## IDENTIFICATION
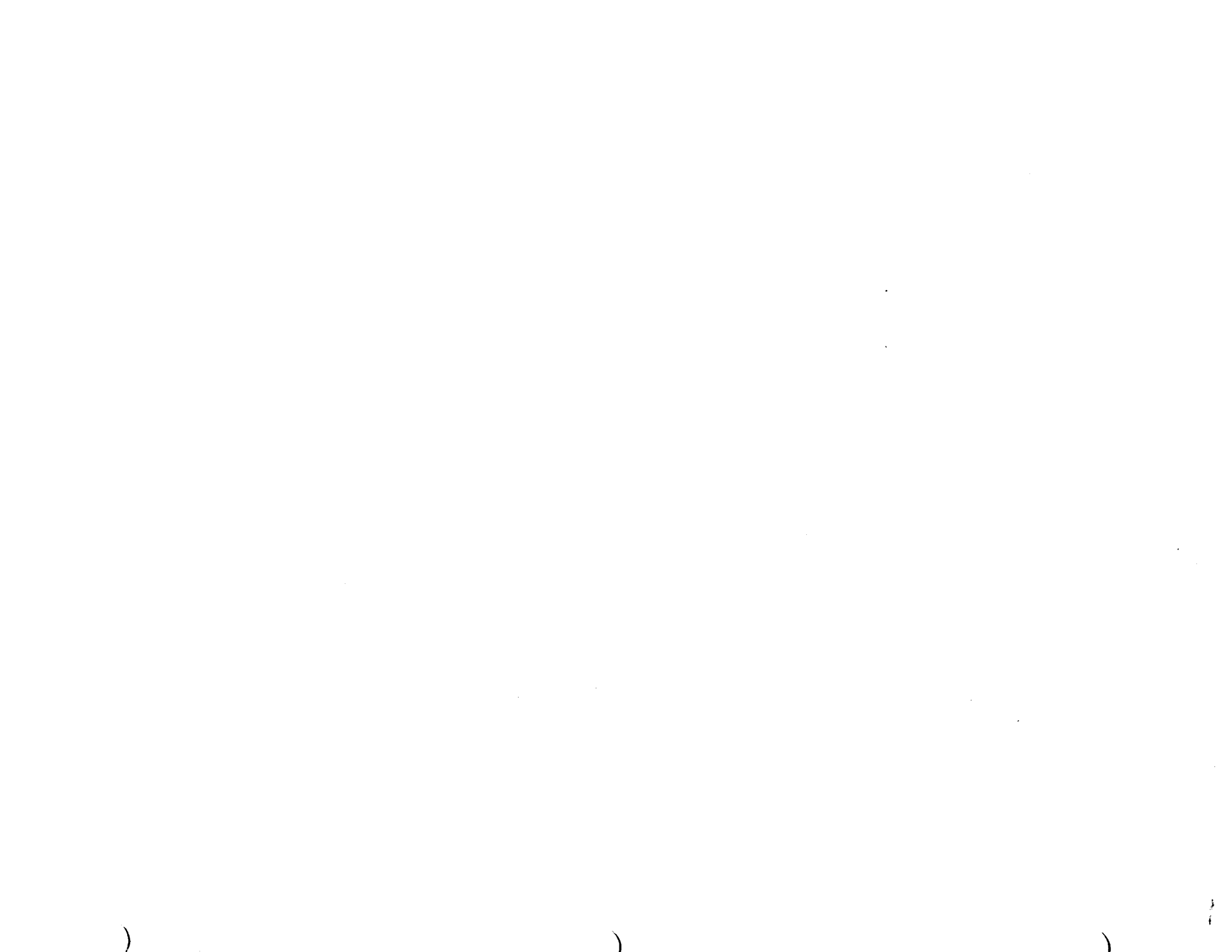
PRODUCT CODE:          MAINDEC-8E-D0CC-D

PRODUCT NAME:          8E ADDER TESTS

DATE CREATED:          SEPT. 1, 1971

MAINTAINER:            DIAGNOSTIC GROUP

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1. ABSTRACT

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

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

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

A CARRY GENERATION TEST

A SERIES OF RANDOM NUMBER TESTS

A FIELD RELOCATION ADDER TEST

2. REQUIREMENTS

2.1 EQUIPMENT

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

2.2 STORAGE

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

2.3 PRELIMINARY PROGRAMS

MAINDEC-8E-D0AA, D0BA

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

3. LOADING PROCEDURE

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

4. STARTING PROCEDURE

4.1 CONTROL SWITCH SETTINGS

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

4.2 STARTING ADDRESSES

NORMAL STARTING ADDRESS=0200
RESTORE LOADERS=7600

4,3       OPERATOR ACTION

4,3,1     SET SR=0200

4,3,2     PRESS ADDR LOAD SWITCH

4,3,3     SET SR=0000

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

4,3,5     PRESS CLEAR AND CONT SWITCHES

5,        OPERATING PROCEDURE

5,1       FAST TEST

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

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

5,3       RELOCATION ADDER TEST

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

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

5,4       OPTIONS

          SEE 4,1

6,        ERRORS

6,1       ERROR MESSAGES

6,1,1     SIMULATED ADDITION TEST

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

                    SIMULATED ADD TEST FAILED
     ARG1           ARG2          SIMULATED       ARG1+ARG2        ARG2+ARG1
XXXXXXXXXXXX XXXXXXXXXXXX X XXXXXXXXXXXX X XXXXXXXXXXXX X XXXXXXXXXXXX

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

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

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

6.1.2    SIMULATED ROTATE TEST

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

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

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

6.1.3    FALSE CARRY TEST

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

        DATA ERROR
AAAA    X XXXXXXXXXXXX

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

NOTE! EACH FALSE CARRY TEST EXPECTS LINK=1 AND AC=0
AS A RESULT.

6.1.4    RANDOM ADD TEST 1

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

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

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

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

6.1.5    RANDOM ADD TEST 2

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

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

6.1.6    RANDOM ROTATE TESTS

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

RANDOM AAA TEST FAILED
    ORIGINAL             ACTUAL
X 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 |
|---|---|
| 502 | SIMAD |
| 1066 | SIMROT (WITH LOCATION OF SPECIFIC TEST IN AC) |
| 3035 | FCT (WITH LOCATION OF SPECIFIC TEST IN AC) |
| 3510 | RNAD1 |
| 4041 | RNAD2 |
| 5061 | RANDOM ROTATE (WITH LOCATION OF SPECIFIC TEST IN AC) |

6.2    ERROR RECOVERY

DEPRESS CONT TO RESUME TEST

6.3    LOOPING ON ERROR

6.3.1    SWITCH REGISTER CONTROL

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

6.3.2    PROGRAM MODIFICATION

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

7.    RESTRICTIONS

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

)                              )                                    )

8, EXECUTION TIME

TIME DEPENDENT ON AMOUNT OF MEMORY, FOR EACH BANK
APPROXIMATELY 35 MINUTES, IF SR03=1, AND KXXXX=7777(SEE 5,1)
ONE PASS TAKES APPROXIMATELY 40 SECONDS,

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

SIMAD
SIMROT
FCT
RANDOM

9, PROGRAM DESCRIPTION

9,I SIMULATED ADDITION TEST

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

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

9,2 SIMULATED ROTATE TESTS

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

9,3 FALSE CARRY TEST

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

)                         )               )

```
                         /
                         /ADDER TEST
                         /FOR PDP-8/E
                         /COPYRIGHT 1970 DIGITAL EQUIPMENT CORP, MAYNARD MASS,
                         /V 82 07552
                         /
                         /INSTRUCTION DEFINITIONS
                         /
         7501     MQA=7501
         7421     MQL=7421
         7002     BSW=7002
         6007     CAF=6007
                         /
                         /SWITCH REGISTER MASK BITS
                         /
         0103     SR00=K4000
         0104     SR01=K2000
         0105     SR02=K1000
         0106     SR03=K0400
         0107     SR04=K0200
         0110     SR05=K0100
         0111     SR06=K0040
         0112     SR07=K0020
         0113     SR08=K0010
         0114     SR09=K0004
         0115     SR10=K0002
         0116     SR11=K0001
                         /
                         /LOCATION EQUIVALENCIES
                         /
         0023     RAC=ARG1                 /AC TO BE ROTATED
         0024     RLNK=ARG2                /LINK TO BE ROTATED
         0031     RRAC=SUM1                /AC AFTER REAL ROTATE
         0033     RRLNK=SUM2               /LINK AFTER REAL ROTATE
         0025     TEMPAC=SIMAC             /TEMPORARY AC STORAGE
         0026     TEMPL=SIMLNK             /TEMPORARY LINK STORAGE
         0037     TEMP1=WD1                /TEMPORARY DATA STORAGE
         0037     W1=WD1                   /    "         "       "
         0040     W2=WD2                   /    "         "       "
         0035     RHFLG=AHFLG              /ROTATE TEST ERROR HEADER FLAG
         0067     NERROP=XLOOP

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

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

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


        0020    *20
0020    0000    CNTR1,   0
0021    0022    ADA1,    ADA2
0022    7777    ADA2,    7777
                        /
                        /SIMULATION VARIABLES
                        /
0023    0000    ARG1,    0
0024    0000    ARG2,    0
0025    0000    SIMAC,   0
0026    0000    SIMLNK,  0
0027    0000    A1ORA2,  0
0030    0000    CARRY,   0
0031    0000    SUM1,    0
0032    0000    LINK1,   0
0033    0000    SUM2,    0
0034    0000    LINK2,   0


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




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

)                                    )                                        )

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

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

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

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


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

                        /
                        /
                        /SIMULATED ADDITION TEST
                        /
```

)                                    )                                    )

```
         0200      *200
0200  5156    RSIMAD,  JMP    START         /GO TO FAST TEST CHECK
0201  3024             DCA    ARG2
0202  3023             DCA    ARG1          /CLEAR SIMULATION VARIABLES
0203  3035             DCA    AHFLG         /CLEAR ERROR MESSAGE FLAG
                       /
                       /
                       /SIMULATE ADDITION BY SIMULATED GENERATEION OF SUM
                       /AND CARRY BITS
                       /
                       /
                       /FORM OR OF ARG1 WITH ARG2
                       /
0204  7340    SIMAD,   CLA CLL CMA
0205  0023             AND    ARG1          /LOAD AC WITH ARG1
0206  7421             MQL                  /PLACE IN MQ
0207  7040             CMA
0210  0024             AND    ARG2          /LOAD AC WITH ARG2
0211  7501             MQA                  /FORM ARG1 OR ARG2
0212  3027             DCA    A1ORA2        /SAVE ARG1 OR ARG2

                       /
                       /FORM XOR(EXCLUSIVE OR) OF ARG1 WITH ARG2
                       /BY A XOR B=(A AND NOTB)OR(NOTA AND B)
                       /
0213  7501             MQA                  /GET ARG1 FROM MQ
0214  7040             CMA                  /FORM NOTARG1
0215  0024             AND    ARG2          /AND WITH ARG2 TO GET ARG2 AND NOTARG1
0216  7421             MQL                  /SAVE IN MQ
0217  7040             CMA
0220  0024             AND    ARG2          /LOAD AC WITH ARG2
0221  7040             CMA                  /FORM NOTARG2
0222  0023             AND    ARG1          /AND WITH ARG1 TO GET ARG1 AND NOTARG2
0223  7501             MQA                  /OR WITH ARG2 AND NOTARG1
0224  3025             DCA    SIMAC         /TO GET ARG1 XOR ARG2
0225  3026             DCA    SIMLNK


                       /
                       /AND ARG1 WITH ARG2
                       /TEST FOR CARRIES
                       /IF THERE ARE NO BITS IN COMMON BETWEEN ARG1 AND ARG2
                       /THERE WILL BE NO CARRIES GENERATED
                       /
0226  7040             CMA
0227  0023             AND    ARG1          /LOAD AC WITH ARG1
0230  0024             AND    ARG2          /AND WITH ARG2
0231  7450             SNA                  /ARE THERE ANY CARRIES
0232  5274             JMP    ADD           /NO, TERMINATE SIMULATION
                       /
                       /GENERATE CARRIES
                       /
0233  7421             MQL                  /SAVE FIRST CARRIES
0234  7521    NXTCAR,  MQA MQL              /GET CARRIES FROM MQ
0235  0027             AND    A1ORA2        /AND WITH A1ORA2 TO SEE IF MORE CAPRIES ARE GENERATED
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0236    7450            SNA                     /ARE THERE ANY MORE CARRIES
0237    5244            JMP     ENCAR           /NO, END SIMULATION OF CARRIES
0240    7104            CLL RAL                 /PROPIGATE CARRIES
0241    7521            MQA MQL                 /GET PREVIOUS CARRIES FROM MQ, SAVE NEW CARRIES
0242    7501            MQA                     /OR NEW CARRIES WITH PREVIOUS CARRIES
0243    5234            JMP     NXTCAR          /CONTINUE
                        /
                        /TEST FOR CARRY INTO LINK
                        /
0244    7501    ENCAR,  MQA                     /GET CARRIES
0245    0027            AND     A1ORA2          /AND WITH A1ORA2
0246    0103            AND     K4000           /TEST BIT 00
0247    7450            SNA                     /IS BIT 00 1
0250    5253            JMP     ENCAR1          /NO, CARRIES DID NOT PROPIGATE INTO LINK
0251    3026            DCA     SIMLNK          /YES, SAVE CARRY INTO LINK
0252    5260            JMP     XORALL          /COMPLETE SIMULATION
0253    7130    ENCAR1, CLL CML RAR             /SET AC=4000
0254    0023            AND     ARG1            /AND WITH ARG1
0255    0024            AND     ARG2            /AND WITH ARG2 TO SEE IF ORIGINAL
0256    7440            SZA                     /NUMBERS GENERATED CARRY INTO LINK
0257    3026            DCA     SIMLNK          /SAVE SIMULATED LINK


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

)                                   )                                   )

```
0311  3034            DCA       LINK2           /SAVE LINK
0312  7000            NOP
                      /
                      /
                      /COMPARE RESULTS OF REAL ADDS
                      /IF A=B, A XOR B=0, THIS IS USED TO COMPARE RESULTS
                      /
0313  7340            CLA CLL CMA
0314  0031            AND       SUM1            /GET RESULT OF ARG1+ARG2
0315  7040            CMA                       /COMPLEMENT
0316  0033            AND       SUM2            /AND RESULTS OF ARG2+ARG1
0317  7440            SZA                       /IS SUM2 AND NOTSUM1=0
0320  5377            JMP       ERROR1          /NO, ERROR
0321  7040            CMA
0322  0033            AND       SUM2            /LOAD AC WITH RESULTS OF ARG2+ARG1
0323  7040            CMA                       /COMPLEMENT
0324  0031            AND       SUM1            /AND WITH SUM1
0325  7440            SZA                       /IS SUM1 AND NOTSUM2=0
0326  5377            JMP       ERROR1          /NO, ERROR
                      /
                      /
                      /COMPARE REAL AND SIMULATED ADDS
                      /
0327  7340            CLA CLL CMA
0330  0031            AND       SUM1            /LOAD AC WITH RESULTS OF ARG1+ARG2
0331  7040            CMA                       /COMPLEMENT
0332  0025            AND       SIMAC           /AND WITH RESULTS OF SIMULATION
0333  7440            SZA                       /IS SIMAC AND NOTSUM1=0
0334  5377            JMP       ERROR1          /NO, ERROR
0335  7040            CMA
0336  0025            AND       SIMAC           /LOAD AC WITH SIMULATION RESULTS
0337  7040            CMA                       /COMPLEMENT
0340  0031            AND       SUM1            /AND WITH RESULTS OF ARG1+ARG2
0341  7440            SZA                       /IS SUM1 AND NOTSIMAC=0
0342  5377            JMP       ERROR1          /NO, ERROR
                      /
                      /COMPARE LINKS GENERATED BY REAL ADDS
                      /
0343  7340            CLA CLL CMA
0344  0032            AND       LINK1           /GET LINK FROM ARG1+ARG2
0345  7004            RAL
0346  7240            CLA CMA
0347  0034            AND       LINK2           /GET LINK FROM ARG2+ARG1
0350  7640            SZA CLA
0351  7020            CML
0352  7430            SZL                       /ARE THEY THE SAME
0353  5377            JMP       ERROR1          /NO, ERROR
                      /
                      /
                      /COMPARE LINKS GENERATED BY REAL AND SIMULATED ADDS
```

```
                              /
       0354  7340             CLA CLL CMA
       0355  0032             AND        LINK1         /GET LINK FROM ARG1+ARG2
       0356  7004             RAL
       0357  7240             CLA CMA
       0360  0026             AND        SIMLNK        /GET LINK FROM SIMULATION
       0361  7640             SZA CLA
       0362  7020             CML
       0363  7430             SZL                      /ARE THEY THE SAME
       0364  5377             JMP        ERROR1        /NO, ERROR
                              /
                              /
                              /SET UP FOR NEXT ADDITION
                              /
       0365  5474    NXTADD,  JMP I      XLOOP2        /TEST FOR SIMULATION WITH SAME DATA
       0366  2023             ISZ        ARG1          /INCREMENT ARG1
       0367  5204             JMP        SIMAD         /GO TO SIMULATION
       0370  2024             ISZ        ARG2          /INCREMENT ARG2
       0371  7410             SKP                      /GO TO SIMULATION
       0372  5475             JMP I      XLOOP1        /TEST FOR TRANSFER TO NEXT TEST
       0373  7240             CLA CMA
       0374  0024             AND        ARG2          /TRANSFER ARG2 TO ARG1
       0375  3023             DCA        ARG1
       0376  5204             JMP        SIMAD         /CONTINUE SIMULATION
             0377             *377
       0377  7000    ERROR1,  NOP
                              /
                              /
                              /ERROR HANDLER FOR ADDITION TEST
             0400             *400
       0400  7604    ADDERR,  LAS                      /GET SWITCHES
       0401  0104             AND        SR01          /TEST SR01
       0402  7650             SNA CLA                  /SUPPRESS TYPEOUT IF SR01=1
       0403  4217             JMS        ADPRT         /TYPE ERROR MESSAGE
       0404  7604    HLTA,    LAS
       0405  0103             AND        SR00
       0406  7650             SNA CLA                  /HALT IF SR00=0
       0407  4277             JMS        HALTA         /HALT WITH ADDRESS OF TEST IN AC
       0410  7604             LAS
       0411  0105             AND        SR02          /TEST SR02
       0412  7640             SZA CLA                  /LOOP WITH SAME DATA IF SR02=1
       0413  5615             JMP I      XADD          /LOOP WITH SAME DATA
       0414  5616             JMP I      XNXTAD
       0415  0274    XADD,    ADD
       0416  0366    XNXTAD,  NXTADD+1
                              /
                              /TYPE ERROR MESSAGE FOR ADDITION TEST
                              /
       0417  0000    ADPRT,   0
       0420  7340             CLA CLL CMA
       0421  0035             AND        AHFLG         /GET FLAG FOR ERROR MESSAGE HEADER TYPEOUT
       0422  7650             SNA CLA                  /HAS HEADER FOR TEST BEEN TYPED
       0423  4267             JMS        AHOUT         /NO TYPE HEADER
```

)                                        )                                    )

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

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

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


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

)                                              )                                    )

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

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


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

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


0652  4754   SIMRO3,  JMS I   XR3
                      /
                      /TEST RTL
                      /
0653  7340   SIMRTL,  CLA CLL CMA
0654  0053            AND     XRTLTA       /GET MASK TABLE FOR
0655  3012            DCA     POINT2       /SIMULATED RTL
0656  4451            JMS I   XSROT        /SIMULATE RTL
0657  7340   RRTL,    CLA CLL CMA
0660  0024            AND     RLNK         /SET UP TO DO REAL ROTATE
0661  7640            SZA CLA
0662  7020            CML
0663  7040            CMA
0664  0023            AND     RAC
0665  7006            RTL                  /DO REAL ROTATE
0666  7000            NOP
0667  3031            DCA     RRAC         /SAVE ROTATED ACCUMULATOR
0670  7430            SZL
0671  7040            CMA
0672  3033            DCA     RRLNK        /SAVE ROTATED LINK
0673  4456            JMS I   XCOMRO       /COMPARE ROTATES
0674  5257            JMP     RRTL         /RETURN HERE FOR LOOP ON ERROR
0675  4457            JMS I   XNXTRO       /SET UP TO DO NEXT ROTATE
0676  5253            JMP     SIMRTL       /CONTINUE RTL TEST


0677  4755   SIMRO4,  JMS I   XR4
                      /
                      /TEST RTR
                      /
```

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


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

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

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


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

)                                          )                                          )

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


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


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

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

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


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

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

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




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

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


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

/
/

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



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

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


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

)                                              )                                    )

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


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

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

```
2003   3020              DCA      CNTR1

                         /
                         /
                         /FALSE CARRY TEST#1
                         /
2004   7300      FCT1,   CLA CLL
                         /
                         /PLACE INSTRUCTIONS AND DATA IN TEST ADDRESSES
                         /
2005   7300      FCS1,   CLA CLL                    /DATA=0000
2006   3471              DCA I    XSTA1             /LOC,=7776
2007   1136              TAD      INS1              /INSTRUCTION=TAD ,-1
2010   3472              DCA I    XSTA2             /LOC,=7777
2011   1332              TAD      INS2              /INSTRUCTION=TAD ,-3
2012   3000              DCA      TSTA3             /LOC,=0000
2013   1137              TAD      INS3              /INSTRUCTION=IAC
2014   3001              DCA      TSTA4             /LOC,=0001
2015   1140              TAD      INS4              /INSTRUCTION=JMP I ,+2
2016   3002              DCA      TSTA5             /LOC,=0002
2017   7240              CLA CMA                    /DATA=7777
2020   3003              DCA      TSTA6             /LOC,=0003
2021   1327              TAD      AD1               /ADDRESS=RET1
2022   3004              DCA      TSTA7             /LOC,=0004
                         /
                         /EXECUTE INSTRUCTIONS PREVIOUSLY ASSEMBLED IN TEST
                         /ADDRESSES
                         /
2023   7300      FCL1,   CLA CLL
2024   5472              JMP I    XSTA2
2025   7000      RET1,   NOP                        /PROVIDED FOR PROGRAM MODIFICATION
2026   7000              NOP
2027   4464              JMS I    XAVREG            /SAVE LINK AND AC
                         /
                         /EXPECTED RESULTS ARE AC=0, LINK=1
                         /
2030   7430              SZL
2031   7440              SZA
2032   4465              JMS I    XDATER            /COMPUTATION ERROR HAS OCCURED
2033   7410              SKP
2034   4466              JMS I    XHALT2            /TEST FOR HALT
2035   4467              JMS I    XLOOP             /TEST FOR LOOP
2036   5223              JMP      FCL1
2037   7200              CLA
2040   1123              TAD      SEQ2              /ADDRESS OF NEXT TEST
2041   3154              DCA      SEQ
2042   5554              JMP I    SEQ               /GO TO NEXT TEST


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

```
                        /
                        /PLACE INSTRUCTIONS AND DATA IN TEST ADDRESSES
                        /
   2044   7340   FCS2,   CLA CLL CMA              /DATA=7777
   2045   3471           DCA I   XSTA1           /LOC,=7776
   2046   1136           TAD     INS1            /INSTRUCTION=TAD ,-1
   2047   3472           DCA I   XSTA2           /LOC,=7777
   2050   1137           TAD     INS3            /INSTRUCTION=IAC
   2051   3000           DCA     TSTA3           /LOC,=0000
   2052   1141           TAD     INS5            /INSTRUCTION=JMP I ,-1
   2053   3001           DCA     TSTA4           /LOC,=0001
   2054   1330           TAD     AD2             /ADDRESS=RET2
   2055   3002           DCA     TSTA5           /LOC,=0002
                        /
                        /EXECUTE INSTRUCTIONS PREVIOUSLY ASSEMBLED IN TEST
                        /ADDRESSES
                        /
   2056   7300   FCL2,   CLA CLL
   2057   5472           JMP I   XSTA2
   2060   7000   RET2,   NOP
   2061   7000           NOP
   2062   4464           JMS I   XAVREG          /SAVE AC AND LINK
                        /
                        /EXPECTED RESULTS ARE AC=0, LINK=1
                        /
   2063   7430           SZL
   2064   7440           SZA
   2065   4465           JMS I   XDATER
   2066   7410           SKP
   2067   4466           JMS I   XHALT2
   2070   4467           JMS I   XLOOP
   2071   5256           JMP     FCL2
   2072   7200           CLA
   2073   1124           TAD     SEQ3
   2074   3154           DCA     SEQ
   2075   5554           JMP I   SEQ


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

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


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

)                                    )                                    )

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


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

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


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

)                                )                                )

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

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

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


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

)                              )                                    )

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


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

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

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


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

)                                    )                                    )

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


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



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

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


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

)                                        )                                        )

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

                        /
                        /TYPE DATA ERROR MESSAGE
                        /
3056    0000    TYPS2,  0
3057    4446            JMS I   XPRINT
3060    5744            DATE-1                          /TYPE "DATA ERROR"
3061    1037            TAD     W1
3062    4673            JMS I   XADOUT                  /TYPE TEST ADDRESS
3063    7340            CLA CLL CMA
3064    0025            AND     TEMPAC
3065    3037            DCA     WD1
3066    0026            AND     TEMPL
3067    3040            DCA     WD2
3070    4460            JMS I   XLNKOU                  /OUTPUT RECEIVED LINK
3071    4461            JMS I   XWDOUT                  /OUTPUT RECEIVED AC
3072    5656            JMP I   TYPS2
3073    3227    XADOUT, ADOUT
                        /
                        /END OF PASS
                        /
        3200    PAGE
3200    7300    ENDFCT, CLA CLL
3201    2020            ISZ     CNTR1                   /INCREMENT PASS COUNT
3202    5224            JMP     OUT                     /PASS NOT COMPLETE
3203    7604            LAS
3204    0115            AND     SR10                    /TEST SR10
3205    7650            SNA CLA                         /IS SR10=1
3206    5221            JMP     FCTOK                   /NO, TYPE FCT
3207    7604    FCTHLT, LAS
3210    0114            AND     SR09                    /TEST SR09
3211    7640            SZA CLA                         /IS SR09=1
3212    7402            HLT                             /YES, HALT
3213    7604            LAS
3214    0116            AND     SR11                    /TEST SR11
3215    7640            SZA CLA                         /IS SR11=1
3216    5224            JMP     OUT                     /YES, LOOP ON FCT
3217    5620            JMP I   .+1                     /NO, GO TO NEXT TEST
3220    3400            RNAD1
3221    4446    FCTOK,  JMS I   XPRINT
3222    5732            OK3-1
3223    5207            JMP     FCTHLT
3224    1122    OUT,    TAD     SEQ1
3225    3154            DCA     SEQ
3226    5554            JMP I   SEQ

                        /
                        /
```

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


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

)                          )                                    )

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

3446  3447    XRN1ER, RN1ER


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

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


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


                      /ADDITION OF RANDOM NUMBER AND MODIFIED
                      /COMPLEMENT TO PRODUCE ONE KNOWN BIT
                      /SET IN AC
                      /
                      /
       3600    PAGE
3600   7340    RNAD2,  CLA CLL CMA
3601   0041            AND     RANDA          /GET RANDOM NUMBER
3602   3346            DCA     APOS           /STORE IT
3603   7040            CMA
3604   0041            AND     RANDA
3605   7040            CMA
3606   3347            DCA     ANEG           /ONE'S COMPLIMENT OF RANDOM NUMBER
```

)                                    )                                    )

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


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

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


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

)                           )                                    )

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


                /ROTATE RANDOM NUMBER RIGHT USING RAR

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

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

                      /ROTATE RANDOM NUMBER LEFT USING RAL
4255  7300     RALR,  CLA CLL
4256  1044            TAD      LINKR          /GET LINK TO BE ROTATED
4257  7440            SZA
4260  7220            CLA CML
4261  1041            TAD      RANDA          /GET NUMBER TO BE ROTATED
4262  7004            RAL
4263  7004            RAL
4264  7004            RAL
```

)                                )                                          )

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

/ROTATE RANDOM NUMBER LEFT USING RTL

```
      4400      PAGE
4400  7300    RTLR,    CLA CLL
4401  1044              TAD      LINKR       /GET LINK TO BE ROTATED
4402  7440              SZA
4403  7220              CLA CML
4404  1041              TAD      RANDA       /GET NUMBER TO BE ROTATED
4405  7006              RTL
4406  7006              RTL
4407  7006              RTL
4410  7006              RTL
```

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


                     /ROTATE RANDOM NUMBER RIGHT USING RTR

4455  7300    RTRR,  CLA CLL
4456  1044           TAD     LINKR          /GET LINK TO BE ROTATED
4457  7440           SZA
4460  7220           CLA CML
4461  1041           TAD     RANDA          /GET NUMBER TO BE ROTAED
4462  7012           RTR
4463  7012           RTR
4464  7012           RTR
4465  7012           RTR
4466  7012           RTR
4467  7012           RTR
4470  7012           RTR
4471  7012           RTR
4472  7012           RTR
4473  7012           RTR
```

```
4474  7012          RTR
4475  7012          RTR
4476  7012          RTR
4477  7012          RTR
4500  7012          RTR
4501  7012          RTR
4502  7012          RTR
4503  7012          RTR
4504  7012          RTR
4505  7012          RTR
4506  7012          RTR
4507  7012          RTR
4510  7012          RTR
4511  7012          RTR
4512  7012          RTR
4513  7012          RTR
4514  7000          NOP
4515  7000          NOP
4516  4464          JMS I  XAVREG        /SAVE AC AND LINK
4517  1043          TAD    RANDC         /ADD COMPLEMENT OF ORIGINAL NUMBER TO AC
4520  7440          SZA                  /ARE THEY THE SAME
4521  5325          JMP    .+4           /NO, ERROR
4522  1044          TAD    LINKR
4523  3037          DCA    WD1
4524  1026          TAD    TEMPL
4525  3040          DCA    WD2
4526  4462          JMS I  XAMEAS        /ARE LINKS THE SAME
4527  4770          JMS I  XRTRR         /NO, ERROR
4530  4467          JMS I  NERROP
4531  5255          JMP    RTRR


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

```
4560  5772            JMP I XFLOCK           /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    XFLOCK, FLOCHK
              /
      4600    PAGE
              /
              /ROUTINE TO SORT AND COMPARE RELOCATION INFORMATION
              /
4600  4231    FLOCHK, JMS FLDFND           /YES, FIND NUMBER OF FIELDS PRESENT
4601  4264            JMS RELOC             /RELOCATE TO NEXT BANK PRESENT OR BANK 0
4602  7346            CLA CLL CMA RTL       /AC TO 7775
4603  4341            JMS LFCR              /PRINT SOME CR-LF
4604  4331            JMS ASTRK             /PRINT SOME *******
4605  4352            JMS FLDNO             /PRINT AMOUNT OF MEMORY
4606  4446            JMS I XPRINT     /PRINT " EXTENDED BANKS OF MEMORY TO BANK "
4607  5755            BKMES            /TEXT FOR   EXTENDED BANKS OF MEMORY TO BANK
4610  4360            JMS FLDHR             /PRINT NEW FIELD
4611  4331            JMS ASTRK             /PRINT SOME *******
4612  7344            CLA CLL CMA RAL       /AC TO 7776
4613  4341            JMS LFCR              /PRINT SOME CR - LP
4614  1175            TAD FLDSAV
4615  7041            CIA
4616  1174            TAD FLDNUM
4617  7650            SNA CLA               /COMPARE SWITCHES
4620  5223            JMP ,+3
4621  7602            HLT CLA
4622  5770            JMP I XFLDSW          /TRY IT AGAIN
4623  1314            TAD FLDGO
4624  1115            TAD K0002
4625  3226            DCA ,+1
4626  0000            0000                  /MODIFIED FOR NEW FIELD
4627  5630    FLDEX,  JMP I ,+1
4630  0200            RSIMAD                /START POINTER
              /
              /ROUTINE TO DETERMINE NUMBER OF BANKS OF MEM.
              /
4631  0000    FLDFND, 0
4632  7300            CLA CLL
4633  3174            DCA FLDNUM
4634  1371            TAD KSTOP
4635  3176            DCA FLDCNT            /JUST A COUNTER
4636  6201            CDF     0            /TO FIELD 0
4637  3571            DCA I K0
4640  1372            TAD KCDF
4641  1113            TAD K0010
4642  3243            DCA FLDDF
4643  0000    FLDDF,  0                     /MODIFIED BY TEST
```

```
4644   7340              CLA CLL CMA
4645   3571              DCA I 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     0               /BACK TO FIELD Ø
4657   1571              TAD I KØ
4660   7650              SNA CLA                 /DID FIELD Ø CHANGE
4661   5651              JMP I FLDFND            /FIELD Ø O'K', EXIT
4662   7602              HLT CLA                 /FIELD ERROR
4663   5274              JMP FLDFND .+1          /TRY AGAIN
               /
               /ROUTINE TO MOVE PROGRAM TO NEXT FIELD OR FIELD Ø
               /
4664   0000     RELOC,   0
4665   7300              CLA CLL
4666   3176              DCA FLDCNT
4667   6224              RIF                     /GET CURRENT FIELD
4670   1113              TAD KØØ1Ø               /UPDATE TO NEXT FIELD
4671   0375              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   0000     FLDFRM,  0000                    /MODIFIED TO CURRENT FIELD
4713   1576              TAD I FLDCNT            /GET DATA WORD
4714   0000     FLDGO,   0000
4715   3576              DCA I FLDCNT            /STORE DATA
4716   1576              TAD I FLDCNT
4717   0000     FLDRM1,  0000
4720   7041              CIA
4721   1576              TAD I FLDCNT            /THIS THE GOOD ONE
4722   7650              SNA CLA                 /DID DATA CHANGE
4723   5326              JMP .+3                 /DATA O.K,
4724   7602              HLT CLA                 /RELOCATION ERROR
4725   5312              JMP FLDFRM              /TRY SAME WORD AGAIN
4726   2176              ISZ FLDCNT              /UPDATE TO NEXT ADDRESS
4727   5312              JMP FLDFRM              /TRANSFER NEXT WORD
```

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

)                                    )                                    )

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

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

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

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

```
      5200    PAGE
5200  3736    DW1,    TEXT    /**   ARG1        ARG2        SIMULATED      ARG1*ARG2      ARG2*ARG1**/
5201  4040
5202  4001
5203  2207
5204  6140
5205  4040
5206  4040
5207  4040
5210  4040
5211  0122
5212  0762
5213  4040
5214  4040
5215  4040
5216  4040
5217  4023
5220  1115
5221  2514
5222  0124
5223  0504
5224  4040
5225  4040
5226  4040
5227  4001
5230  2207
5231  6153
5232  0122
5233  0762
5234  4040
5235  4040
5236  4001
5237  2207
5240  6253
5241  0122
```

)                                    )                                    )

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

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

)                              )                                    )

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

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

)                                        )                                        )

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

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

)                                    )                                    )

```
5276  0440
5277  2405
5300  2324
5301  4061
5302  4006
5303  0111
5304  1405
5305  0400
5306  3736      EM11,   TEXT    /**    RANDOM ADD TEST 2 FAILED/
5307  4040
5310  4040
5311  4022
5312  0116
5313  0417
5314  1540
5315  0104
5316  0440
5317  2405
5320  2324
5321  4062
5322  4006
5323  0111
5324  1405
5325  0400
5326  3736      EM12,   TEXT    /**    RANDOM RAR TEST FAILED/
5327  4040
5330  4040
5331  4022
5332  0116
5333  0417
5334  1540
5335  2201
5336  2240
5337  2405
5340  2324
5341  4006
5342  0111
5343  1405
5344  0400
5345  3736      EM13,   TEXT    /**    RANDOM RAL TEST FAILED/
5346  4040
5347  4040
5350  4022
5351  0116
5352  0417
5353  1540
5354  2201
5355  1440
5356  2405
5357  2324
5360  4006
5361  0111
5362  1405
5363  0400
5364  3736      EM14,   TEXT    /**    RANDOM RTL TEST FAILED/
```

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

)                              )                              )

```
5754    3600

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

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

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

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

0600   11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
0700   11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111


1000   11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
1100   11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111110

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

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

1600   11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111000
1700   00000000  00000000  00000000  00000000  00000000  00000000  00000000  00000000


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

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

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

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


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

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

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

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

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

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

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

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


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

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

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

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


6000
6100

6200
6300

6400
6500

6600
6700


7000
7100

7200
7300

7400
7500

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

| Symbol | Value | Symbol | Value | Symbol | Value | Symbol | Value |
|---|---|---|---|---|---|---|---|
| A1 | 3263 | DH5 | 5350 | FCT12 | 2667 | K0010 | 0113 |
| A1ORA2 | 0027 | DH6 | 5365 | FCT2 | 2043 | K0020 | 0112 |
| A2 | 3264 | EM1 | 5420 | FCT3 | 2076 | K0040 | 0111 |
| ABNOT | 3754 | EM10 | 5566 | FCT4 | 2200 | K0070 | 0173 |
| AD1 | 2127 | EM11 | 5606 | FCT5 | 2232 | K0077 | 1645 |
| AD10 | 2715 | EM12 | 5626 | FCT6 | 2270 | K0100 | 0110 |
| AD11 | 2716 | EM13 | 5645 | FCT7 | 2400 | K0170 | 4775 |
| AD12 | 2717 | EM14 | 5664 | FCT8 | 2436 | K0200 | 0107 |
| AD2 | 2130 | EM15 | 5703 | FCT9 | 2472 | K0400 | 0106 |
| AD3 | 2131 | EM2 | 5441 | FCTHLT | 3207 | K0700 | 3266 |
| AD4 | 2324 | EM3 | 5462 | FCTOK | 3221 | K1000 | 0105 |
| AD5 | 2325 | EM4 | 5503 | FLDCHK | 4600 | K2000 | 0104 |
| AD6 | 2326 | EM5 | 5524 | FLDCNT | 0176 | K212 | 1650 |
| AD7 | 2526 | EM6 | 5545 | FLDDF | 4643 | K215 | 1651 |
| AD8 | 2527 | ENCAR | 0244 | FLDEX | 4627 | K240 | 0096 |
| AD9 | 2530 | ENCAR1 | 0253 | FLDFND | 4631 | K252 | 4776 |
| ADA1 | 0021 | ENDBSW | 1277 | FLDFRM | 4712 | K260 | 0097 |
| ADA2 | 0022 | ENDFCT | 3200 | FLDGO | 4714 | K261 | 0100 |
| ADD | 0274 | ENDROT | 1303 | FLDHR | 4760 | K336 | 1647 |
| ADDERR | 0400 | ENRN | 4566 | FLDNO | 4752 | K4000 | 0103 |
| ADHLT | 0556 | EROUT1 | 3744 | FLDNUM | 0174 | K6000 | 0101 |
| ADOUT | 3227 | ERROR1 | 0377 | FLDRM1 | 4717 | K6060 | 3267 |
| ADPRT | 0417 | ERROR2 | 1046 | FLDSAV | 0175 | KCDF | 4772 |
| ADT | 0551 | ERROT | 1026 | FLDSW | 4550 | KCR | 4774 |
| AHFLG | 0035 | FCL1 | 2023 | GOTEST | 0177 | KLF | 4773 |
| AHOUT | 0467 | FCL10 | 2612 | HALT2 | 3027 | KSTOP | 4771 |
| ALT1BT | 3616 | FCL11 | 2644 | HALTA | 0497 | KXXXX | 0170 |
| ANEG | 3747 | FCL12 | 2677 | HALTB | 1063 | LPCR | 4741 |
| APOS | 3746 | FCL2 | 2056 | HLTA | 0404 | LINK1 | 0032 |
| ARG1 | 0023 | FCL3 | 2107 | HLTB | 1052 | LINK2 | 0034 |
| ARG2 | 0024 | FCL4 | 2213 | INS1 | 0136 | LINKR | 0044 |
| ASTRK | 4731 | FCL5 | 2246 | INS10 | 0146 | LINKRC | 0045 |
| BIN | 0155 | FCL6 | 2302 | INS11 | 0147 | LNKOUT | 0504 |
| BKMES | 5755 | FCL7 | 2412 | INS12 | 0150 | LOOP | 3046 |
| BNEG | 3751 | FCL8 | 2450 | INS13 | 0151 | LOOP1 | 0552 |
| BPOS | 3750 | FCL9 | 2503 | INS14 | 0152 | M4 | 1070 |
| BSW | 7002 | FCS1 | 2005 | INS15 | 0153 | M40 | 1646 |
| BSWTAB | 1660 | FCS10 | 2601 | INS16 | 2133 | MASK | 3752 |
| CAF | 6007 | FCS11 | 2635 | INS2 | 2132 | MODNEG | 3632 |
| CARRY | 0030 | FCS12 | 2670 | INS3 | 0137 | MOVMSK | 3667 |
| CBTST1 | 3640 | FCS2 | 2044 | INS4 | 0140 | MQA | 7501 |
| CBTST2 | 3654 | FCS3 | 2077 | INS5 | 0141 | MQL | 7421 |
| CHAR | 0036 | FCS4 | 2201 | INS6 | 0142 | MTP | 1643 |
| CNTR1 | 0020 | FCS5 | 2233 | INS7 | 0143 | N1BIT | 1244 |
| COMROT | 1000 | FCS6 | 2271 | INS8 | 0144 | NBIT | 1207 |
| CRLF | 5743 | FCS7 | 2401 | INS9 | 0145 | NERROP | 0067 |
| DATE | 5745 | FCS8 | 2437 | K0 | 0171 | NEWLNK | 1044 |
| DATER | 3037 | FCS9 | 2473 | K0001 | 0116 | NLOOP | 3054 |
| DH1 | 5200 | FCT | 2000 | K0002 | 0115 | NMASK | 3753 |
| DH2 | 5245 | FCT1 | 2004 | K0003 | 3542 | NOTAC | 3755 |
| DH3 | 5274 | FCT10 | 2600 | K0004 | 0114 | NXBIT | 0527 |
| DH4 | 5317 | FCT11 | 2634 | K0007 | 0172 | NXTADD | 0365 |

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

ERRORS DETECTED: 0

LINKS GENERATED: 3

RUN-TIME:  32 SECONDS

3K CORE USED

)                                                  )                                        )    :