XAVREG
                        /
                        /
                        /
 2311  743Ø             SZL
 2312  744Ø             SZA
 2313  4465             JMS I   XDATER
 2314  741Ø             SKP
 2315  4466             JMS I   XHALT2
 2316  4467             JMS I   XLOOP
 2317  53Ø2             JMP     FCL6
 232Ø  72ØØ             CLA
 2321  113Ø             TAD     SEQ7
 2322  3154             DCA     SEQ
 2323  5554             JMP I   SEQ
 2324  2215     AD4,    RET4
 2325  2252     AD5,    RET5
 2326  23Ø6     AD6,    RET6

       24ØØ     PAGE
                        /
                        /
```

```
                           /FALSE CARRY TEST#7
                           /
 24ØØ  73ØØ     FCT7,      CLA CLL
                           /
                           /
                           /
 24Ø1  73ØØ     FCS7,      CLA CLL
 24Ø2  1145                TAD      INS9           /INSTRUCTION=ISZ I TSTIND
 24Ø3  3472                DCA I    XSTA2          /LOC,=7777
 24Ø4  1137                TAD      INS3           /INSTRUCTION=IAC
 24Ø5  3ØØ1                DCA      TSTA4          /LOC,=ØØØ1
 24Ø6  1151                TAD      INS13          /INSTRUCTION=JMP I .+1
 24Ø7  3ØØ2                DCA      TSTA5          /LOC,=ØØØ2
 241Ø  1326                TAD      AD7            /ADDRESS=RET7
 2411  3ØØ3                DCA      TSTA6          /LOC,=ØØØ3
                           /
                           /
                           /
 2412  734Ø     FCL7,      CLA CLL CMA
 2413  3Ø1Ø                DCA      TSTIND
 2414  7Ø4Ø                CMA
 2415  3ØØØ                DCA      TSTA3
 2416  7Ø4Ø                CMA
 2417  5472                JMP I    XSTA2
 242Ø  7ØØØ     RET7,      NOP
 2421  7ØØØ                NOP
 2422  4464                JMS I    XAVREG
                           /
                           /
                           /
 2423  743Ø                SZL
 2424  744Ø                SZA
 2425  4465                JMS I    XDATER
 2426  741Ø                SKP
 2427  4466                JMS I    XHALT2
 243Ø  4467                JMS I    XLOOP
 2431  5212                JMP      FCL7
 2432  72ØØ                CLA
 2433  1131                TAD      SEQ8
 2434  3154                DCA      SEQ
 2435  5554                JMP I    SEQ

                           /
                           /
                           /FALSE CARRY TEST #8
                           /
 2436  73ØØ     FCT8,      CLA CLL
                           /
                           /
                           /
 2437  73ØØ     FCS8,      CLA CLL
 244Ø  1137                TAD      INS3           /INSTRUCTION=IAC
 2441  3ØØØ                DCA      TSTA3          /LOC,=ØØØØ
 2442  1137                TAD      INS3           /INSTRUCTION=IAC
 2443  3ØØ1                DCA      TSTA4          /LOC,=ØØØ1
 2444  114Ø           TAD     INS4           /INSTRUCTION=JMP I ,+2
 2445  3ØØ2           DCA     TSTA5          /LOC,=ØØØ2
 2446  1327           TAD     AD8            /ADDRESS=RET8
 2447  3ØØ4           DCA     TSTA7          /LOC,=ØØØ4
                      /
                      /
                      /
 245Ø  73ØØ  FCL8,    CLA CLL
 2451  1146           TAD     INS1Ø          /INSTRUCTION=JMS ,+1
 2452  3472           DCA I   XSTA2          /LOC,=7777
 2453  724Ø           CLA CMA
 2454  5472           JMP I   XSTA2
 2455  7ØØØ  RET8,    NOP
 2456  7ØØØ           NOP
                      /
                      /
                      /
 2457  743Ø           SZL
 246Ø  744Ø           SZA
 2461  4465           JMS I   XDATER
 2462  741Ø           SKP
 2463  4466           JMS I   XHALT2
 2464  4467           JMS I   XLOOP
 2465  525Ø           JMP     FCL8
 2466  72ØØ           CLA
 2467  1132           TAD     SEQ9
 247Ø  3154           DCA     SEQ
 2471  5554           JMP I   SEQ


                      /
                      /
                      /FALSE CARRY TEST #9
                      /
 2472  73ØØ  FCT9,    CLA CLL
                      /
                      /
                      /
 2473  734Ø  FCS9,    CLA CLL CMA            /DATA=7777
 2474  3471           DCA I   XSTA1          /LOC,=7776
 2475  1137           TAD     INS3           /INSTRUCTION=IAC
 2476  3ØØØ           DCA     TSTA3          /LOC,=ØØØØ
 2477  1141           TAD     INS5           /INSTRUCTION=JMP I ,+1
 25ØØ  3ØØ1           DCA     TSTA4          /LOC,=ØØØ1
 25Ø1  133Ø           TAD     AD9            /ADDRESS=RET9
 25Ø2  3ØØ2           DCA     TSTA5          /LOC,=ØØØ2
                      /
                      /
                      /
                      /
 25Ø3  73ØØ  FCL9,    CLA CLL
 25Ø4  1147           TAD     INS11          /INSTRUCTION=JMS I ,-1
 25Ø5  3472           DCA I   XSTA2
 25Ø6  724Ø           CLA CMA
 25Ø7  5472           JMP I   XSTA2
```

```
  251Ø  7ØØØ     RET9,    NOP
  2511  7ØØØ              NOP
  2512  4464              JMS I    XAVREG
                          /
                          /
                          /
  2513  743Ø              SZL
  2514  744Ø              SZA
  2515  4465              JMS I    XDATER
  2516  741Ø              SKP
  2517  4466              JMS I    XHALT2
  252Ø  4467              JMS I    XLOOP
  2521  53Ø3              JMP      FCL9
  2522  72ØØ              CLA
  2523  1133              TAD      SEQ1Ø
  2524  3154              DCA      SEQ
  2525  5554              JMP I    SEQ
  2526  242Ø     AD7,     RET7
  2527  2455     AD8,     RET8
  253Ø  251Ø     AD9,     RET9


        26ØØ     PAGE
                          /
                          /
                          /
                          /FALSE CARRY TEST #1Ø
                          /
  26ØØ  73ØØ     FCT1Ø,   CLA CLL
                          /
                          /
                          /
  26Ø1  73ØØ     FCS1Ø,   CLA CLL
  26Ø2  115Ø              TAD      INS12           /INSTRUCTION=JMS I TSTIND
  26Ø3  3472              DCA I    XSTA2           /LOC,=7777
  26Ø4  1137              TAD      INS3            /INSTRUCTION=IAC
  26Ø5  3ØØ1              DCA      TSTA4           /LOC,=ØØØ1

  26Ø6  1151              TAD      INS13           /INSTRUCTION=JMP I ,+1
  26Ø7  3ØØ2              DCA      TSTA5           /LOC,=ØØØ2
  261Ø  1315              TAD      AD1Ø            /ADDRESS=RET1Ø
  2611  3ØØ3              DCA      TSTA6           /LOC,=ØØØ3
                          /
                          /
                          /
  2612  734Ø     FCL1Ø,   CLA CLL CMA
  2613  3Ø1Ø              DCA      TSTIND
  2614  7Ø4Ø              CMA
  2615  5472              JMP I    XSTA2
  2616  7ØØØ     RET1Ø,   NOP
  2617  7ØØØ              NOP
  262Ø  4464              JMS I    XAVREG
                          /
                          /
                          /
 2621  743Ø               SZL
 2622  744Ø               SZA
 2623  4465               JMS I    XDATER
 2624  741Ø               SKP
 2625  4466               JMS I    XHALT2
 2626  4467               JMS I    XLOOP
 2627  5212               JMP      FCL1Ø
 263Ø  72ØØ               CLA
 2631  1134               TAD      SEQ11
 2632  3154               DCA      SEQ
 2633  5554               JMP I    SEQ


                          /
                          /
                          /FALSE CARRY TEST #11
                          /
 2634  73ØØ      FCT11,   CLA CLL
                          /
                          /
                          /
 2635  73ØØ      FCS11,   CLA CLL
 2636  1137               TAD      INS3            /INSTRUCTION=IAC
 2637  3ØØØ               DCA      TSTA3           /LOC,=ØØØØ
 264Ø  1141               TAD      INS5            /INSTRUCTION=JMP I ,+1
 2641  3ØØ1               DCA      TSTA4           /ADDRESS=ØØØ1
 2642  1316               TAD      AD11            /ADDRESS=RET11
 2643  3ØØ2               DCA      TSTA5           /LOC,=ØØØ2
                          /
                          /
                          /
 2644  73ØØ      FCL11,   CLA CLL
 2645  1153               TAD      INS15           /INSTRUCTION=JMS ,
 2646  3472               DCA I    XSTA2           /LOC,=7777
 2647  724Ø               CLA CMA
 265Ø  5472               JMP I    XSTA2
 2651  7ØØØ      RET11,   NOP
 2652  7ØØØ               NOP
 2653  4464               JMS I    XAVREG
                          /
                          /
                          /
 2654  743Ø               SZL
 2655  744Ø               SZA
 2656  4465               JMS I    XDATER
 2657  741Ø               SKP
 266Ø  4466               JMS I    XHALT2
 2661  4467               JMS I    XLOOP
 2662  5244               JMP      FCL11
 2663  72ØØ               CLA
 2664  1135               TAD      SEQ12
 2665  3154               DCA      SEQ
 2666  5554               JMP I    SEQ
```

```
                        /
                        /
                        /FALSE CARRY TEST #12
                        /
 2667  73ØØ     FCT12,  CLA CLL
                        /
                        /
                        /
 267Ø  73ØØ     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  3ØØØ             DCA     TSTA3           /LOC,=ØØØØ
 2675  1317             TAD     AD12            /ADDRESS=RET12
 2676  3ØØ1             DCA     TSTA4           /LOC,=ØØØ1
                        /
                        /
                        /
                        /
 2677  734Ø     FCL12,  CLA CLL CMA
 27ØØ  5472             JMP I   XSTA2
 27Ø1  7ØØØ     RET12,  NOP
 27Ø2  7ØØØ             NOP
 27Ø3  4464             JMS I   XAVREG
                        /
                        /
                        /
 27Ø4  743Ø             SZL
 27Ø5  744Ø             SZA
 27Ø6  4465             JMS I   XDATER
 27Ø7  741Ø             SKP
 271Ø  4466             JMS I   XHALT2
 2711  4467             JMS I   XLOOP
 2712  5277             JMP     FCL12
 2713  5714             JMP I   .+1
 2714  32ØØ             ENDFCT
 2715  2616     AD1Ø,   RET1Ø
 2716  2651     AD11,   RET11
 2717  27Ø1     AD12,   RET12


       3ØØØ     PAGE
                        /(TAPE 3)
                        /COMPARE TWO NUMBERS; W1•NOT(W2)•W2•NOT(W1)=Ø, W1=W2
                        /
 3ØØØ  ØØØØ     SAMEAS, Ø
 3ØØ1  734Ø             CLA CLL CMA
 3ØØ2  ØØ4Ø             AND     W2
 3ØØ3  7Ø4Ø             CMA
 3ØØ4  ØØ37             AND     W1
 3ØØ5  764Ø             SZA CLA                 /W1•NOT(W2)=Ø
 3ØØ6  56ØØ             JMP I   SAMEAS          /W1•NOT(W2)NOT Ø, ERROR
```

```
  3ØØ7  7Ø4Ø             CMA
  3Ø1Ø  ØØ37             AND     W1
  3Ø11  7Ø4Ø             CMA
  3Ø12  ØØ4Ø             AND     W2
  3Ø13  764Ø             SZA CLA                 /W2♦NOT(W1)=Ø
  3Ø14  56ØØ             JMP I   SAMEAS          /W2♦NOT(W1) NOT Ø, ERROR
  3Ø15  22ØØ             ISZ     SAMEAS
  3Ø16  56ØØ             JMP I   SAMEAS          /W1=W2
                         /
                         /SAVE AC AND LINK
                         /
  3Ø17  ØØØØ    SAVREG,  Ø
  3Ø2Ø  3Ø25             DCA     TEMPAC
  3Ø21  743Ø             SZL
  3Ø22  7Ø4Ø             CMA
  3Ø23  3Ø26             DCA     TEMPL
  3Ø24  7Ø4Ø             CMA
  3Ø25  ØØ25             AND     TEMPAC
  3Ø26  5617             JMP I   SAVREG
                         /
                         /HALT ON ERROR,  DISPLAY ADDRESS OF FAILED TEST IN AC
                         /
  3Ø27  ØØØØ    HALT2,   Ø
  3Ø3Ø  76Ø4             LAS
  3Ø31  Ø1Ø3             AND     SRØØ            /TEST SRØØ
  3Ø32  764Ø             SZA CLA                 /SUPPRESS HALT IF SRØØ=1
  3Ø33  5627             JMP I   HALT2
  3Ø34  1154             TAD     SEQ             /PUT ADDRESS OF FAILED TEST IN
  3Ø35  74Ø2             HLT                     /AC AND STOP
  3Ø36  5627             JMP I   HALT2           /CONTINUE TESTING


                         /
                         /
                         /DATA ERROR HAS OCCURED
                         /
  3Ø37  ØØØØ    DATER,   Ø
  3Ø4Ø  76Ø4             LAS
  3Ø41  Ø1Ø4             AND     SRØ1                    /TEST SRØ1
  3Ø42  745Ø             SNA                     /SUPPRESS ERROR TYPE IF SRØ1=1
  3Ø43  4256             JMS     TYPS2           /SET UP FOR ERROR TYPE
  3Ø44  2237             ISZ     DATER
  3Ø45  5637             JMP I   DATER
                         /
                         /
                         /
                         /
                         /
                         /LOOP ON DATA ERROR
                         /
  3Ø46  ØØØØ    LOOP,    Ø
  3Ø47  76Ø4             LAS
  3Ø5Ø  Ø1Ø5             AND     SRØ2                    /TEST SRØ2
  3Ø51  765Ø             SNA CLA                 /LOOP IF SRØ2=1
  3Ø52  5254             JMP     NLOOP           /DO NOT LOOP
```

```
 3Ø53  5646            JMP I   LOOP
 3Ø54  2246   NLOOP,   ISZ     LOOP
 3Ø55  5646            JMP I   LOOP

                       /
                       /TYPE DATA ERROR MESSAGE
                       /
 3Ø56  ØØØØ   TYPS2,   Ø
 3Ø57  4446            JMS I   XPRINT
 3Ø6Ø  5744            DATE-1                  /TYPE "DATA ERROR"
 3Ø61  1Ø37            TAD     W1
 3Ø62  4673            JMS I   XADOUT          /TYPE TEST ADDRESS
 3Ø63  734Ø            CLA CLL CMA
 3Ø64  ØØ25            AND     TEMPAC
 3Ø65  3Ø37            DCA     WD1
 3Ø66  ØØ26            AND     TEMPL
 3Ø67  3Ø4Ø            DCA     WD2
 3Ø7Ø  446Ø            JMS I   XLNKOU          /OUTPUT RECEIVED LINK
 3Ø71  4461            JMS I   XWDOUT          /OUTPUT RECEIVED AC
 3Ø72  5656            JMP I   TYPS2
 3Ø73  3227   XADOUT,  ADOUT
                       /
                       /END OF PASS
                       /
       32ØØ   PAGE
 32ØØ  73ØØ   ENDFCT,  CLA CLL
 32Ø1  2Ø2Ø            ISZ     CNTR1           /INCREMENT PASS COUNT
 32Ø2  5224            JMP     OUT             /PASS NOT COMPLETE
 32Ø3  76Ø4            LAS
 32Ø4  Ø115            AND     SR1Ø            /TEST SR1Ø
 32Ø5  765Ø            SNA CLA                 /IS SR1Ø=1
 32Ø6  5221            JMP     FCTOK           /NO, TYPE FCT
 32Ø7  76Ø4   FCTHLT,  LAS
 321Ø  Ø114            AND     SRØ9            /TEST SRØ9
 3211  764Ø            SZA CLA                 /IS SRØ9=1
 3212  74Ø2            HLT                     /YES, HALT
 3213  76Ø4            LAS
 3214  Ø116            AND     SR11            /TEST SR11
 3215  764Ø            SZA CLA                 /IS SR11=1
 3216  5224            JMP     OUT             /YES, LOOP ON FCT
 3217  562Ø            JMP I   ,+1             /NO, GO TO NEXT TEST
 322Ø  34ØØ            RNAD1
 3221  4446   FCTOK,   JMS I   XPRINT
 3222  5732            OK3-1
 3223  52Ø7            JMP     FCTHLT
 3224  1122   OUT,     TAD     SEQ1
 3225  3154            DCA     SEQ
 3226  5554            JMP I   SEQ


                       /
                       /
                       /CONVERT ADDRESS TO ASCII AND OUTPUT
                       /
 3227  ØØØØ   ADOUT,   Ø
 323Ø  3Ø37              DCA     TEMP1
 3231  1Ø37              TAD     TEMP1
 3232  Ø172              AND     KØØØ7
 3233  3264              DCA     A2
 3234  1Ø37              TAD     TEMP1
 3235  7ØØ6              RTL
 3236  7ØØ4              RAL
 3237  Ø266              AND     KØ7ØØ
 324Ø  1264              TAD     A2
 3241  1267              TAD     K6Ø6Ø
 3242  3264              DCA     A2
 3243  1Ø37              TAD     TEMP1
 3244  7Ø12              RTR
 3245  7Ø12              RTR
 3246  7Ø12              RTR
 3247  Ø172              AND     KØØØ7
 325Ø  3263              DCA     A1
 3251  1Ø37              TAD     TEMP1
 3252  7Ø12              RTR
 3253  7Ø1Ø              RAR
 3254  Ø266              AND     KØ7ØØ
 3255  1263              TAD     A1
 3256  1267              TAD     K6Ø6Ø
 3257  3263              DCA     A1
 326Ø  4446              JMS I   XPRINT
 3261  3262              A1-1
 3262  5627              JMP I   ADOUT
 3263  ØØØØ    A1,       Ø
 3264  ØØØØ    A2,       Ø
 3265  4ØØØ              4ØØØ
 3266  Ø7ØØ    KØ7ØØ,    Ø7ØØ
 3267  6Ø6Ø    K6Ø6Ø,    6Ø6Ø

                         /MULTIPLE ADDITIONS OF RANDOM NUMBER AND ITS TWO'S COMPLEMENT
       34ØØ    PAGE
 34ØØ  73ØØ    RNAD1,    CLA CLL
 34Ø1  4473              JMS I   XRAND           /GENERATE RANDOM NUMBERS
 34Ø2  73ØØ              CLA CLL
 34Ø3  1Ø41              TAD     RANDA
 34Ø4  1Ø43              TAD     RANDC           /AC=Ø
 34Ø5  1Ø43              TAD     RANDC
 34Ø6  1Ø41              TAD     RANDA           /AC=Ø
 34Ø7  1Ø41              TAD     RANDA
 341Ø  1Ø41              TAD     RANDA
 3411  1Ø43              TAD     RANDC
 3412  1Ø43              TAD     RANDC           /AC=Ø
 3413  1Ø41              TAD     RANDA
 3414  1Ø41              TAD     RANDA
 3415  1Ø43              TAD     RANDC
 3416  1Ø41              TAD     RANDA
 3417  1Ø43              TAD     RANDC
 342Ø  1Ø43              TAD     RANDC           /AC=Ø
 3421  1Ø41              TAD     RANDA
 3422  1Ø41              TAD     RANDA
 3423  1Ø43              TAD     RANDC
 3424  1043              TAD     RANDC            /AC=Ø
 3425  1043              TAD     RANDC
 3426  1041              TAD     RANDA
 3427  1043              TAD     RANDC
 3430  1041              TAD     RANDA            /AC=Ø
 3431  1041              TAD     RANDA
 3432  1041              TAD     RANDA
 3433  1043              TAD     RANDC
 3434  1043              TAD     RANDC            /AC=Ø
 3435  7000              NOP
 3436  4464              JMS I   XAVREG           /SAVE AC AND LINK
 3437  7430              SZL                      /IS LINK=1, AND AC=Ø
 3440  7440              SZA
 3441  4646              JMS I   XRN1ER           /ERROR, AC NOT Ø, 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  ØØØØ     RN1ER,   Ø
 345Ø  7604              LAS
 3451  Ø104              AND     SRØ1             /TEST SRØ1
 3452  7640              SZA CLA                  /IS SRØ1=1
 3453  5302              JMP     SKHLT            /YES, SUPPRESS ERROR TYPEOUT
 3454  4446              JMS I   XPRINT           /TYPE "RANDOM ADD TEST1 FAILED"
 3455  5565              EM1Ø-1
 3456  4446              JMS I   XPRINT           /TYPE "RANDA, RANDC, RESULT"
 3457  5316              DH4-1
 346Ø  734Ø              CLA CLL CMA
 3461  ØØ41              AND     RANDA
 3462  3037              DCA     WD1
 3463  4461              JMS I   XWDOUT           /OUTPUT RANDA
 3464  734Ø              CLA CLL CMA
 3465  ØØ43              AND     RANDC
 3466  3037              DCA     WD1
 3467  4461              JMS I   XWDOUT           /OUTPUT RANDC
 347Ø  734Ø              CLA CLL CMA
 3471  ØØ25              AND     TEMPAC
 3472  3037              DCA     WD1
 3473  7040              CMA
 3474  ØØ26              AND     TEMPL
 3475  304Ø              DCA     WD2
 3476  446Ø              JMS I   XLNKOU           /OUTPUT RESULTANT LINK
 3477  4461              JMS I   XWDOUT           /OUTPUT RESULTANT AC
 35ØØ  4446              JMS I   XPRINT
 35Ø1  5742              CRLF-1
 35Ø2  7604     SKHLT,   LAS
 35Ø3  Ø103              AND     SRØØ             /TEST SRØØ
 35Ø4  764Ø              SZA CLA                  /IS SRØØ=1
 3505  5647              JMP I   RN1ER           /YES, SUPPRESS ERROR HALT
 3506  73ØØ              CLA CLL
 35Ø7  1247              TAD     RN1ER
 351Ø  74Ø2              HLT                     /HALT WITH ADDRESS OF RNAD1 IN AC
 3511  5647              JMP I   RN1ER


                         /
                         /RANDOM NUMBER GENERATOR
                         /
 3512  ØØØØ      RANDOM, Ø
 3513  73ØØ              CLA CLL
 3514  1Ø41              TAD     RANDA
 3515  7ØØ4              RAL
 3516  743Ø              SZL
 3517  1342              TAD     KØØØ3
 352Ø  3Ø41              DCA     RANDA
 3521  1Ø41              TAD     RANDA
 3522  7Ø41              CIA
 3523  3Ø43              DCA     RANDC
 3524  71ØØ              CLL
 3525  1341              TAD     R2A
 3526  7ØØ4              RAL
 3527  743Ø              SZL
 353Ø  1342              TAD     KØØØ3
 3531  3341              DCA     R2A
 3532  743Ø              SZL
 3533  7Ø4Ø              CMA
 3534  3Ø44              DCA     LINKR
 3535  1Ø44              TAD     LINKR
 3536  7Ø4Ø              CMA
 3537  3Ø45              DCA     LINKRC
 354Ø  5712              JMP I   RANDOM
 3541  ØØØ1      R2A,    1
 3542  ØØØ3      KØØØ3,  3


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

       36ØØ      PAGE
 36ØØ  734Ø      RNAD2,  CLA CLL CMA
 36Ø1  ØØ41              AND     RANDA           /GET RANDOM NUMBER
 36Ø2  3346              DCA     APOS            /STORE IT
 36Ø3  7Ø4Ø              CMA
 36Ø4  ØØ41              AND     RANDA
 36Ø5  7Ø4Ø              CMA
 36Ø6  3347              DCA     ANEG            /ONE'S COMPLIMENT OF RANDOM NUMBER
 36Ø7  7Ø4Ø              CMA
 361Ø  Ø1Ø3              AND     K4ØØØ           /GET MASK
 3611  3352              DCA     MASK
 3612  7Ø4Ø   NXTBT,  CMA
 3613  Ø352           AND      MASK
 3614  7Ø4Ø           CMA
 3615  3353           DCA      NMASK          /COMPLIMENT MASK
 3616  7Ø4Ø   ALT1BT, CMA
 3617  Ø346           AND      APOS           /GET RANDOM NUMBER
 362Ø  Ø352           AND      MASK           /TEST SIGN BIT
 3621  744Ø           SZA                     /IS NUMBER NEGATIVE
 3622  5232           JMP      MODNEG         /YES, MODIFY COMPLIMENT OF NUMBER
 3623  7Ø4Ø           CMA
 3624  Ø346           AND      APOS           /GET RANDOM NUMBER
 3625  43Ø1           JMS      XOR1           /MODIFY WITH MASK
 3626  7Ø4Ø           CMA
 3627  Ø347           AND      ANEG           /GET COMPLIMENT OF RANDOM NUMBER
 363Ø  3351           DCA      BNEG           /AND USE AS IS
 3631  524Ø           JMP      CBTST1
 3632  724Ø   MODNEG, CMA CLA                 /MODIFY NEGATIVE NUMBER
 3633  Ø347           AND      ANEG           /GET COMPLEMENT OF RANDOM NUMBER
 3634  4315           JMS      XOR2           /MODIFY WITH MASK
 3635  7Ø4Ø           CMA
 3636  Ø346           AND      APOS           /GET RANDOM NUMBER
 3637  3351           DCA      BNEG           /AND USE AS IS
 364Ø  734Ø   CBTST1, CLA CLL CMA
 3641  Ø35Ø           AND      BPOS           /LOAD AC WITH MODIFIED ARGUMENT
 3642  1351           TAD      BNEG           /ADD UNMODIFIED ARGUMENT
 3643  743Ø           SZL                     /DID CARRY PROPIGATE INTO LINK
 3644  7ØØ1           IAC                     /NO, INCREMENT NUMBER
 3645  4464           JMS I    XAVREG         /SAVE AC
 3646  4463           JMS I    XAMEA          /COMPARE MODIFIED BIT AND MASK
 3647  741Ø           SKP
 365Ø  4756           JMS I    XRN2ER         /AC AND MASK DIFFERENT, ERROR
 3651  4467           JMS I    NERROP         /NO ERROR, AC AND MASK THE SAME
 3652  524Ø           JMP      CBTST1         /RETURN HERE FOR LOOPING
 3653  5254           JMP      CBTST2


 3654  734Ø   CBTST2, CLL CLA CMA
 3655  Ø351           AND      BNEG           /LOAD AC WITH UNMODIFIED ARGUMENT
 3656  135Ø           TAD      BPOS           /ADD MODIFIED ARGUMENT
 3657  743Ø           SZL                     /DID CARRY PROPIGATE INTO LINK
 366Ø  7ØØ1           IAC                     /NO, INCREMENT NUMBER
 3661  4464           JMS I    XAVREG         /SAVE AC
 3662  4463           JMS I    XAMEA          /COMPARE AC AND MASK
 3663  741Ø           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  734Ø   MOVMSK, CLA CLL CMA
 367Ø  Ø352           AND      MASK
 3671  7Ø1Ø           RAR
 3672  3352           DCA      MASK
 3673  742Ø           SNL                     /HAVE ALL BITS BEEN TESTED
 3674  5212           JMP      NXTBT          /NO, CONTINUE
 3675  4467           JMS I    NERROP         /YES, TEST FOR LOOP ON RNAD2
```

```
   3676  52ØØ             JMP     RNAD2
   3677  57ØØ             JMP I   .+1
   37ØØ  42ØØ             RARR
   37Ø1  ØØØØ   XOR1,     Ø
   37Ø2  Ø353             AND     NMASK
   37Ø3  7Ø4Ø             CMA
   37Ø4  3354             DCA     ABNOT
   37Ø5  7Ø4Ø             CMA
   37Ø6  Ø347             AND     ANEG
   37Ø7  Ø352             AND     MASK
   371Ø  7Ø4Ø             CMA
   3711  Ø354             AND     ABNOT
   3712  7Ø4Ø             CMA
   3713  335Ø             DCA     BPOS
   3714  57Ø1             JMP I   XOR1
   3715  ØØØØ   XOR2,     Ø
   3716  Ø352             AND     MASK
   3717  7Ø4Ø             CMA
   372Ø  3354             DCA     ABNOT
   3721  7Ø4Ø             CMA
   3722  Ø346             AND     APOS
   3723  Ø353             AND     NMASK
   3724  7Ø4Ø             CMA
   3725  Ø354             AND     ABNOT
   3726  335Ø             DCA     BPOS
   3727  5715             JMP I   XOR2


   373Ø  ØØØØ   SAMEA,    Ø
   3731  7Ø4Ø             CMA
   3732  3355             DCA     NOTAC
   3733  7Ø4Ø             CMA
   3734  ØØ25             AND     TEMPAC
   3735  Ø353             AND     NMASK
   3736  744Ø             SZA
   3737  5344             JMP     EROUT1
   374Ø  7Ø4Ø             CMA
   3741  Ø352             AND     MASK
   3742  Ø355             AND     NOTAC
   3743  744Ø             SZA
   3744  233Ø   EROUT1,   ISZ     SAMEA
   3745  573Ø             JMP I   SAMEA
   3746  ØØØØ   APOS,     Ø
   3747  ØØØØ   ANEG,     Ø
   375Ø  ØØØØ   BPOS,     Ø
   3751  ØØØØ   BNEG,     Ø
   3752  ØØØØ   MASK,     Ø
   3753  ØØØØ   NMASK,    Ø
   3754  ØØØØ   ABNOT,    Ø
   3755  ØØØØ   NOTAC,    Ø
   3756  4ØØØ   XRN2ER,   RN2ER
```

```
        4ØØØ    PAGE
                /
                /ERROR HANDLER FOR RANDOM ADD TEST 2,
                /
4ØØØ    ØØØØ    RN2ER,  Ø
4ØØ1    76Ø4            LAS
4ØØ2    Ø1Ø4            AND     SRØ1            /TEST SRØ1
4ØØ3    764Ø            SZA CLA                 /IS SRØ1 = 1
4ØØ4    5233            JMP     SHLT            /YES SUPPRESS ERROR TYPEOUT
4ØØ5    4446            JMS I   XPRINT          /NO, TYPE "RANDOM ADD TEST 2 FAILED"
4ØØ6    56Ø5            EM11-1
4ØØ7    4446            JMS I   XPRINT          /TYPE ARG1, ARG2, ARG1+ARG2, EXPECTED
4Ø1Ø    5364            DH6-1
4Ø11    734Ø            CLA CLL CMA
4Ø12    Ø777'           AND     BPOS            /OUTPUT ARG1
4Ø13    3Ø37            DCA     WD1
4Ø14    4461            JMS I   XWDOUT
4Ø15    7Ø4Ø            CMA
4Ø16    Ø776'           AND     BNEG            /OUTPUT ARG2
4Ø17    3Ø37            DCA     WD1
4Ø2Ø    4461            JMS I   XWDOUT
4Ø21    7Ø4Ø            CMA
4Ø22    Ø775'           AND     MASK            /OUTPUT EXPECTED RESULT
4Ø23    3Ø37            DCA     WD1
4Ø24    4461            JMS I   XWDOUT
4Ø25    7Ø4Ø            CMA
4Ø26    ØØ25            AND     TEMPAC          /OUTPUT RESULTANT AC
4Ø27    3Ø37            DCA     WD1
4Ø3Ø    4461            JMS I   XWDOUT
4Ø31    4446            JMS I   XPRINT
4Ø32    5742            CRLF-1
4Ø33    76Ø4    SHLT,   LAS
4Ø34    Ø1Ø3            AND     SRØØ            /TEST SRØØ
4Ø35    764Ø            SZA CLA                 /IS SRØØ = 1
4Ø36    56ØØ            JMP I   RN2ER           /YES, DO NOT HALT
4Ø37    73ØØ            CLA CLL                 /NO, HALT WITH ADDRESS IN AC
4Ø4Ø    12ØØ            TAD     RN2ER
4Ø41    74Ø2            HLT
4Ø42    56ØØ            JMP I   RN2ER


                        /ROTATE RANDOM NUMBER RIGHT USING RAR

4175    3752
4176    3751
4177    375Ø
        42ØØ    PAGE
42ØØ    73ØØ    RARR,   CLA CLL
42Ø1    1Ø44            TAD     LINKR           /GET LINK TO BE ROTATED
42Ø2    744Ø            SZA
42Ø3    722Ø            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 ROTA\ED 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      SRØ9              /TEST SRØ9
  4542   7640             SZA CLA                    /IS SRØ9=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 KØØ7Ø
  4552   7110             RAR CLL
  4553   7012             RTR
  4554   3175             DCA FLDSAV                 /SAVE THE SWITCHES
  4555   7604             LAS
  4556   0107             AND SRØ4                   /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 Ø
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 KØØØ2
4625  3226            DCA .+1
4626  ØØØØ            ØØØØ                    /MODIFIED FOR NEW FIELD
4627  5630    FLDEX,  JMP I .+1
4630  Ø2ØØ            RSIMAD                  /START POINTER
              /
              /ROUTINE TO DETERMINE NUMBER OF BANKS OF MEM.
              /
4631  ØØØØ    FLDFND, Ø
4632  73ØØ            CLA CLL
4633  3174            DCA FLDNUM
4634  1371            TAD KSTOP
4635  3176            DCA FLDCNT              /JUST A COUNTER
4636  62Ø1            CDF     Ø               /TO FIELD Ø
4637  3571            DCA I KØ
464Ø  1372            TAD KCDF
4641  1113            TAD KØØ1Ø
4642  3243            DCA FLDDF
4643  ØØØØ    FLDDF,  Ø                       /MODIFIED BY TEST
4644  734Ø            CLA CLL CMA
4645  3571            DCA I KØ                /TRY EXTENDED FIELD
4646  1571            TAD I KØ
```

```
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     Ø               /BACK TO FIELD Ø
4657 1571           TAD I KØ
4660 7650           SNA CLA                 /DID FIELD Ø CHANGE
4661 5631           JMP I FLDFND            /FIELD Ø O.K, EXIT
4662 7602           HLT CLA                 /FIELD ERROR
4663 5232           JMP FLDFND +1           /TRY AGAIN
                /
                /ROUTINE TO MOVE PROGRAM TO NEXT FIELD OR FIELD Ø
                /
4664 ØØØØ       RELOC,  Ø
4665 7300           CLA CLL
4666 3176           DCA FLDCNT
4667 6224           RIF                     /GET CURRENT FIELD
4670 1113           TAD KØØ1Ø               /UPDATE TO NEXT FIELD
4671 Ø375           AND KØ17Ø               /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 Ø
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 ØØØØ       FLDFRM, ØØØØ                /MODIFIED TO CURRENT FIELD
4713 1576           TAD I FLDCNT            /GET DATA WORD
4714 ØØØØ       FLDGO,  ØØØØ
4715 3576           DCA I FLDCNT            /STORE DATA
4716 1576           TAD I FLDCNT
4717 ØØØØ       FLDRM1, ØØØØ
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 ØØØØ       ASTRK,  Ø
```

```
 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
 474Ø  5731            JMP I ASTRK
               /
 4741  ØØØØ    LFCR,   Ø
 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
 475Ø  5343            JMP .-5
 4751  5741            JMP I LFCR
               /
 4752  ØØØØ    FLDNO,  Ø
 4753  1174            TAD FLDNUM
 4754  Ø172            AND KØØØ7
 4755  1Ø77            TAD K26Ø
 4756  4447            JMS I XTYPE
 4757  5752            JMP I FLDNO
               /
 476Ø  ØØØØ    FLDHR,  Ø
 4761  1314            TAD FLDGO
 4762  Ø173            AND KØØ7Ø
 4763  7Ø1Ø            RAR
 4764  7Ø12            RTR
 4765  1Ø77            TAD K26Ø
 4766  4447            JMS I XTYPE
 4767  576Ø            JMP I FLDHR
               /
 477Ø  455Ø    XFLDSW, FLDSW
 4771  7771    KSTOP,  7771
 4772  62Ø1    KCDF,   62Ø1
 4773  Ø212    KLF,    Ø212
 4774  Ø215    KCR,    Ø215
 4775  Ø17Ø    KØ17Ø,  Ø17Ø
 4776  Ø252    K252,   Ø252
               /
       5ØØØ    PAGE
               /
 5ØØØ  ØØØØ    RARER,  Ø
 5ØØ1  76Ø4            LAS
 5ØØ2  Ø1Ø4            AND     SRØ1
 5ØØ3  764Ø            SZA CLA
 5ØØ4  521Ø            JMP     .+4
 5ØØ5  4446            JMS I   XPRINT
 5ØØ6  5625            EM12-1
 5ØØ7  4264            JMS     ROPRT
 5Ø1Ø  73ØØ            CLA CLL
 5Ø11  12ØØ            TAD     RARER
 5Ø12  5253            JMP     ROHLT
```

```
5Ø13  ØØØØ     RALER,  Ø
5Ø14  76Ø4             LAS
5Ø15  Ø1Ø4             AND     SRØ1
5Ø16  764Ø             SZA CLA
5Ø17  5223             JMP     .+4
5Ø2Ø  4446             JMS I   XPRINT
5Ø21  5644             EM13-1
5Ø22  4264             JMS     ROPRT
5Ø23  73ØØ             CLA CLL
5Ø24  1213             TAD     RALER
5Ø25  5253             JMP     ROHLT
5Ø26  ØØØØ     RTRER,  Ø
5Ø27  76Ø4             LAS
5Ø3Ø  Ø1Ø4             AND     SRØ1
5Ø31  764Ø             SZA CLA
5Ø32  5236             JMP     .+4
5Ø33  4446             JMS I   XPRINT
5Ø34  5663             EM14-1
5Ø35  4264             JMS     ROPRT
5Ø36  73ØØ             CLA CLL
5Ø37  1226             TAD     RTRER
5Ø4Ø  5253             JMP     ROHLT
5Ø41  ØØØØ     RTLER,  Ø
5Ø42  76Ø4             LAS
5Ø43  Ø1Ø4             AND     SRØ1
5Ø44  764Ø             SZA CLA
5Ø45  5251             JMP     .+4
5Ø46  4446             JMS I   XPRINT
5Ø47  57Ø2             EM15-1
5Ø5Ø  4264             JMS     ROPRT
5Ø51  73ØØ             CLA CLL
5Ø52  1241             TAD     RTLER
5Ø53  3263     ROHLT,  DCA     ROBACK
5Ø54  76Ø4             LAS
5Ø55  Ø1Ø3             AND     SRØØ
5Ø56  764Ø             SZA CLA
5Ø57  5262             JMP     .+3
5Ø6Ø  1263             TAD     ROBACK
5Ø61  74Ø2             HLT
5Ø62  5663             JMP I   ROBACK
5Ø63  ØØØØ     ROBACK, Ø


5Ø64  ØØØØ     ROPRT,  Ø
5Ø65  4446             JMS I   XPRINT
5Ø66  5347             DH5-1
5Ø67  734Ø             CLA CLL CMA
5Ø7Ø  ØØ44             AND     LINKR
5Ø71  3Ø4Ø             DCA     WD2
5Ø72  7Ø4Ø             CMA
5Ø73  ØØ41             AND     RANDA
5Ø74  3Ø37             DCA     WD1
```

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

                        /

        5200    PAGE
  5200  3736    DH1,    TEXT    /←↑    ARG1           ARG2           SIMULATED       ARG1+ARG2      ARG2+ARG1←↑/
  5201  4040
  5202  4001
  5203  2207
  5204  6140
  5205  4040
  5206  4040
  5207  4040
  5210  4040
  5211  0122
  5212  0762
  5213  4040
  5214  4040
  5215  4040
  5216  4040
  5217  4023
  5220  1115
  5221  2514
  5222  0124
  5223  0504
  5224  4040
  5225  4040
  5226  4040
  5227  4001
  5230  2207
  5231  6153
  5232  0122
  5233  0762
  5234  4040
  5235  4040
  5236  4001
  5237  2207
  5240  6253
  5241  0122
  5242  0761
  5243  3736
  5244  0000
```

```
 5245  3736     DH2,     TEXT     /←↑        ORIGINAL       SIMULATED        ACTUAL←↑/
 5246  4Ø4Ø
 5247  4Ø4Ø
 525Ø  4Ø17
 5251  2211
 5252  Ø711
 5253  16Ø1
 5254  144Ø
 5255  4Ø4Ø
 5256  4Ø4Ø
 5257  4Ø23
 526Ø  1115
 5261  2514
 5262  Ø124
 5263  Ø5Ø4
 5264  4Ø4Ø
 5265  4Ø4Ø
 5266  4Ø4Ø
 5267  4ØØ1
 527Ø  Ø324
 5271  25Ø1
 5272  1437
 5273  36ØØ
 5274  3736     DH3,     TEXT     /←↑RANDA        RANDC        RESULT←↑/
 5275  22Ø1
 5276  16Ø4
 5277  Ø14Ø
 53ØØ  4Ø4Ø
 53Ø1  4Ø4Ø
 53Ø2  4Ø4Ø
 53Ø3  4Ø22
 53Ø4  Ø116
 53Ø5  Ø4Ø3
 53Ø6  4Ø4Ø
 53Ø7  4Ø4Ø
 531Ø  4Ø4Ø
 5311  4Ø4Ø
 5312  22Ø5
 5313  2325
 5314  1424
 5315  3736
 5316  ØØØØ
 5317  3736     DH4,     TEXT     /←↑RANDA        BPOS         BNEG         RESULT←↑/
 532Ø  22Ø1
 5321  16Ø4
 5322  Ø14Ø
 5323  4Ø4Ø
 5324  4Ø4Ø
 5325  4Ø4Ø
 5326  4ØØ2
 5327  2Ø17
 533Ø  234Ø
 5331  4Ø4Ø
 5332  4Ø4Ø
 5333  4Ø4Ø
```

```
  5334  4Ø4Ø
  5335  Ø216
  5336  Ø5Ø7
  5337  4Ø4Ø
  534Ø  4Ø4Ø
  5341  4Ø4Ø
  5342  4Ø4Ø
  5343  4Ø22
  5344  Ø523
  5345  2514
  5346  2437
  5347  36ØØ
  535Ø  3736     DH5,    TEXT    /←↑ORIGINAL      ACTUAL←↑/
  5351  1722
  5352  11Ø7
  5353  1116
  5354  Ø114
  5355  4Ø4Ø
  5356  4Ø4Ø
  5357  4Ø4Ø
  536Ø  Ø1Ø3
  5361  2425
  5362  Ø114
  5363  3736
  5364  ØØØØ
  5365  3736     DH6,    TEXT    /←↑    ARG1         ARG2       EXPECTED      ACTUAL←↑/
  5366  4Ø4Ø
  5367  4Ø4Ø
  537Ø  Ø122
  5371  Ø761
  5372  4Ø4Ø
  5373  4Ø4Ø
  5374  4Ø4Ø
  5375  4Ø4Ø
  5376  4ØØ1
  5377  22Ø7
  54ØØ  624Ø
  54Ø1  4Ø4Ø
  54Ø2  4Ø4Ø
  54Ø3  4Ø4Ø
  54Ø4  Ø53Ø
  54Ø5  2ØØ5
  54Ø6  Ø324
  54Ø7  Ø5Ø4
  541Ø  4Ø4Ø
  5411  4Ø4Ø
  5412  4Ø4Ø
  5413  Ø1Ø3
  5414  2425
  5415  Ø114
  5416  3736
  5417  ØØØØ
  542Ø  3736     EM1,    TEXT    /←↑     SIMULATED ADD TEST FAILED/
  5421  4Ø4Ø
  5422  4Ø4Ø
```

```
 5423  4Ø23
 5424  1115
 5425  2514
 5426  Ø124
 5427  Ø5Ø4
 543Ø  4ØØ1
 5431  Ø4Ø4
 5432  4Ø24
 5433  Ø523
 5434  244Ø
 5435  Ø6Ø1
 5436  1114
 5437  Ø5Ø4
 544Ø  ØØØØ
 5441  3736   EM2,    TEXT    /-↑     SIMULATED RAL TEST FAILED/
 5442  4Ø4Ø
 5443  4Ø4Ø
 5444  4Ø23
 5445  1115
 5446  2514
 5447  Ø124
 545Ø  Ø5Ø4
 5451  4Ø22
 5452  Ø114
 5453  4Ø24
 5454  Ø523
 5455  244Ø
 5456  Ø6Ø1
 5457  1114
 546Ø  Ø5Ø4
 5461  ØØØØ
 5462  3736   EM3,    TEXT    /-↑     SIMULATED RAR TEST FAILED/
 5463  4Ø4Ø
 5464  4Ø4Ø
 5465  4Ø23
 5466  1115
 5467  2514
 547Ø  Ø124
 5471  Ø5Ø4
 5472  4Ø22
 5473  Ø122
 5474  4Ø24
 5475  Ø523
 5476  244Ø
 5477  Ø6Ø1
 55ØØ  1114
 55Ø1  Ø5Ø4
 55Ø2  ØØØØ
 55Ø3  3736   EM4,    TEXT    /-↑     SIMULATED RTL TEST FAILED/
 55Ø4  4Ø4Ø
 55Ø5  4Ø4Ø
 55Ø6  4Ø23
 55Ø7  1115
 551Ø  2514
 5511  Ø124
```

```
  5512  Ø5Ø4
  5513  4Ø22
  5514  2414
  5515  4Ø24
  5516  Ø523
  5517  244Ø
  552Ø  Ø6Ø1
  5521  1114
  5522  Ø5Ø4
  5523  ØØØØ
  5524  3736     EM5,     TEXT     /←↑      SIMULATED RTR TEST FAILED/
  5525  4Ø4Ø
  5526  4Ø4Ø
  5527  4Ø23
  553Ø  1115
  5531  2514
  5532  Ø124
  5533  Ø5Ø4
  5534  4Ø22
  5535  2422
  5536  4Ø24
  5537  Ø523
  554Ø  244Ø
  5541  Ø6Ø1
  5542  1114
  5543  Ø5Ø4
  5544  ØØØØ
  5545  3736     EM6,     TEXT     /←↑      SIMULATED BSW TEST FAILED/
  5546  4Ø4Ø
  5547  4Ø4Ø
  555Ø  4Ø23
  5551  1115
  5552  2514
  5553  Ø124
  5554  Ø5Ø4
  5555  4ØØ2
  5556  2327
  5557  4Ø24
  556Ø  Ø523
  5561  244Ø
  5562  Ø6Ø1
  5563  1114
  5564  Ø5Ø4
  5565  ØØØØ
  5566  3736     EM1Ø,    TEXT     /←↑      RANDOM ADD TEST 1 FAILED/
  5567  4Ø4Ø
  557Ø  4Ø4Ø
  5571  4Ø22
  5572  Ø116
  5573  Ø417
  5574  154Ø
  5575  Ø1Ø4
  5576  Ø44Ø
  5577  24Ø5
  56ØØ  2324
  5601  4061
  5602  4006
  5603  0111
  5604  1405
  5605  0400
  5606  3736    EM11,   TEXT    /←↑     RANDOM ADD TEST 2 FAILED/
  5607  4040
  5610  4040
  5611  4022
  5612  0116
  5613  0417
  5614  1540
  5615  0104
  5616  0440
  5617  2405
  5620  2324
  5621  4062
  5622  4006
  5623  0111
  5624  1405
  5625  0400
  5626  3736    EM12,   TEXT    /←↑     RANDOM RAR TEST FAILED/
  5627  4040
  5630  4040
  5631  4022
  5632  0116
  5633  0417
  5634  1540
  5635  2201
  5636  2240
  5637  2405
  5640  2324
  5641  4006
  5642  0111
  5643  1405
  5644  0400
  5645  3736    EM13,   TEXT    /←↑     RANDOM RAL TEST FAILED/
  5646  4040
  5647  4040
  5650  4022
  5651  0116
  5652  0417
  5653  1540
  5654  2201
  5655  1440
  5656  2405
  5657  2324
  5660  4006
  5661  0111
  5662  1405
  5663  0400
  5664  3736    EM14,   TEXT    /←↑     RANDOM RTL TEST FAILED/
  5665  4040
  5666  4040
  5667  4022
```

```
 5670  Ø116
 5671  Ø417
 5672  154Ø
 5673  2224
 5674  144Ø
 5675  24Ø5
 5676  2324
 5677  4ØØ6
 57ØØ  Ø111
 57Ø1  14Ø5
 57Ø2  Ø4ØØ
 57Ø3  3736     EM15,   TEXT    /←↑     RANDOM RTR TEST FAILED/
 57Ø4  4Ø4Ø
 57Ø5  4Ø4Ø
 57Ø6  4Ø22
 57Ø7  Ø116
 571Ø  Ø417
 5711  154Ø
 5712  2224
 5713  224Ø
 5714  24Ø5
 5715  2324
 5716  4ØØ6
 5717  Ø111
 572Ø  14Ø5
 5721  Ø4ØØ
 5722  3736     OK1,    TEXT    /←↑SIMAD/
 5723  2311
 5724  15Ø1
 5725  Ø4ØØ
 5726  3736     OK2,    TEXT    /←↑SIMROT/
 5727  2311
 573Ø  1522
 5731  1724
 5732  ØØØØ
 5733  3736     OK3,    TEXT    /←↑FCT/
 5734  Ø6Ø3
 5735  24ØØ
 5736  3736     OK4,    TEXT    /←↑RANDOM/
 5737  22Ø1
 574Ø  16Ø4
 5741  1715
 5742  ØØØØ
 5743  3736     CRLF,   TEXT    /←↑/
 5744  ØØØØ
 5745  3736     DATE,   TEXT    /←↑ DATA ERROR←↑/
 5746  4ØØ4
 5747  Ø124
 575Ø  Ø14Ø
 5751  Ø522
 5752  2217
 5753  2237
 5754  36ØØ

 5755  7777     BKMES,  7777            /TEXT FOR EXTENDED BANKS OF MEMORY TO BANK
```

```
  5756  4ØØ5            4ØØ5
  5757  3Ø24            3Ø24
  576Ø  Ø516            Ø516
  5761  Ø4Ø5            Ø4Ø5
  5762  Ø44Ø            Ø44Ø
  5763  Ø2Ø1            Ø2Ø1
  5764  1613            1613
  5765  234Ø            234Ø
  5766  17Ø6            17Ø6
  5767  4Ø15            4Ø15
  577Ø  Ø515            Ø515
  5771  1722            1722
  5772  314Ø            314Ø
  5773  2417            2417
  5774  4ØØ2            4ØØ2
  5775  Ø116            Ø116
  5776  134Ø            134Ø
  5777  ØØØØ            ØØØØ
                        /
                        /
                        /RESTORE BINARY LOADER AND START LOADER
                        /
        76ØØ    *76ØØ
  76ØØ  73ØØ            CLA CLL
  76Ø1  1155            TAD     BIN
  76Ø2  3377            DCA     TSTA2
  76Ø3  5377            JMP     TSTA2
                        $
```

```
ØØØØ  11111ØØØ  111ØØØØØ  11111111  11111111  11111111  11111111  11111111  11111111
Ø1ØØ  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111

Ø2ØØ  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
Ø3ØØ  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111

Ø4ØØ  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
Ø5ØØ  11111111  11111111  11111111  11111111  11111111  11111111  11111111  111ØØØØ1

Ø6ØØ  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
Ø7ØØ  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111


1ØØØ  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
11ØØ  11111111  11111111  11111111  11111111  11111111  11111111  11111111  1111111Ø

12ØØ  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
13ØØ  11111111  11111111  11111111  11111111  11111ØØØ  ØØØØØØØØ  ØØØØØØØØ  ØØØØØØØØ

14ØØ  11111111  11111111  11111111  11111111  11111111  11111ØØØ  ØØØØØØØØ  ØØØØØØØØ
15ØØ  ØØØØØØØØ  ØØØØØØØØ  ØØØØØØØØ  ØØØØØØØØ  ØØØØØØØØ  ØØØØØØØØ  ØØØØØØØØ  ØØØØØØØØ

16ØØ  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111ØØØ
17ØØ  ØØØØØØØØ  ØØØØØØØØ  ØØØØØØØØ  ØØØØØØØØ  ØØØØØØØØ  ØØØØØØØØ  ØØØØØØØØ  ØØØØØØØØ


2ØØØ  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
21ØØ  11111111  11111111  11111111  1111ØØØØ  ØØØØØØØØ  ØØØØØØØØ  ØØØØØØØØ  ØØØØØØØØ

22ØØ  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
23ØØ  11111111  11111111  1111111Ø  ØØØØØØØØ  ØØØØØØØØ  ØØØØØØØØ  ØØØØØØØØ  ØØØØØØØØ

24ØØ  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
25ØØ  11111111  11111111  11111111  1ØØØØØØØ  ØØØØØØØØ  ØØØØØØØØ  ØØØØØØØØ  ØØØØØØØØ

26ØØ  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
27ØØ  11111111  11111111  ØØØØØØØØ  ØØØØØØØØ  ØØØØØØØØ  ØØØØØØØØ  ØØØØØØØØ  ØØØØØØØØ


3ØØØ  11111111  11111111  11111111  11111111  11111111  11111111  11111111  1111ØØØØ
31ØØ  ØØØØØØØØ  ØØØØØØØØ  ØØØØØØØØ  ØØØØØØØØ  ØØØØØØØØ  ØØØØØØØØ  ØØØØØØØØ  ØØØØØØØØ

32ØØ  11111111  11111111  11111111  11111111  11111111  11111111  11111111  ØØØØØØØØ
33ØØ  ØØØØØØØØ  ØØØØØØØØ  ØØØØØØØØ  ØØØØØØØØ  ØØØØØØØØ  ØØØØØØØØ  ØØØØØØØØ  ØØØØØØØØ

34ØØ  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
35ØØ  11111111  11111111  11111111  11111111  111ØØØØØ  ØØØØØØØØ  ØØØØØØØØ  ØØØØØØØØ

36ØØ  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
37ØØ  11111111  11111111  11111111  11111111  11111111  1111111Ø  ØØØØØØØØ  ØØØØØØØØ
```

```
4ØØØ  11111111  11111111  11111111  11111111  111ØØØØØ  ØØØØØØØØ  ØØØØØØØØ  ØØØØØØØØ
41ØØ  ØØØØØØØØ  ØØØØØØØØ  ØØØØØØØØ  ØØØØØØØØ  ØØØØØØØØ  ØØØØØØØØ  ØØØØØØØØ  ØØØØØ111

42ØØ  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
43ØØ  11111111  11111111  11111111  111111ØØ  ØØØØØØØØ  ØØØØØØØØ  ØØØØØØØØ  ØØØØØØØØ

44ØØ  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
45ØØ  11111111  11111111  11111111  11111111  11111111  11111111  11111111  111ØØØØØ

46ØØ  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
47ØØ  11111111  11111111  11111111  11111111  11111111  11111111  11111111  1111111Ø


5ØØØ  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
51ØØ  11111111  11ØØØØØØ  ØØØØØØØØ  ØØØØØØØØ  ØØØØØØØØ  ØØØØØØØØ  ØØØØØØØØ  ØØØØØØØØ

52ØØ  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
53ØØ  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111

54ØØ  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
55ØØ  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111

56ØØ  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
57ØØ  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111


6ØØØ
61ØØ

62ØØ
63ØØ

64ØØ
65ØØ

66ØØ
67ØØ


7ØØØ
71ØØ

72ØØ
73ØØ

74ØØ
75ØØ

76ØØ  1111ØØØØ  ØØØØØØØØ  ØØØØØØØØ  ØØØØØØØØ  ØØØØØØØØ  ØØØØØØØØ  ØØØØØØØØ  ØØØØØØØØ
77ØØ  ØØØØØØØØ  ØØØØØØØØ  ØØØØØØØØ  ØØØØØØØØ  ØØØØØØØØ  ØØØØØØØØ  ØØØØØØØØ  ØØØØØ111
```

```
/       PAL1Ø   V142    29-MAR-73        20:13    PAGE 1-57

A1      3263            DH5      535Ø             FCT12    2667             KØØ1Ø    Ø113
A1ORA2  ØØ27            DH6      5365             FCT2     2043             KØØ2Ø    Ø112
A2      3264            EM1      542Ø             FCT3     2076             KØØ4Ø    Ø111
ABNOT   3754            EM1Ø     5566             FCT4     22ØØ             KØØ7Ø    Ø173
AD1     2127            EM11     56Ø6             FCT5     2232             KØØ77    1645
AD1Ø    2715            EM12     5626             FCT6     227Ø             KØ1ØØ    Ø11Ø
AD11    2716            EM13     5645             FCT7     24ØØ             KØ17Ø    4775
AD12    2717            EM14     5664             FCT8     2436             KØ2ØØ    Ø1Ø7
AD2     213Ø            EM15     57Ø3             FCT9     2472             KØ4ØØ    Ø1Ø6
AD3     2131            EM2      5441             FCTHLT   32Ø7             KØ7ØØ    3266
AD4     2324            EM3      5462             FCTOK    3221             K1ØØØ    Ø1Ø5
AD5     2325            EM4      55Ø3             FLDCHK   46ØØ             K2ØØØ    Ø1Ø4
AD6     2326            EM5      5524             FLDCNT   Ø176             K212     165Ø
AD7     2526            EM6      5545             FLDDF    4643             K215     1651
AD8     2527            ENCAR    Ø244             FLDEX    4627             K24Ø     ØØ76
AD9     253Ø            ENCAR1   Ø253             FLDFND   4631             K252     4776
ADA1    ØØ21            ENDBSW   1277             FLDFRM   4712             K26Ø     ØØ77
ADA2    ØØ22            ENDFCT   32ØØ             FLDGO    4714             K261     Ø1ØØ
ADD     Ø274            ENDROT   13Ø3             FLDHR    476Ø             K336     1647
ADDERR  Ø4ØØ            ENRN     4566             FLDNO    4752             K4ØØØ    Ø1Ø3
ADHLT   Ø556            EROUT1   3744             FLDNUM   Ø174             K6ØØØ    Ø1Ø1
ADOUT   3227            ERROR1   Ø377             FLDRM1   4717             K6Ø6Ø    3267
ADPRT   Ø417            ERROR2   1Ø46             FLDSAV   Ø175             KCDF     4772
ADT     Ø551            ERROT    1Ø26             FLDSW    455Ø             KCR      4774
AHFLG   ØØ35            FCL1     2Ø23             GOTEST   Ø177             KLF      4773
AHOUT   Ø467            FCL1Ø    2612             HALT2    3Ø27             KSTOP    4771
ALT1BT  3616            FCL11    2644             HALTA    Ø477             KXXXX    Ø17Ø
ANEG    3747            FCL12    2677             HALTB    1Ø63             LFCR     4741
APOS    3746            FCL2     2Ø56             HLTA     Ø4Ø4             LINK1    ØØ32
ARG1    ØØ23            FCL3     21Ø7             HLTB     1Ø52             LINK2    ØØ34
ARG2    ØØ24            FCL4     2213             INS1     Ø136             LINKR    ØØ44
ASTRK   4731            FCL5     2246             INS1Ø    Ø146             LINKRC   ØØ45
BIN     Ø155            FCL6     23Ø2             INS11    Ø147             LNKOUT   Ø5Ø4
BKMES   5755            FCL7     2412             INS12    Ø15Ø             LOOP     3Ø46
BNEG    3751            FCL8     245Ø             INS13    Ø151             LOOP1    Ø552
BPOS    375Ø            FCL9     25Ø3             INS14    Ø152             M4       1Ø7Ø
BSW     7ØØ2            FCS1     2ØØ5             INS15    Ø153             M4Ø      1646
BSWTAB  166Ø            FCS1Ø    26Ø1             INS16    2133             MASK     3752
CAF     6ØØ7            FCS11    2635             INS2     2132             MODNEG   3632
CARRY   ØØ3Ø            FCS12    267Ø             INS3     Ø137             MOVMSK   3667
CBTST1  364Ø            FCS2     2Ø44             INS4     Ø14Ø             MQA      75Ø1
CBTST2  3654            FCS3     2Ø77             INS5     Ø141             MQL      7421
CHAR    ØØ36            FCS4     22Ø1             INS6     Ø142             MTP      1643
CNTR1   ØØ2Ø            FCS5     2233             INS7     Ø143             N1BIT    1244
COMROT  1ØØØ            FCS6     2271             INS8     Ø144             NBIT     12Ø7
CRLF    5743            FCS7     24Ø1             INS9     Ø145             NERROP   ØØ67
DATE    5745            FCS8     2437             KØ       Ø171             NEWLNK   1Ø44
DATER   3Ø37            FCS9     2473             KØØØ1    Ø116             NLOOP    3Ø54
DH1     52ØØ            FCT      2ØØØ             KØØØ2    Ø115             NMASK    3753
DH2     5245            FCT1     2ØØ4             KØØØ3    3542             NOTAC    3755
DH3     5274            FCT1Ø    26ØØ             KØØØ4    Ø114             NXBIT    Ø527
DH4     5317            FCT11    2634             KØØØ7    Ø172             NXTADD   Ø365
```

```
NXTBT   3612          RNDHLT  454Ø         SIMRTL  Ø653         XFLDSW  477Ø
NXTCAR  Ø234          RNDOK   4563         SIMRTR  Ø7ØØ         XHALT2  ØØ66
NXTROT  1Ø31          ROBACK  5Ø63         SKHLT   35Ø2         XLNKOU  ØØ6Ø
OK1     5722          ROHLT   5Ø53         SP1     Ø545         XLOOP   ØØ67
OK2     5726          ROPRT   5Ø64         SRØØ    Ø1Ø3         XLOOP1  ØØ75
OK3     5733          ROTDNE  1323         SRØ1    Ø1Ø4         XLOOP2  ØØ74
OK4     5736          ROTHLT  1327         SRØ2    Ø1Ø5         XM2     145Ø
OR1     1225          ROTPRT  1Ø71         SRØ3    Ø1Ø6         XM3     1451
OUT     3224          RRAC    ØØ31         SRØ4    Ø1Ø7         XM4     1452
OUT1    Ø52Ø          RRAL    Ø6Ø5         SRØ5    Ø11Ø         XM5     1453
OUT1A   Ø542          RRAR    Ø632         SRØ6    Ø111         XM6     1454
POINT1  ØØ11          RRLNK   ØØ33         SRØ7    Ø112         XNXTAD  Ø416
POINT2  ØØ12          RRTL    Ø657         SRØ8    Ø113         XNXTRO  ØØ57
PRINT   16ØØ          RRTR    Ø7Ø4         SRØ9    Ø114         XOR1    37Ø1
R1      14ØØ          RSIMAD  Ø2ØØ         SR1Ø    Ø115         XOR2    3715
R2      141Ø          RTLER   5Ø41         SR11    Ø116         XORALL  Ø26Ø
R2A     3541          RTLR    44ØØ         SROTAL  12ØØ         XPRINT  ØØ46
R3      142Ø          RTLTAB  116Ø         SROTOK  1342         XR1     Ø752
R4      143Ø          RTRER   5Ø26         START   Ø156         XR2     Ø753
R5      144Ø          RTRR    4455         SUM1    ØØ31         XR3     Ø754
RAC     ØØ23          RTRTAB  1141         SUM2    ØØ33         XR4     Ø755
RALER   5Ø13          SADOK   Ø57Ø         TEMP1   ØØ37         XR5     Ø756
RALR    4255          SAMEA   373Ø         TEMPAC  ØØ25         XRALR   4334
RALTAB  Ø757          SAMEAS  3ØØØ         TEMPL   ØØ26         XRALTA  ØØ52
RANDA   ØØ41          SAVREG  3Ø17         TSTAØ   7775         XRAND   ØØ73
RANDB   ØØ42          SBSW    1236         TSTA1   7776         XRARR   4335
RANDC   ØØ43          SEQ     Ø154         TSTA2   7777         XRARTA  Ø1Ø2
RANDOM  3512          SEQ1    Ø122         TSTA3   ØØØØ         XRHD    ØØ5Ø
RARER   5ØØØ          SEQ1Ø   Ø133         TSTA4   ØØØ1         XRN1ER  3446
RARR    42ØØ          SEQ11   Ø134         TSTA5   ØØØ2         XRN2ER  3756
RBSW    Ø731          SEQ12   Ø135         TSTA6   ØØØ3         XROTDN  Ø777
RELOC   4664          SEQ2    Ø123         TSTA7   ØØØ4         XRTLR   4571
RET1    2Ø25          SEQ3    Ø124         TSTIND  ØØ1Ø         XRTLTA  ØØ53
RET1Ø   2616          SEQ4    Ø125         TYBIT   Ø54Ø         XRTRR   457Ø
RET11   2651          SEQ5    Ø126         TYLNK   Ø513         XRTRTA  ØØ54
RET12   27Ø1          SEQ6    Ø127         TYPE    1652         XSBSW   Ø776
RET2    2Ø6Ø          SEQ7    Ø13Ø         TYPS2   3Ø56         XSROT   ØØ51
RET3    2111          SEQ8    Ø131         TYPSET  1617         XSTAØ   ØØ7Ø
RET4    2215          SEQ9    Ø132         W1      ØØ37         XSTA1   ØØ71
RET5    2252          SHLT    4Ø33         W2      ØØ4Ø         XSTA2   ØØ72
RET6    23Ø6          SIMAC   ØØ25         WD1     ØØ37         XTYPE   ØØ47
RET7    242Ø          SIMAD   Ø2Ø4         WD2     ØØ4Ø         XWDOUT  ØØ61
RET8    2455          SIMBSW  Ø725         WDOUT   Ø523
RET9    251Ø          SIMLNK  ØØ26         XADD    Ø415
RHD     1133          SIMR    Ø577         XADOUT  3Ø73
RHFLG   ØØ35          SIMRAL  Ø6Ø1         XAMEA   ØØ63
RHOUT   1131          SIMRAR  Ø626         XAMEAS  ØØ62
RLNK    ØØ24          SIMRO1  Ø6ØØ         XAVREG  ØØ64
RN1ER   3447          SIMRO2  Ø625         XBSWTA  ØØ55
RN2ER   4ØØØ          SIMRO3  Ø652         XCOMRO  ØØ56
RNAD1   34ØØ          SIMRO4  Ø677         XDATER  ØØ65
RNAD2   36ØØ          SIMRO5  Ø724         XFLDCK  4572
```

```
ERRORS DETECTED: 0

LINKS GENERATED: 3

RUN-TIME:  10 SECONDS

3K CORE USED
```