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IDENTIFICATION

Product Code:	MAINDEC-08-D1HA-D
Product Name:	PDP-8, 8/I, Extended Memory Address Test
Date Created:	March 13, 1968
Maintainer:	Diagnostic Group
Author:	J. W. Richardson

1. ABSTRACT

The PDP-8, 8/I Extended Memory Address Test tests all of memory not occupied by the program to make sure that each location can be uniquely addressed. This is performed by a series of four tests. The first two tests write the address and complement address of each memory location into itself, and then checks the contents of each location to make sure each is correct. The third test first sets all of memory not occupied by the program to all ones, and then writes a word of all zeroes, except for one bit, into each location and checks for error. The fourth test is similar except that a word of all ones, except for one bit, is written into each location and checks for error.

2. REQUIREMENTS

2.1 Equipment

A standard PDP-8 or 8/I with a minimum of 8K words of core memory.

2.2 Storage

The program requires locations 0010 to 2534 octal.

2.3 Preliminary Programs

The Binary loader must be in locations 7756-7776 octal. Also, all diagnostics for a basic PDP-8 or 8/I must have previously been run successfully.

3. LOADING PROCEDURE

3.1 Method

a. Turn off the Teletype reader.

b. Set the SR to 7777.

c. Press LOAD ADDRESS, and then START.

d. Place the Binary tape in the Teletype reader and turn on the reader.

e. When the program has been loaded, stop the computer, turn off the reader, and remove the tape.

4. STARTING PROCEDURE

4.1 Starting Address

Start from address 200 to specify the amount of core memory to test, SR settings, and to receive a header print-out.

4.2 Restarting Address

Start from address 211 to change the test limits, SR settings, and to inhibit the header print-out.

4.3 Operator Action

Immediately after starting from address 200 or 207, the program will print "TEST LIMITS". The operator must then specify, via the Teletype keyboard, the amount of core memory to test, followed by a carriage return.

The following rules govern the amount of memory to test:

a. Type two octal numbers, separating the numbers with a comma. The first number signifies the lowest order 4K stack to test; the second signifies the highest order.

b. The program expects the 4K stacks to be numbered sequentially starting with stack 0.

c. If the highest order stack to test is typed as the first stack, the program will interchange the two values so as to make the second value the first to test.

d. After typing the second octal number, press the carriage return key to terminate the line.

e. The program will test the lowest and highest order 4K stack specified, plus every stack between, starting with the lowest specified.

f. Any single stack, or two or more sequential stacks may be specified.

g. The stack containing the program may be included when specifying two or more stacks. The stack containing the program will be tested after automatic program relocation takes place (see section 5.3.1).

h. If a typing error is made, press the RUB-OUT key. "TEST LIMITS" will be printed again. All previous input is disregarded.

For the following examples assume the program to be located in stack 0, and the program has been started from address 200 or 207. The amount of core memory available is 32K.

Example A:
```
TEST LIMITS
0,7↵    ( ↵ denotes carriage return)
```
Example A indicates stacks 0, 1, 2, 3, 4, 5, 6, and 7 will be tested.

Example B:
```
TEST LIMITS
7,0 ↵
```
The program will perform exactly as Example A.

Example C: TEST LIMITS
4,5↵.

Only stacks 4 and 5 will be tested.

Example D: TEST LIMITS
3,3↵

Stack 3 alone will be tested.

Example E: TEST LIMITS
0,0 PROGRAM IS LOCATED IN FIELD 0

TEST LIMITS
0,1↵

Example E shows the message printed by the program when a single stack is selected which currently contains the program. "TEST LIMITS" is printed again, and the operator must then correct the test limits.

Operation of the program is unpredictable if the amount of memory selected for testing exceeds the actual amount available, i.e., selecting 32K for testing on a PDP-8 or 8/I equipped with a maximum of 28K.

4.3.1 Setup SR - After the test limits is specified, the program will print "SETUP SR". For normal program operation, the SR must be set to equal $0000_{(8)}$. Press the carriage return key after setting the SR to 0000. The program will then run until stopped by the operator. Normal program operation is defined as performing all four checkerboard patterns on all of available memory from every memory stack.

5. OPERATING PROCEDURE

5.1 Program and Operator Action

a. Load the program into stack 0 using the procedure described in section 3.

b. Set the SR to 200; press LOAD ADDRESS, and then start.

c. The message "TEST LIMITS" will be printed. Specify the limits, via keyboard, as described in section 4.3.

d. The message "SETUP SR" will be printed. Set the SR to $0000_{(8)}$, and press the carriage return key.

e. The program will perform all four tests on all of core memory specified, after which, automatic program relocation takes place.

5.2 Operational Switch Settings

Normal operation of the program requires the SR set to $0000_{(8)}$. Refer to section 8.2, applications, for switch settings provided for trouble-shooting.

5.3 Subroutine Abstracts

5.3.1 The Patterns Used for Testing - The program executes a series of four tests on core memory. Each test writes a unique pattern, and checks each location for error.

Test 1 writes the value of each address into itself, from the lowest order to the highest order 4K field under test. The address pattern is then read and checked for error in the same direction, i.e., from the lowest to highest field under test. The pattern is then read and checked for error in the reverse directions, i.e., from the highest to the lowest field under test. When reading in the reverse direction, each location is repeatedly read a random number of times before reading the next location. The minimum number of reads per location is one, and the maximum is 20 octal. Error checking is done after each read.

Test 1 then writes the same address pattern again, only this time starting with the highest 4K field under test, and decrementing to the lowest under test. Reading and error checking is then performed as previously described.

Test 2 writes the ones complement value of each location into itself, and proceeds to read and check in the same manner as test 1.

Test 3 and 4 both write a "sliding" bit pattern throughout memory. The difference between the two tests being that test 3 rotates a single bit equal to 1, and test 4 rotates a single 0. Both tests use the following test sequence. The sequence is repeated 12 times, resulting in each bit of every memory location being complemented.

a. Write all 1's into all of memory.

b. Write a sliding 1 or 0 pattern into one 4K field.

c. Read and test the 4K field in the forward direction only.

d. Repeat steps b and c 11 more times before testing the next sequential field in the same manner.

After test 4 is completed on all memory fields, the program is relocated, and restarted with test 1.

6. ERRORS

Starting the program from address 200 will give a header print-out after the SR has been set up. The header identifies the information printed when a data error is found. The header appears as:

FIELD OCTAL ADR. GOOD BAD TEST

Where: FIELD = an octal number (0 to 7) indicating the 4K field containing the error.

OCTAL ADR. = the memory address which contains the incorrect data.

GOOD = what the data in octal should have been.

BAD = the data as read. This will equal the good data except for one or more bits complemented.

TEST = the number (1 to 4) of the test which detected the error.

After each error print-out the program continues on with the next sequential memory location.

6.1 Error Halts and Description

Placing SR 0 on a 1 during an error print-out will cause a halt at location 2042. Press CONTINUE to resume testing.

7. RESTRICTIONS

7.1 Starting Restrictions

Start from address 200 to indicate the amount of core memory to test; to set up the SR and to receive a header print-out.

Starting from 207 requires the same operator action, but no header will be printed.

7.2 Operating Restrictions

None

8. MISCELLANEOUS

8.1 Execution Time

The time required to perform all four tests on one 4K memory stack is approximately 20 seconds.

8.2 Applications

For operating convenience, and as an aid to trouble-shooting, the SR may be used to control the program. The switch assignments and their effect on the program are described below. Please note that it is important that the program should be halted before changing the test selection switches. These switches are not sensed by the program during testing.

Halting the program with SR 0 is preferred, rather than with the STOP key. Using the STOP key may result in a halt while the program is in the process of relocating, which is disastrous.

8.2.1 Halt After Test or Error - SR 0 - Placing SR 0 on a 1 at any time while the program is running will cause a halt after the current test is completed. The MA will equal 2042 in the current stack containing the program. Press CONTINUE to resume testing, or restart from 200 or 207 to enter new parameters.

Placing SR 0 on a 1 during an error typeout will also cause a halt at location 2042. Proceed exactly as described in the above paragraph.

8.2.2 Inhibit Error Printout - SR 1 - Placing SR 1 on a 1 causes all error printouts to be inhibited. All other messages will not be inhibited. The program will continue to recognize errors, but will not print any information. SR 1 may be placed on a 1 or 0 while the program is running.

8.2.3 Bell on Error - SR 2 - SR 2 on a 1 causes the program to ring the TTY BELL whenever an error is detected. This is convenient when testing with power supply margins. SR 2 has recedence over SR 1 if both should happen to be on a 1. SR 2 may be placed on a 1 or 0 while the program is running.

8.2.4 Test Selection SR 3 Through 6 - Any one, or any combination of tests may be executed by placing any one or any combination of SR 3 through 6 on a 1. Test selections may be made only when starting from 200 or 207. SR 3 specifies test 1; SR 4, test 2; SR 5 test 3; SR 6 test 4. The test specified by the most significant SR on a 1 will be executed first.

If all four switches are on a 0, all four tests will be executed in order starting with test 1.

Program relocation is not effected, regardless of the SR settings.

8.2.5 SR 7 and 8 - Not Used

8.2.6 Inhibit Program Relocation - SR 9 - The program normally relocates automatically as indicated by the INSTRUCTION FIELD indicators. To retain the program in its current 4K field, place SR 9 on a 1 at any time. Changing SR 9 to a 0 will permit relocation to resume.

8.2.7 SR 10 - Not used

8.2.8 Change Test Limits and SR - SR 11 - Placing SR 11 on a 1 will cause the program to automatically restart from address 207. The TEST LIMITS and SR may then be changed. SR 11 is sensed only after all specified tests have been completed on all of memory under test.

8.2.9 Loop on Address - A subroutine is provided which may be used to continuously loop on a single location, or a group of consecutive locations. No error checking is performed. The routine performs a read, and immediately follows with a write, on each location. The loop time between two reads, or two writes, is approximately 22.5 μs.

Operating Procedure

a. Set the INSTRUCTION FIELD switches to the current field, and the SR to 1137.

b. Press LOAD ADDRESS

c. Set the DATA FIELD switches to equal the 4K field number to test, and set the SR to equal the first address of the group.

d. Press START. A halt will occur at 1142. Set the SR to equal the last address of the group.

e. Press CONTINUE. The address (s) specified will be looped until stopped by the operator with STOP. SR 0 will not halt this routine.

To resume normal operation, restart the program from 200 or 207 of the current field.

9. PROGRAM DESCRIPTION

The Extended Memory address test is intended for use with a PDP-8, 8/I or 8/S equipped with the extended memory option. A total of four tests are executed by the program. Each test writes a unique pattern into core memory and then checks for error. The patterns were chosen so as to aid the operator in the event of addressing errors.

The program automatically relocates itself to each memory field under test to ensure that all fields may be correctly referenced from any field.

Control of the program is given to the operator by means of the SR. The operator may halt the program, inhibit error printouts, substitute the TTY BELL for error indication, halt after printout, select any one or a combination of the four tests, inhibit program relocation, and create an automatic program restart.

10. LISTING

```
                        /
                        /PDP-8, 81, 8S EXTENDED MEMORY ADDRESS TEST.
                        /START AT 200.  RESTART AT 207 TO SKIP HEADER.
                        /MIN. OF 8K OF CORE REQUIRED.
                        /

        0001            *1
                        /
0001    5001                    JMP .
0002    0002                    0002
0003    0003                    0003
                        /
        0010            *0010
                        /
        6201            CDF=6201
        6202            CIF=6202
        6214            RDF=6214
        6224            RIF=6224
0010    0000                    0
0011    0000                    0
0012    0000                    0
0013    0000                    0
0014    0000                    0
0015    0000                    0
0016    0000                    0
0017    0000                    0
0020    0000            DATFLD, 0
0021    0000            FLAGS,  0
0022    1407            XLMTS,  SLMTS
0023    0000            INSFLD, 0
0024    0026            ERTBL,  ERWRD
0025    0036            ENTBL,  ERWRD+10
0026    0026            ERWRD,  .
0027    7600                    7600
0030    7600                    7600
0031    7600                    7600
0032    7600                    7600
0033    7600                    7600
0034    7600                    7600
0035    7600                    7600
0036    7600                    7600
0037    0000            MCWA,   0
0040    0010            K10,    10
0041    0740            K740,   740
0042    0400            K400,   400
0043    0200            K200,   200
0044    0100            K100,   100
0045    0040            K40,    40
0046    0020            K20,    20
0047    0276            XTST1,  TST1
0050    0330            XTST2,  TST2
0051    0400            XTST3,  TST3
0052    0503            XTST4,  TST4
0053    2200            XMOVE,  CMOVE
```

```
0054  1400              XSETU,  SETU1
0055  0261              K261,   261
0056  0262              K262,   262
0057  0263              K263,   263
0060  0264              K264,   264
0061  7760              M20,    7760
```

```
0062  7740          M40,    /7400
0063  7774          M4,     /7774
0064  7773          M5,     7773
0065  0000          TNUM,   0
0066  1066          XBANK,  CBANK
0067  1103          XTBNK,  NXTBNK
0070  0000          COUNT,  0
0071  0000          FLCNT,  0
0072  0000          LOOP,   0
0073  1200          XRROR,  ERROR
0074  0000          MEMADR, 0
0075  0000          FIRST1, 0
0076  0000          LAST1,  0
0077  6201          KCDF,   6201
0100  6202          KCIF,   6202
0101  2041          XHLT,   HALT
0102  0213          XRTN,   RTN1
0103  1125          XFILD,  FIELD
0104  1346          XPRER,  PRERR
0105  0007          K7,     7
0106  0000          CHAR,   0
0107  1674          XHDR,   PHDR
0110  1346          XPERR,  PRERR
0111  1315          XPING,  SPING
```

```
0112  7765          M13,    7765
0113  7764          M14,    7764
0114  7770          M10,    7770
0115  0260          K260,   260
0116  0215          K215,   215
0117  0377          K377,   377
0120  0370          K370,   370
0121  0277          K277,   277
0122  1354          XCRLF,  CRLF
0123  0001          K1,     1
0124  0000          NXLOC,  0
0125  0000          EXIT,   0
0126  0000          PATR,   0
0127  0000          COMPR,  0
0130  0654          XWRF,   WFR1
0131  0720          XFWD,   RFR1
0132  1000          XBAK,   RBK1
0133  0671          XWRB,   WRB1
0134  0662          XWRF2,  WFR2
0135  0736          XFWD2,  RFR2
0136  1030          XBAK2,  RBK2
0137  0704          XWRB2,  WRB2
0140  1057          XONES,  ONES
0141  0000          SHIFT,  0
0142  7777          M1,     7777
0143  0000          DATA,   0
```

```
      0200                    *200
0200  6002    BEGIN,  IOF              /PI OFF
0201  7200            CLA
0202  6224            RIF
0203  3023            DCA INSFLD
0204  3021            DCA FLAGS        /CLEAR PROGRAM FLAGS
0205  4422            JMS I XLMTS      /SETUP TEST LIMITS
0206  4675            JMS I XSTSR      /SETUP SR
0207  4507            JMS I XHDR       /PRINT HEADER
0210  5213            JMP RTN1
                      /
                      /RESTART HERE
                      /
0211  4422    RSTRT1, JMS I XLMTS      /SET TEST LIMITS
0212  4675            JMS I XSTSR      /SETUP SR
0213  6224    RTN1,   RIF              /READ INSTRUCTION FIELD
0214  3023            DCA INSFLD       /CURRENT FIELD
0215  4503            JMS I XFILD
0216  1114            TAD M10                  /-10
0217  3072            DCA LOOP
0220  7600    ALAW,   7600
0221  1220            TAD ALAW
0222  2026            ISZ ERWRD
0223  3426            DCA I ERWRD
0224  2072            ISZ LOOP
0225  5220            JMP ALAW
0226  1024            TAD ERTBL
0227  3026            DCA ERWRD
                      /
```

```
                        /EXAMINE SR
0230  1037                      TAD MCWA
0231  0041                      AND K740              /MASK 3,4,5 AND 6
0232  7440                      SZA                 /DO ALL IF 0
0233  5237                      JMP EXAM1
0234  1037                      TAD MCWA
0235  1041                      TAD K740              /SET ALL TEST BITS
0236  3037                      DCA MCWA              /SAVE
0237  7200                EXAM1, CLA
0240  1037                      TAD MCWA
0241  0042                      AND K400
0242  7440                      SZA                 /TEST 1 IF NO SKIP
0243  5447                      JMP I XTST1
0244  7200                EXAM2, CLA
0245  1037                      TAD MCWA
0246  0043                      AND K200
0247  7440                      SZA                 /TEST 2 IF NO SKIP
0250  5450                      JMP I XTST2
0251  7200                EXAM3, CLA
0252  1037                      TAD MCWA
0253  0044                      AND K100
0254  7440                      SZA                 /TEST 3 IF NO SKIP
0255  5451                      JMP I XTST3
0256  7200                EXAM4, CLA
0257  1037                      TAD MCWA
0260  0045                      AND K40
0261  7440                      SZA                 /TEST 4 IF NO SKIP
0262  5452                      JMP I XTST4
0263  4503                      JMS I XFILD         /RESTORE DATA FIELD
0264  7604                      LAS
0265  0123                      AND K1
0266  7440                      SZA                 /CHECK SR 11
0267  5211                      JMP RSTRT1
0270  7604                      LAS
0271  0046                      AND K20
0272  7440                      SZA                 /INHIBIT MOVE IF A 1
0273  5213                      JMP RTN1
0274  5453                      JMP I XMOVE               /GO RELOCATE
                        /
0275  2045                XSTSR, SETSR
```

```
                        /
                        /TEST 1, WRITE THE ADDRESS OF EACH LOCATION INTO
                        /ITSELF, THEN READ EACH STACK FORWARDS AND BACKWARDS,
                        /
0276  4454    TST1,     JMS I XSETU     /SET DF TO 1ST FIELD
0277  1055              TAD K261                /TEST NUMBER
0300  3065              DCA TNUM
0301  3074              DCA MEMADR      /SET ADR, COUNT TO 0
0302  3126              DCA PATR
0303  4466              JMS I XBANK     /SEE IF FIELD HAS PROGRAM
0304  7410              SKP             /NO, BEGIN WRITING
0305  5313              JMP TST1A               /NEXT TEST
0306  4530              JMS I XWRF      /WRITE FORWARDS
0307  4531              JMS I XFWD      /READ FORWARDS
0310  4532              JMS I XBAK      /READ BACKWARDS
0311  4467              JMS I XTBNK     /SETUP FOR NEXT FIELD
0312  5301              JMP TST1+3
                        /
                        /NOW WRITE BACKWARDS
                        /
0313  4454    TST1A,    JMS I XSETU     /SET DF TO 1ST FIELD
0314  7240              CLA CMA
0315  3074              DCA MEMADR      /SET ADR, COUNT TO 7777
0316  3126              DCA PATR                /COMPARE WORD
0317  4466              JMS I XBANK     /SEE IF FIELD HAS PROGRAM
0320  7410              SKP             /BEGIN WRITING
0321  5244              JMP EXAM2               /NEXT TEST
0322  4533              JMS I XWRB      /WRITE BACKWARDS
0323  4531              JMS I XFWD      /READ FORWARDS
0324  4532              JMS I XBAK      /READ BACKWARDS
0325  4467              JMS I XTBNK     /SETUP FOR NEXT FIELD
0326  5314              JMP TST1A+1
0327  5244              JMP EXAM2               /NEXT TEST
```

```
                        /
                        /TEST 2, WRITE COMPLEMENT ADDRESS
                        /PATTERN FORWARD AND BACKWARD.
                        /
0330  4454   TST2,     JMS I XSETU      /SET DF TO 1ST FIELD
0331  1056             TAD K262                 /TEST NUMBER
0332  3065             DCA TNUM
0333  3074             DCA MEMADR       /SET ADDRESS COUNT TO 0
0334  7040             CMA
0335  3126             DCA PATR                 /COMPARE WORD
0336  4466             JMS I XBANK      /SEE IF FIELD HAS PROGRAM
0337  7410             SKP              /WRITE
0340  5346             JMP TST2A                /NEXT TEST
0341  4534             JMS I XWRF2
0342  4535             JMS I XFWD2      /READ FORWARDS
0343  4536             JMS I XBAK2      /READ BACKWARDS
0344  4467             JMS I XTBNK      /SETUP FOR NEXT FIELD
0345  5333             JMP TST2+3

                        /
                        /NOW WRITE BACKWARDS
                        /
0346  4454   TST2A,    JMS I XSETU      /SET DF TO 1ST FIELD
0347  7240             CLA CMA
0350  3074             DCA MEMADR       /SET ADDRESS COUNT TO 7777
0351  7040             CMA
0352  3126             DCA PATR                 /COMPARE WORD
0353  4466             JMS I XBANK      /SEE IF FIELD HAS PROGRAM
0354  7410             SKP              /WRITE
0355  5251             JMP EXAM3                /NEXT TEST
0356  4537             JMS I XWRB2      /WRITE BACKWARDS
0357  4535             JMS I XFWD2      /READ FORWARDS
0360  4536             JMS I XBAK2      /READ BACKWARDS
0361  4467             JMS I XTBNK      /SETUP FOR NEXT FIELD
0362  5347             JMP TST2A+1
0363  5251             JMP EXAM3                /NEXT TEST
```

```
                        /
                        /TEST3. WRITE ALL 1'S, THEN SLIDE A SINGLE 1 THRU EACH
                        /WORD, READ AND WRITE IN THE FORWARD DIRECTION ONLY.
                        /
      0400              *400
                        /
0400  4454              TST3,   JMS I XSETU     /SET DF TO 1ST FIELD
0401  1057                      TAD K263
0402  3065                      DCA TNUM
0403  7001                      IAC             /SET BIT 11
0404  3126                      DCA PATR                /COMPARE WORD
0405  7001                      IAC
0406  3127                      DCA COMPR               /SAVE FIRST BIT
0407  3074                      DCA MEMADR      /SET ADDRESS COUNT TO 0
0410  4466                      JMS I XBANK     /SEE IF FIELD HAS PROGRAM
0411  7410                      SKP             /WRITE
0412  5301                      JMP EXT3
0413  4540                      JMS I XONES     /WRITE 1'S
0414  1113              WROT,   TAD M14         /-12 DECIMAL
0415  3141                      DCA SHIFT
0416  1126                      TAD PATR
0417  3474                      DCA I MEMADR
0420  2074                      ISZ MEMADR      /DONE 4K WHEN SKIP
0421  7410                      SKP
0422  5236                      JMP RSL1                /READ AND COMPARE
0423  2141                      ISZ SHIFT               /CHECK FOR 12 POSITIONS
0424  5230                      JMP .+4         /POSITION NEXT BIT
0425  1127                      TAD COMPR               /START OVER WITH 11
0426  3126                      DCA PATR
0427  5214                      JMP WROT
0430  1126                      TAD PATR
0431  7104                      CLL RAL
0432  7430                      SZL
0433  7001                      IAC             /START NEXT WITH BIT 11
0434  3126                      DCA PATR
0435  5216                      JMP WROT+2
```

```
                        /
                        /READ AND TEST ROUTINE FOR SLIDING ONE
                        /
0436  1127   RSL1,     TAD COMPR               /FIRST POSITION
0437  3126             DCA PATR
0440  3074             DCA MEMADR        /SET ADDRESS COUNT TO 0
0441  1113   RROT,     TAD M14           /-12 DECIMAL
0442  3141             DCA SHIFT
0443  1474             TAD I MEMADR
0444  3143             DCA DATA                /SAVE
0445  1143             TAD DATA
0446  7041             CIA               /2'S COMPLEMENT
0447  1126             TAD PATR
0450  7640             SZA CLA           /OK IF 0
0451  4473             JMS I XRROR       /PRINT ERROR
0452  2074             ISZ MEMADR        /DONE IF SKIP
0453  7410             SKP
0454  5270             JMP CKDN1               /DONE
0455  2141             ISZ SHIFT               /CHECK FOR 12 POSITIONS
0456  5262             JMP .+4           /POSITION NEXT BIT
0457  1127             TAD COMPR               /START OVER WITH 11
0460  3126             DCA PATR
0461  5241             JMP RROT
0462  1126             TAD PATR
0463  7104             CLL RAL
0464  7430             SZL
0465  7001             IAC
0466  3126             DCA PATR
0467  5243             JMP RROT+2

                        /
0470  1127   CKDN1,    TAD COMPR
0471  7104             CLL RAL
0472  7430             SZL               /DONE ALL 12 IF NO SKIP
0473  5277             JMP .+4
0474  3126             DCA PATR
0475  1126             TAD PATR
0476  5206             JMP WROT-6        /WRITE IN SAME FIELD AGAIN
                        /
0477  4467             JMS I XTBNK       /SETUP FOR NEXT FIELD
0500  5203             JMP TST3+3
0501  5702   EXT3,     JMP I .+1               /NEXT TEST
0502  0256             EXAM4
```

```
                        /
                        /TEST 4, WRITE ALL 1'S, THEN SLIDE A SINGLE Ø THRU EACH
                        /WORD, WRITE AND READ IN THE FORWARD DIRECTION ONLY.
                        /
0503  4454               TST4,   JMS I XSETU     /SET DF TO 1ST FIELD
0504  1060                       TAD K264                 /TEST NUMBER
0505  3065                       DCA TNUM
0506  7001                       IAC
0507  3127                       DCA COMPR
0510  1127                       TAD COMPR                /COMPARE WORD
0511  7040                       CMA
0512  3126                       DCA PATR
0513  3074                       DCA MEMADR      /SET ADDRESS COUNT TO Ø
0514  4466                       JMS I XBANK     /SEE IF FIELD HAS PROGRAM
0515  7410                       SKP             /WRITE
0516  5751                       JMP I XT4
0517  4540                       JMS I XONES     /WRITE 1'S
0520  7120               WR1T,   STL
0521  1113                       TAD M14         /-12 DECIMAL
0522  3141                       DCA SHIFT
0523  1126                       TAD PATR
0524  3474                       DCA I MEMADR
0525  2074                       ISZ MEMADR      /DONE 4K WHEN SKIP
0526  7410                       SKP
0527  5752                       JMP I XSLØ              /READ AND COMPARE
0530  2141                       ISZ SHIFT               /CHECK FOR 12 POSITIONS
0531  5336                       JMP .+5         /POSITION NEXT BIT
0532  1127                       TAD COMPR               /START OVER WITH BIT 11
0533  7040                       CMA
0534  3126                       DCA PATR
0535  5320                       JMP WR1T
0536  1126                       TAD PATR
0537  7004                       RAL
0540  7420                       SNL
0541  5344                       JMP .+3
0542  3126                       DCA PATR
0543  5323                       JMP WR1T+3
0544  7200                       CLA
0545  7001                       IAC
0546  7040                       CMA
0547  7120                       STL
0550  5342                       JMP .-6
                        /
0551  0263               XT4,    EXAM4+5
0552  0600               XSLØ,   RSLØ
```

```
                0600            *600
                                /
                                /READ AND TEST ROUTINE FOR SLIDING ZERO
                                /
0600  1127       RSL0,   TAD COMPR               /1ST POSITION
0601  7040               CMA
0602  3126               DCA PATR
0603  3074               DCA MEMADR      /SET ADR, COUNT TO 0
0604  1113       RR1T,   TAD M14         /-12 DECIMAL
0605  3141               DCA SHIFT
0606  1474               TAD I MEMADR    /READ
0607  3143               DCA DATA                /SAVE
0610  1143               TAD DATA
0611  7040               CMA
0612  1126               TAD PATR
0613  7040               CMA
0614  7640               SZA CLA         /MUST=0
0615  4473               JMS I XRROR     /PRINT ERROR
0616  2074               ISZ MEMADR      /DONE WHEN SKIP
0617  7410               SKP
0620  5242               JMP CKDN0
0621  2141               ISZ SHIFT       /CHECK FOR 12 POSITIONS
0622  5227               JMP .+5
0623  1127               TAD COMPR               /START OVER WITH 11
0624  7040               CMA
0625  3126               DCA PATR
0626  5204               JMP RR1T
0627  1126               TAD PATR
0630  7120               STL
0631  7004                RAL
0632  7420               SNL
0633  5236               JMP .+3
0634  3126               DCA PATR
0635  5206               JMP RR1T+2
0636  7200               CLA
0637  7001               IAC
0640  7040               CMA
0641  5234               JMP .-5
                        /
0642  1127       CKDN0,  TAD COMPR
0643  7104               CLL RAL
0644  7420               SNL             /DONE ALL 12 IF NO SKIP
0645  5652               JMP I XRT4
                        /
0646  4467               JMS I XTBNK     /SETUP FOR NEXT FIELD
0647  5653               JMP I XST4
0650  5651       EXT4,   JMP I .+1               /DONE ALL TESTS
0651  0263               EXAM4+5
                        /
0652  0507       XRT4,   TST4+4
0653  0506       XST4,   TST4+3
```

```
                        /
                        /WRITE FORWARD ROUTINE FOR TST1
                        /
0654  0000    WFR1,     0
0655  1074              TAD MEMADR        /WRITE C(MEMADR) INTO
0656  3474              DCA I MEMADR      /SAME ADDRESS
0657  2074              ISZ MEMADR        /DONE WHEN SKIP
0660  5255              JMP WFR1+1
0661  5654              JMP I WFR1        /EXIT
                        /
                        /WRITE FORWARD ROUTINE FOR TST2
                        /
0662  0000    WFR2,     0
0663  1074              TAD MEMADR        /WRITE COMPLEMENT OF
0664  7040              CMA               /C(MEMADR) INTO SAME
0665  3474              DCA I MEMADR
0666  2074              ISZ MEMADR        /DONE 4K WHEN SKIP
0667  5263              JMP WFR2+1
0670  5662              JMP I WFR2        /EXIT
                        /
                        /WRITE BACKWARD ROUTINE FOR TST1A
                        /
0671  0000    WRB1,     0
0672  3072              DCA LOOP                  /4K COUNTER
0673  1074              TAD MEMADR        /INITIALLY=7777
0674  3474              DCA I MEMADR
0675  2072              ISZ LOOP                  /DONE 4K WHEN SKIP
0676  7410              SKP
0677  5671              JMP I WRB1        /EXIT
0700  1074              TAD MEMADR
0701  1142              TAD M1            /SUBTRACT 1 FROM ADDRESS
0702  3074              DCA MEMADR
0703  5273              JMP WRB1+2
                        /
                        /WRITE BACKWARDS ROUTINE FOR TST2A
                        /
0704  0000    WRB2,     0
0705  3072              DCA LOOP                  /4K COUNTER
0706  1074              TAD MEMADR        /INITIALLY=7777
0707  7040              CMA
0710  3474              DCA I MEMADR
0711  2072              ISZ LOOP                  /DONE 4K WHEN SKIP
0712  7410              SKP
0713  5704              JMP I WRB2        /EXIT
0714  1074              TAD MEMADR
0715  1142              TAD M1            /SUBTRACT 1 FROM ADDRESS
0716  3074              DCA MEMADR
0717  5306              JMP WRB2+2
```

```
                        /
                        /READ FORWARD ROUTINE FOR TST1 AND TST1A
                        /
0720  0000    RFR1,     0
0721  1474              TAD I MEMADR
0722  3143              DCA DATA                  /SAVE
0723  1143              TAD DATA
0724  7041              CIA
0725  1126              TAD PATR                  /COMPARE WORD
0726  7640              SZA CLA             /MUST EQUAL 0
0727  4473              JMS I XRROR         /PRINT ERROR
0730  2074              ISZ MEMADR          /DONE 4K WHEN SKIP
0731  7410              SKP
0732  5720              JMP I RFR1          /EXIT
0733  2126              ISZ PATR
0734  5321              JMP RFR1*1
0735  5720              JMP I RFR1          /SHOULD NEVER GET HERE
                        /
                        /READ FORWARD ROUTINE FOR TST2 AND TST2A
                        /
0736  0000    RFR2,     0
0737  1474              TAD I MEMADR
0740  3143              DCA DATA                  /SAVE
0741  1143              TAD DATA
0742  7041              CIA
0743  1126              TAD PATR                  /COMPARE WORD
0744  7640              SZA CLA             /MUST=0
0745  4473              JMS I XRROR         /PRINT ERROR
0746  2074              ISZ MEMADR          /DONE 4K WHEN SKIP
0747  7410              SKP
0750  5736              JMP I RFR2          /EXIT
0751  1126              TAD PATR
0752  7041              CIA                 /SUBTRACT 1
0753  7040              CMA
0754  3126              DCA PATR
0755  5337              JMP RFR2*1
```

```
      1000              *1000
                        /
                        /READ BACKWARD ROUTINE FOR TST1 AND TST1A
                        /
1000  0000    RBK1,     0
1001  3072              DCA LOOP                  /4K COUNTER
1002  7040              CMA
1003  3074              DCA MEMADR        /SET ADR, COUNT TO 7777
1004  7040              CMA
1005  3126              DCA PATR                  /COMPARE WORD
1006  4665              JMS I XSALL
1007  1474    LBK1,     TAD I MEMADR      /READ
1010  3143              DCA DATA                  /SAVE
1011  1143              TAD DATA
1012  7041              CIA
1013  1126              TAD PATR
1014  7640              SZA CLA           /MUST=0
1015  4473              JMS I XRROR       /PRINT ERROR
1016  2071              ISZ FLCNT                 /RANDOM LOOP
1017  5207              JMP LBK1
1020  2072              ISZ LOOP                  /DONE 4K WHEN SKIP
1021  7410              SKP
1022  5600              JMP I RBK1        /EXIT

1023  1074              TAD MEMADR
1024  1142              TAD M1            /SUBTRACT 1 FROM ADDRESS
1025  3074              DCA MEMADR
1026  1074              TAD MEMADR
1027  5205              JMP LBK1+2
```

```
                        /
                        /READ BACKWARD ROUTINE FOR TST2 AND TST2A
                        /
1030  0000  RBK2,   0
1031  3072          DCA LOOP          /4K COUNTER
1032  7040          CMA
1033  3074          DCA MEMADR        /SET ADR, COUNT TO 7777
1034  3126          DCA PATR                  /COMPARE WORD
1035  4665          JMS I XSALL
1036  1474  LBK2,   TAD I MEMADR      /READ
1037  3143          DCA DATA                  /SAVE
1040  1143          TAD DATA
1041  7041          CIA
1042  1126          TAD PATR
1043  7640          SZA CLA           /MUST=0
1044  4473          JMS I XRROR       /PRINT ERROR
1045  2071          ISZ FLCNT                 /RANDOM LOOP
1046  5236          JMP LBK2
1047  2072          ISZ LOOP                  /DONE 4K WHEN SKIP
1050  7410          SKP
1051  5630          JMP I RBK2        /EXIT
1052  2126          ISZ PATR                  /COMPARE WORD
1053  1074          TAD MEMADR
1054  1142          TAD M1
1055  3074          DCA MEMADR
1056  5235          JMP LBK2-1                /LOOP
                        /
                        /ROUTINE TO WRITE ONES IN ONE FIELD
                        /
1057  0000  ONES,   0
1060  7240          CLA CMA
1061  3474          DCA I MEMADR
1062  2074          ISZ MEMADR        /DONE 4K WHEN SKIP
1063  5260          JMP ONES+1
1064  5657          JMP I ONES        /EXIT
                        /
1065  2102  XSALL,  STALL
```

PAUSE

```
                        /EXTENDED MEMORY ADDRESS TEST - TAPE 2
                        /ROUTINE TO SEE IF TESTED FIELD HAS PROGRAM
                        /
1066  0000      CBANK,  0
1067  6224              RIF             /READ INST, FIELD
1070  3302              DCA SAVIF               /SAVE
1071  6214              RDF             /READ DATA FIELD
1072  7041              CIA
1073  1302              TAD SAVIF
1074  7640              SZA CLA         /EQUAL IF AC=0
1075  5666              JMP I CBANK     /DOESN'T HAVE PROGRAM
1076  4467              JMS I XTBNK     /INCREMENT DATA FIELD
1077  5666              JMP I CBANK     /TEST NEW FIELD
1100  2266              ISZ CBANK               /DONE ALL CAUSE PROGRAM NOW
                                        /IN HIGHEST FIELD
1101  5666              JMP I CBANK     /EXIT
1102  0000      SAVIF,  0
```

```
                        /
                        /ROUTINE TO SET DF FOR NEXT FIELD
                        /
1103  0000              NXTBNK, 0
1104  7200                      CLA
1105  6214                      RDF             /READ DATA FIELD
1106  7041                      CIA
1107  1076                      TAD LAST1               /C(LAST1) = LAST TO TEST
1110  7640                      SZA CLA         /ALL DONE IF 0
1111  5314                      JMP .+3
1112  2303                      ISZ NXTBNK
1113  5321                      JMP .+6                 /EXIT
1114  6214                      RDF
1115  1040                      TAD K10         /INCREMENT DATA FIELD
1116  1077                      TAD KCDF                /ADD .6201
1117  3320                      DCA .+1
1120  6201                      CDF 00          /CHANGE TO NEW DATA FIELD
                        /
                        /CHECK SWITCH REGISTER
1121  7604                      LAS
1122  7710                      SPA CLA         /CHEC HALT
1123  4501                      JMS I XHLT      /GO HALT, SR0=1
1124  5703                      JMP I NXTBNK    /EXIT
                        /
                        /RESTORE DATA FIELD AND CHECK SR
                        /
1125  0000              FIELD,  0
1126  7200                      CLA
1127  6214                      RDF
1130  3020                      DCA DATFLD      /SAVE TESTED FIELD#
1131  6224                      RIF
1132  1077                      TAD KCDF
1133  3334                      DCA .+1
1134  6201                      CDF 00          /MAKE DATA AND INST FIELD EQUAL
1135  7200                      CLA
1136  5725                      JMP I FIELD
```

```
                        /
                        /
                        /START HERE TO LOOP ON ADDRESS
                        /
1137  7200                      CLA
1140  7604                      LAS               /READ LOWER LIMIT
1141  3075                      DCA FIRST1
1142  7402                      HLT               /NOW SETUP UPPER LIMIT
1143  7604                      LAS
1144  3076                      DCA LAST1
1145  1075              OVER,   TAD FIRST1
1146  3074                      DCA MEMADR
1147  1474              WRLOP,  TAD I MEMADR              /READ
1150  3474                      DCA I MEMADR      /WRITE
1151  1074                      TAD MEMADR
1152  7041                      CIA
1153  1076                      TAD LAST1
1154  7650                      SNA CLA
1155  5345                      JMP OVER
1156  2074                      ISZ MEMADR
1157  5347                      JMP WRLOP
1160  7402                      HLT
                        /
1161  0000              CFLD,   0
1162  7200                      CLA
1163  1020                      TAD DATFLD        /TEST FIELD
1164  1077                      TAD KCDF
1165  3366                      DCA .+1
1166  6201                      CDF 00            /RESTORE TEST FIELD
1167  7200                      CLA
1170  5761                      JMP I CFLD        /EXIT
```

```
                        /
                        /PRINT ERROR ROUTINE
                        /
      1200              *1200
1200  0000    ERROR,    0
1201  1143              TAD DATA
1202  3363              DCA BAD           /SAVE BAD DATA
1203  1126              TAD PATR
1204  3364              DCA GOOD                  /SAVE GOOD DATA
1205  1074              TAD MEMADR
1206  3365              DCA OCADR                 /OCTAL ADDRESS
1207  7040              CMA
1210  3071              DCA FLCNT
1211  4503              JMS I XFILD       /RESTORE DATA FIELD
1212  1020              TAD DATFLD        /DATA FIELD
1213  7041              CIA
1214  1366              TAD LAST                  /LAST = FIELD WITH LAST ERROR
1215  7650              SNA CLA           /SAME IF 0
1216  5233              JMP SW2           /DON'T STORE
1217  1020              TAD DATFLD
1220  3366              DCA LAST
1221  1026              TAD ERWRD                 /TABLE POINTER
1222  7041              CIA
1223  1025              TAD ENTBL
1224  7640              SZA CLA           /END OF TABLE IF = 0
1225  5230              JMP .+3
1226  1024              TAD ERTBL
1227  3026              DCA ERWRD                 /RESTORE POINTER
1230  1020              TAD DATFLD
1231  2026              ISZ ERWRD                 /INCREMENT POINTER
1232  3426              DCA I ERWRD       /STORE IN TABLE
                        /
1233  7604    SW2,      LAS
1234  7006              RTL
1235  7700              SMA CLA           /SR2 ON A 1 = RING BELL
1236  5242              JMP SW1
1237  1367              TAD K207
1240  4346              JMS PRERR                 /RING BELL
1241  5311              JMP SW0
1242  7604    SW1,      LAS
1243  7004              RAL
1244  7700              SMA CLA           /SR1 A 1 = NO PRINT
1245  5254              JMP EPRNT
1246  1020    EREXT,    TAD DATFLD
1247  1077              TAD KCDF
1250  3251              DCA .+1
1251  6201              CDF 00            /SET TO TESTED FIELD
1252  7200              CLA
1253  5600              JMP I ERROR
```

```
                        /
1254  4354  EPRNT,  JMS CRLF              /CR,LF
1255  1020           TAD DATFLD            /TEST NUMBER
1256  7012           RTR
1257  7010           RAR
1260  1115           TAD K260
1261  4346           JMS PRERR             /PRINT
1262  1113           TAD M14         /-12 DECIMAL
1263  3072           DCA LOOP
1264  4315           JMS SPING             /SPACE 12
1265  1365           TAD OCADR             /OCTAL ADR,
1266  3106           DCA CHAR              /SAVE
1267  4326           JMS PROCTL      /PRINT
1270  1114           TAD M10         /-8 DECIMAL
1271  3072           DCA LOOP
1272  4315           JMS SPING             /SPACE  8
1273  1364           TAD GOOD
1274  3106           DCA CHAR
1275  4326           JMS PROCTL      /PRINT
1276  1064           TAD M5          /-5
1277  3072           DCA LOOP
1300  4315           JMS SPING             /SPACE 5
1301  1363           TAD BAD
1302  3106           DCA CHAR
1303  4326           JMS PROCTL      /PRINT
1304  1064           TAD M5
1305  3072           DCA LOOP
1306  4315           JMS SPING             /SPACE 5
1307  1065           TAD TNUM              /TEST NUMBER
1310  4346           JMS PRERR             /PRINT

                        /
1311  7604  SW0,    LAS
1312  7710           SPA CLA         /CH CK SR0
1313  4501           JMS I XHLT            /GO HALT
1314  5246           JMP EREXT             /EIT
                        /
                        /PRINT SPACES
                        /
1315  0000  SPING,   0
1316  1370           TAD K240              /SPACE
1317  6046           TLS             /PRINT
1320  6041           TSF
1321  5320           JMP .-1
1322  2072           ISZ LOOP
1323  5317           JMP SPING+2
1324  7200           CLA
1325  5715           JMP I SPING     /EXIT
```

```
                        /
                        /PRINT OCTAL
                        /
1326  0000              PROCTL, 0
1327  1063                      TAD M4          /-4
1330  3072                      DCA LOOP                /DIGIT COUNTER
1331  1106              POSITN, TAD CHAR
1332  7104                      CLL RAL
1333  7006                      RTL
1334  3106                      DCA CHAR
1335  1106                      TAD CHAR
1336  7004                      RAL
1337  0105                      AND K7
1340  1115                      TAD K260                /MAKE ASCII
1341  4346                      JMS PRERR               /PRINT ONE
1342  2072                      ISZ LOOP
1343  5331                      JMP POSITN      /DO NEXT
1344  7200                      CLA
1345  5726                      JMP I PROCTL    /EXIT
                        /
                        /PRINT A NUMBER
                        /
1346  0000              PRERR,  0
1347  6046                      TLS
1350  6041                      TSF
1351  5350                      JMP .-1
1352  7200                      CLA
1353  5746                      JMP I PRERR     /EXIT
                        /
                        /CARRIAGE RETURN, LINE FEED
                        /
1354  0000              CRLF,   0
1355  7200                      CLA
1356  1116                      TAD K215                /CR
1357  4346                      JMS PRERR
1360  1371                      TAD K212                /LF
1361  4346                      JMS PRERR
1362  5754                      JMP I CRLF
                        /
1363  0000              BAD,    0
1364  0000              GOOD,   0
1365  0000              OCADR,  0
1366  0000              LAST,   0
1367  0207              K207,   207
1370  0240              K240,   240
1371  0212              K212,   212
```

```
                        /
        1400            *1400
                        /
                        /ROUTINE TO SET DF TO FIRST TEST FIELD
                        /
1400    0000    SETU1,  0
1401    7200            CLA
1402    1075            TAD FIRST1      /FIRST TO TEST
1403    1077            TAD KCDF
1404    3205            DCA .+1

1405    6201            CDF 00          /CHANGE TO TEST FIELD
1406    5600            JMP I SETU1     /EXIT
                        /
                        /ROUTINE TO ACCEPT TEST LIMITS FROM
                        /KEYBOARD INPUT
                        /
1407    0000    SLMTS,  0
1410    4503            JMS I XFILD
1411    4522            JMS I XCRLF     /CR, LF
1412    4751            JMS I XTLIM     /PRINT TEST LIMITS
1413    4522            JMS I XCRLF     /CR, LF
1414    4303            JMS KEYIN               /GO ACCEPT INPUT
1415    4314            JMS LEGAL               /SEE IF IT'S LEGAL
1416    1106            TAD CHAR
1417    0105            AND K7          /MASK AC 9-11
1420    7104            CLL RAL
1421    7006            RTL             /POSITION TO AC 6-8
1422    3075            DCA FIRST1      /FIRST TO TEST
1423    4303            JMS KEYIN               /WAIT FOR COMMA
1424    1106            TAD CHAR                /GET INPUT
1425    7041            CIA
1426    1353            TAD K254
1427    7450            SNA             /OK IF 0
1430    5233            JMP .+3
1431    4344            JMS QUERY               /PRINT QUESTION MARK
1432    5211            JMP SLMTS+2
1433    4303            JMS KEYIN               /WAIT FOR 2ND
1434    4314            JMS LEGAL               /SEE IF IT'S LEGAL
1435    1106            TAD CHAR
1436    0105            AND K7          /MASK AC 9-11
1437    7104            CLL RAL
1440    7006            RTL             /POSITION TO AC 6-8
1441    3076            DCA LAST1               /LAST TO TEST
1442    1075            TAD FIRST1
1443    7041            CIA
1444    1076            TAD LAST1
1445    7500            SMA             /1ST IS > LAST IF NEG
1446    5256            JMP OKAS
1447    7200            CLA
```

```
1450  1075                TAD FIRST1
1451  3106                DCA CHAR
1452  1076                TAD LAST1
1453  3075                DCA FIRST1      /LAST NOW IS FIRST
1454  1106                TAD CHAR
1455  3076                DCA LAST1               /FIRST IS NOW LAST
1456  7200  OKAS,   CLA
1457  1076                TAD LAST1
1460  7041                CIA
1461  1075                TAD FIRST1      /SEE IF EQUAL
1462  7440                SZA             /YES IF 0
1463  5273                JMP ALOK
1464  1075                TAD FIRST1      /NOW SEE IF IT HAS PROGRAM
1465  7041                CIA
1466  1023                TAD INSFLD      /CURRENT FIELD
1467  7640                SZA CLA         /NO IF A 1
1470  5273                JMP ALOK
1471  4752                JMS I XLCAT             /PRINT PROGRAM LOCATION
1472  5211                JMP SLMTS+2     /AND START OVER
1473  4303  ALOK,   JMS KEYIN              /WAIT FOR C.R.
1474  1106                TAD CHAR
1475  7041                CIA
1476  1116                TAD K215
1477  7450                SNA             /NOT A C.R, IF A SKIP
1500  5607                JMP I SLMTS
1501  4344                JMS QUERY               /PRINT QUESTION MARK
1502  5211                JMP SLMTS+2     /START OVER
                  /
1503  0000  KEYIN,  0
1504  6032                KCC
1505  6031                KSF
1506  5305                JMP .-1
1507  6036                KRB
1510  3106                DCA CHAR
1511  1106                TAD CHAR
1512  4510                JMS I XPERR
1513  5703                JMP I KEYIN
```

```
                        /
1514  0000  LEGAL,     0
1515  1106              TAD CHAR
1516  7041              CIA
1517  1117              TAD K377
1520  7650              SNA CLA           /RUB-OUT IF 0
1521  5211              JMP SLMTS+2
1522  1106              TAD CHAR
1523  0120              AND K370
1524  7041              CIA
1525  1115              TAD K260
1526  7650              SNA CLA
1527  5714              JMP I LEGAL
1530  1106              TAD CHAR
1531  7041              CIA
1532  1353              TAD K254
1533  7650              SNA CLA           /A COMMA IF 0
1534  5714              JMP I LEGAL
1535  1106              TAD CHAR
1536  7041              CIA
1537  1116              TAD K215
1540  7650              SNA CLA           /A C,R, IF 0
1541  5714              JMP I LEGAL
1542  4344              JMS QUERY                 /QUERY
1543  5211              JMP SLMTS+2       /START OVER
                        /
1544  0000  QUERY,     0
1545  4522              JMS I XCRLF
1546  1121              TAD K277
1547  4510              JMS I XPERR       /PRINT QUERY MARK
1550  5744              JMP I QUERY
                        /
1551  1646  XTLIM,     TLIMT
1552  1600  XLCAT,     LOCAT
1553  0254  K254,      254
```

```
                    /
                    /PRINT FIELD PROGRAM IS IN
                    /
      1600          *1600
                    /
1600  0000  LOCAT,  0
1601  7200          CLA
1602  1023          TAD INSFLD      /CURRENT FIELD
1603  7012          RTR
1604  7010          RAR
1605  0105          AND K7
1606  1115          TAD K260
1607  3244          DCA FLDN                /FLDN = PRGAM+25
1610  1217          TAD PRGAM
1611  3012          DCA 12
1612  1412  PLOCT,  TAD I 12
1613  7450          SNA             /DONE IF 0
1614  5600          JMP I LOCAT     /EXIT
1615  4510          JMS I XPERR     /PRINT
1616  5212          JMP PLOCT
                    /
1617  1617  PRGAM,  .
1620  0320          320             /P
1621  0322          322             /R
1622  0317          317             /O
1623  0307          307             /G
1624  0322          322             /R
1625  0301          301             /A
1626  0315          315             /M
1627  0240          240             /
1630  0311          311             /I
1631  0323          323             /S
1632  0240          240
1633  0311          311             /I
1634  0316          316             /N
1635  0240          240             /
1636  0306          306             /F
1637  0311          311             /I
1640  0305          305             /E
1641  0314          314             /L
1642  0304          304             /D
1643  0240          240             /
1644  0000  FLDN,   0               /X
1645  0000          0               /TERMINATOR
```

```
                        /
1646  0000  TLIMT,  0                 /PRINT TEST LIMITS
1647  7200          CLA
1650  1257          TAD TSTL
1651  3012          DCA 12
1652  1412  PLIMT,  TAD I 12
1653  7450          SNA               /DONE IF 0
1654  5646          JMP I TLIMT               /DONE IF 0
1655  4510          JMS I XPERR
1656  5252          JMP PLIMT
                        /
1657  1657  TSTL,   .
1660  0324          324               /T
1661  0305          305               /E
1662  0323          323               /S
1663  0324          324               /T
1664  0240          240               /
1665  0314          314               /L
1666  0311          311               /I
1667  0315          315               /M
1670  0311          311               /I
1671  0324          324               /T
1672  0323          323               /S
1673  0000          0                 /TERMINATOR
                        /
                        /HEADER ROUTINE
                        /
1674  0000  PHDR,   0
1675  4522          JMS I XCRLF       /CR, LF
1676  1332          TAD FILD
1677  3012          DCA 12
1700  1412  PFILD,  TAD I 12                  /PRINT FIELD
1701  7450          SNA               /DONE IF 0
1702  5305          JMP .+3
1703  4510          JMS I XPERR
1704  5300          JMP PFILD
1705  1064          TAD M5
1706  3072          DCA LOOP
1707  4511          JMS I XPING       /SPACE 5
1710  1341          TAD OTLDR
1711  3012          DCA 12
```

```
1712  1412          POCDR,  TAD I 12                /PRINT OCTAL ADR
1713  7450                  SNA                     /DONE IF 0
1714  5317                  JMP .+3
1715  4510                  JMS I XPERR
1716  5312                  JMP POCDR
                    /
1717  1064                  TAD M5
1720  3072                  DCA LOOP
1721  4511                  JMS I XPING             /SPACE 5
1722  1355                  TAD GODD
1723  3012                  DCA 12
1724  1412          PGOOD,  TAD I 12                /PRINT GOOD
1725  7450                  SNA                     /DONE IF 0
1726  5731                  JMP I .+3
1727  4510                  JMS I XPERR
1730  5324                  JMP PGOOD
1731  2000                  BSPCE                   /NEXT PAGE
                    /
1732  1732          FILD,   .
1733  0306                  306                     /F
1734  0311                  311                     /I
1735  0305                  305                     /E
1736  0314                  314                     /L
1737  0304                  304                     /D
1740  0000                  0
                    /
1741  1741          OTLDR,  .
1742  0317                  317                     /O
1743  0303                  303                     /C
1744  0324                  324                     /T
1745  0301                  301                     /A
1746  0314                  314                     /L
1747  0240                  240
1750  0301                  301                     /A
1751  0304                  304                     /D
1752  0322                  322                     /R
1753  0256                  256                       /.
1754  0000                  0
                    /
1755  1755          GODD,   .
1756  0307                  307                     /G
1757  0317                  317                     /O
1760  0317                  317                     /O
1761  0304                  304                     /D
1762  0000                  0
                    /
1763  5674          EXHDR,  JMP I PHDR
```

```
                        /
        2000            *2000
                        /
2000    1064    BSPCE,  TAD M5
2001    3072            DCA LOOP
2002    4511            JMS I xPING     /SPACE 5
2003    1234            TAD BADD
2004    3012            DCA 12
2005    1412    PBAD,   TAD I 12                /PRINT BAD
2006    7450            SNA             /DONE IF 0
2007    5212            JMP .+3
2010    4510            JMS I xPERR
2011    5205            JMP PBAD
2012    1064            TAD M5
2013    3072            DCA LOOP
2014    4511            JMS I XPING             /SPACE 5
                        /
2015    1226            TAD TSTN
2016    3012            DCA 12
2017    1412    PTSTN,  TAD I 12                /PRINT TEST
2020    7450            SNA                     /DONE IF 0
2021    5224            JMP .+3
2022    4510            JMS I XPERR
2023    5217            JMP PTSTN
2024    4522            JMS I XCRLF             /CR, LF
2025    5644            JMP I XPHDR             /EXIT
                        /

2026    2026    TSTN,   .
2027    0324            324             /T
2030    0305            305             /E
2031    0323            323             /S
2032    0324            324             /T
2033    0000            0
                        /
2034    2034    BADD,   .
2035    0302            302             /B
2036    0301            301             /A
2037    0304            304             /D
2040    0000            0
                        /
2041    0000    HALT,   0
2042    7402            HLT
2043    5641            JMP I HALT      /RESTART HEREOR RTRN1
                        /
2044    1763    XPHDR,  EXHDR
```

```
                        /
                        /
                        /WAIT HERE TO SETUP SR, TYPE CARRIAGE RETURN
                        /AFTER SETTING SR,
                        /
2045  0000              SETSR,  0
2046  4503                      JMS I XFILD       /RESTORE DATA FIELD
2047  4522                      JMS I XCRLF       /CR, LF
2050  1270                      TAD STSR
2051  3012                      DCA 12
2052  1412              PSTSR,  TAD I 12                  /PRINT SETUP SR
2053  7450                      SNA               /DONE IF 0
2054  5257                      JMP ,+3
2055  4510                      JMS I XPERR
2056  5252                      JMP PSTSR
2057  6036                      KRB
2060  6031              WTCR,   KSF
2061  5265                      JMP ,+4
2062  6036                      KRB
2063  4510                      JMS I XPERR
2064  5645                      JMP I SETSR
2065  7604                      LAS
2066  3037                      DCA MCWA
2067  5260                      JMP WTCR
                        /
2070  2070              STSR,   ,
2071  0323                      323               /S
2072  0305                      305               /E
2073  0324                      324               /T
2074  0325                      325               /U
2075  0320                      320               /P
2076  0240                      240
2077  0323                      323               /S
2100  0322                      322               /R
2101  0000                      0
                        /
2102  0000              STALL,  0
2103  4503                      JMS I XFILD
2104  4317                      JMS GENRAN        /GET ANOTHER
2105  0316                      AND K17
2106  7040                      CMA
2107  3071                      DCA FLCNT
2110  1020                      TAD DATFLD
2111  1077                      TAD KCDF
2112  3313                      DCA ,+1
2113  6201                      CDF 00            /RESTORE DATA FIELD
2114  7200                      CLA
2115  5702                      JMP I STALL       /EXIT
                        /
2116  0017              K17,    0017
```

```
2117  0000  GENRAN, 0
2120  1355         TAD RANTAB
2121  7041         CIA
2122  1343         TAD RANDEX
2123  7640         SZA CLA
2124  5334         JMP RANTAD-1
2125  1356         TAD TBLRAN
2126  3343         DCA RANDEX
2127  1342         TAD RANCON
2130  7104         CLL RAL
2131  7430         SZL
2132  1123         TAD K1
2133  3342         DCA RANCON
2134  1743         TAD I RANDEX
2135  1342  RANTAD, TAD RANCON
2136  3743         DCA I RANDEX
2137  1743         TAD I RANDEX
2140  2343         ISZ RANDEX
2141  5717         JMP I GENRAN
                   /
2142  1234  RANCON, 1234
2143  2154  RANDEX, RANTBL+10
2144  4321  RANTBL, 4321
2145  1416         1416
2146  5363         5363
2147  6060         6060
2150  3035         3035
2151  2572         2572
2152  3237         3237
2153  0214         0214
2154  0000         0
2155  2154  RANTAB, .-1
2156  2144  TBLRAN, RANTBL
```

```
                    /
                    /ROUTINE TO DETERMINE FIELD FOR RELOCATION
                    /
      2200          *2200
                    /
2200  4503          CMOVE,  JMS I XFILD     /SET DF TO CURRENT FIELD
2201  7600                  7600
2202  1024                  TAD ERTBL
2203  3026                  DCA ERWRD               /SETUP ERROR TABLE POINTER
2204  1075                  TAD FIRST1              /FIRST TESTED FIELD
2205  7041                  CIA
2206  1076                  TAD LAST1               /LAST TESTED FIELD
2207  7650                  SNA CLA         /DON'T MOVE IF EQUAL
2210  5502                  JMP I XRTN              /START OVER
2211  1021                  TAD FLAGS
2212  7010                  RAR
2213  7430                  SZL     /FIRST MOVE IF A SKIP
2214  5725                  JMP I XTMV              /SETUP FOR NEXT MOVE
2215  7001                  IAC                     /SET BIT 11
2216  3021                  DCA FLAGS

2217  1076                  TAD LAST1               /LAST TO TEST = 1ST MOVE
2220  3023                  DCA INSFLD      /NEW CURRENT FIELD
2221  1023                  TAD INSFLD
2222  1114                  TAD M10         /SUBTRACT 1 FROM NEW CURRENT
2223  3124                  DCA NXLOC               /NXLOC=DOEST'N FOR NEXT TIME
2224  6224                  RIF
2225  7041                  CIA
2226  1023                  TAD INSFLD
2227  7650                  SNA CLA         /IS NEXT SAME AS CURRENT
2230  5266                  JMP SUB1                /YES, TRY NEXT LOWER FIELD
```

```
                        /CHECK FOR ERROR IN NEW FIELD
                        /
2231  2026      CKERR,  ISZ ERWRD               /POINTER+1
2232  1201              TAD CMOVE+1
2233  7041              CIA
2234  1426              TAD I ERWRD
2235  7650              SNA CLA           /NO ERRORS RECORDED IF 0
2236  5310              JMP STMV                  /INITIALIZE MOVE

2237  1426      CNXT,   TAD I ERWRD
2240  7041              CIA
2241  1023              TAD INSFLD
2242  7650              SNA CLA           /ERROR IN NEW FIELD IF 0
2243  5253              JMP EQUAL
2244  1026              TAD ERWRD
2245  7041              CIA
2246  1025              TAD ENTBL                 /ENTBL=ERWRD+10
2247  7650              SNA CLA           /TABLE DONE IF 0
2250  5310              JMP STMV                  /INITIALIZE MOVE
2251  2026              ISZ ERWRD                 /POINTER+1
2252  5237              JMP CNXT
                        /
2253  1426      EQUAL,  TAD I ERWRD       /GET ERROR FIELD
2254  7041              CIA
2255  1075              TAD FIRST1
2256  7650              SNA CLA           /DON'T MOVE IF = TO FIRST
2257  5502              JMP I XRTN        /START OVER
2260  1426              TAD I ERWRD
2261  7650              SNA CLA           /IS IT FIELD 0?
2262  5266              JMP SUB1                  /YES
2263  1023              TAD INSFLD                /CURRENT NEXT
2264  1114              TAD M10           /SUBTRACT 1 FROM DF
2265  3124              DCA NXLOC
                        /
2266  1024      SUB1,   TAD ERTBL
2267  3026              DCA ERWRD                 /RESTORE TABLE POINTER
2270  1124              TAD NXLOC
2271  7041              CIA
2272  1023              TAD INSFLD
2273  7650              SNA CLA           /NEXT = CURRENT NEXT IF 0
2274  5253              JMP EQUAL
2275  1124              TAD NXLOC
2276  3023              DCA INSFLD        /NEW CURRENT FIELD
2277  1023              TAD INSFLD
2300  7041              CIA
2301  1075              TAD FIRST1        /IS IT = LOWEST FIELD
2302  7650              SNA CLA
2303  5231              JMP CKERR                 /YES
2304  1023              TAD INSFLD        /CURRENT NEW FIELD
2305  1114              TAD M10           /SUBTRACT 1 FROM DF
2306  3124              DCA NXLOC                 /NEXT FIELD LOWER
2307  5231              JMP CKERR
```

```
                        /
2310  7200              STMV,   CLA
2311  1024                      TAD ERTBL
2312  3026                      DCA ERWRD             /RESTORE TABLE POINTER
2313  6224                      RIF
2314  3723                      DCA I XSRCE
2315  1723                      TAD I XSRCE
2316  7041                      CIA
2317  1023                      TAD INSFLD
2320  7650                      SNA CLA         /DON'T MOVE IF EQUAL
2321  5502                      JMP I XRTN      /START OVER
2322  5724                      JMP I XMVE      /GO MOVE
                        /
2323  2522              XSRCE,  SOURCE
2324  2507              XMVE,   MOVE
2325  2400              XTMV,   NXTMV
                        /
```

```
      2400                *2400
                          /
2400  7600    NXTMV,      /600
2401  6224                RIF
2402  3322                DCA SOURCE        /CURRENT FIELD
2403  2026    CHNXT,      ISZ ERWRD               /POINTER +1
2404  1200                TAD NXTMV
2405  7041                CIA
2406  1426                TAD I ERWRD
2407  7650                SNA CLA           /NO ERRORS RECORDED IF 0
2410  5225                JMP STNXT               /INITIALIZE MOVE
2411  1426    CKNXT,      TAD I ERWRD
2412  7041                CIA
2413  1124                TAD NXLOC
2414  7650                SNA CLA           /ERROR IN NEW FIELD IF 0
2415  5255                JMP SUB2                /TRY NEXT LOWER FIELD
2416  1026                TAD ERWRD
2417  7041                CIA
2420  1025                TAD ENTBL
2421  7650                SNA CLA           /DONE WITH TABLE IF 0
2422  5225                JMP STNXT               /INITIALIZE MOVE
2423  2026                ISZ ERWRD               /POINTER +1
2424  5211                JMP CKNXT
                          /
2425  1024    STNXT,      TAD ERTBL
2426  3026                DCA ERWRD               /RESTORE TABLE POINTER
2427  1124                TAD NXLOC               /NEXT LOWER FIELD
2430  7041                CIA
2431  1023                TAD INSFLD
2432  7650                SNA CLA           /NEXT=CURRENT IF 0
2433  5242                JMP CKNT
2434  1124                TAD NXLOC
2435  7041                CIA
2436  1075                TAD FIRST1
2437  7640                SZA CLA           /NEXT = LOWEST IF 0
2440  5247                JMP STNX
2441  5302                JMP MVBK                /MOVE TO LOWEST TEST FIELD
2442  1124    CKNT,       TAD NXLOC
2443  7041                CIA
2444  1075                TAD FIRST1
2445  7650                SNA CLA           /NEXT = LOWEST IF 0
2446  5275                JMP NXTHI               /SETUP TO MOVE TO HIGHEST
2447  1124    STNX,       TAD NXLOC               /NEXT LOWER FIELD
2450  3023                DCA INSFLD        /IS NOW CURRENT FIELD
2451  1023                TAD INSFLD
2452  1114                TAD M10           /SUBTRACT 1 FROM NEW
2453  3124                DCA NXLOC               /NEW NEXT LOWER FIELD
2454  5307                JMP MOVE                /GO MOVE
                          /
```

```
                        /
2455  1024      SUB2,   TAD ERTBL
2456  3026              DCA ERWRD           /RESTORE TABLE POINTER
2457  1124              TAD NXLOC           /NEXT LOWER FIELD
2460  7450              SNA                 /=FIELD 0 IF 0
2461  5502              JMP I XRTN          /START OVER CAN'T MOVE
2462  1114              TAD M10             /SUBTRACT 1
2463  3124              DCA NXLOC           /NOW = 2 FIELDS LOWER
2464  1124              TAD NXLOC
2465  7041              CIA
2466  1023              TAD INSFLD          /CURRENT FIELD
2467  7640              SZA CLA             /ARE THEY EQUAL
2470  5203              JMP CHNXT           /NO
2471  1124              TAD NXLOC           /YES
2472  7450              SNA                 /DOES IT = FIELD 0
2473  5203              JMP CHNXT           /YES
2474  5262              JMP SUB2+5          /NO
                        /
2475  1076      NXTHI,  TAD LAST1           /VERY LAST TO TEST
2476  3124              DCA NXLOC           /MAKE IT NEXT FIELD
2477  1076              TAD LAST1
2500  3023              DCA INSFLD
2501  5203              JMP CHNXT
                        /
2502  1124      MVBK,   TAD NXLOC
2503  3023              DCA INSFLD
2504  6224              RIF
2505  3322              DCA SOURCE
2506  3021              DCA FLAGS           /CLEAR BIT 11
```

```
                        /
                        /ROUTINE TO RELOCATE 4K FIELDS
                        /
2507  1077  MOVE,  TAD KCDF              /6201
2510  1322        TAD SOURCE      /CURRENT FIELD
2511  3322        DCA SOURCE      /SOURCE NOW = CDF N
2512  1077        TAD KCDF              /6201
2513  1023        TAD INSFLD      /NEW FIELD
2514  3324        DCA DESTN             /DESTN NOW = CDF N
2515  7040        CMA
2516  3010        DCA 10          /SOURCE COUNT
2517  7040        CMA
2520  3011        DCA 11          /DESTINATION COUNT
2521  3072        DCA LOOP              /4K COUNTER
2522  0000  SOURCE, 0               /WILL = CDF N
2523  1410        TAD I 10              /TAKE FROM HERE
2524  0000  DESTN, 0
2525  3411        DCA I 11              /PUT IN HERE
2526  2072        ISZ LOOP              /DONE 4K WHEN SKIP
2527  5322        JMP SOURCE      /KEEP MOVING
2530  1100        TAD KCIF              /6202
2531  1023        TAD INSFLD      /NEW FIELD
2532  3333        DCA .+1
2533  6202        CIF 00          /CHANGE TO NEW FIELD
2534  5502        JMP I XRTN      /EXIT TO RTN1 IN
                                  /NEW FIELD
                        $
```

THERE ARE NO ERRORS

SYMBOL TABLE

ALAW	0220
ALOK	1473
BAD	1363
BADD	2034
BEGIN	0200
BSPCE	2000
CBANK	1066
CDF	6201
CFLD	1161
CHAR	0106
CHNXT	2403
CIF	6202
CKDNØ	0642
CKDN1	0470
CKERR	2231
CKNT	2442
CKNXT	2411
CMOVE	2200
CNXT	2237
COMPR	0127
COUNT	0070
CRLF	1354
DATA	0143
DATFLD	0020
DESTN	2524
ENTBL	0025
EPRNT	1254
EQUAL	2253
EREXT	1246
ERROR	1200
ERTBL	0024
ERWRD	0026
EXAM1	0237
EXAM2	0244
EXAM3	0251
EXAM4	0256
EXHDR	1763
EXIT	0125
EXT3	0501
EXT4	0650
FIELD	1125
FILD	1732
FIRST1	0075
FLAGS	0021
FLCNT	0071
FLDN	1644
GENRAN	2117
GODD	1755
GOOD	1364
HALT	2041
INSFLD	0023
KCDF	0077
KCIF	0100

SYMBOL TABLE

KEYIN	1503
K1	0123
K10	0040
K100	0044
K17	2116
K20	0046
K200	0043
K207	1367
K212	1371
K215	0116
K240	1370
K254	1553
K260	0115
K261	0055
K262	0056
K263	0057
K264	0060
K277	0121
K370	0120
K377	0117
K40	0045
K400	0042
K7	0105
K740	0041
LAST	1366
LAST1	0076
LBK1	1007
LBK2	1036
LEGAL	1514
LOCAT	1600
LOOP	0072
MC"A	0037
MEMADR	0074
MOVE	2507
MVBK	2502
M1	0142
M10	0114
M13	0112
M14	0113
M20	0061
M4	0063
M40	0062
M5	0064
NXLOC	0124
NXTBNK	1103
NXTHI	2475
NX_TMV	2400
OCADR	1365
OKAS	1456
ONES	1057
OTLDR	1741
OVER	1145
PATR	0126

SYMBOL TABLE

PBAD	2005
PFILD	1700
PGOOD	1724
PHDR	1674
PLIMT	1652
PLOCT	1612
POCDR	1712
POSITN	1331
PRERR	1346
PRGAM	1617
PROCTL	1326
PSTSR	2052
PTSTN	2017
QUERY	1544
RANCON	2142
RANDEX	2143
RANTAB	2155
RANTAD	2135
RANTBL	2144
RBK1	1000
RBK2	1030
RDF	6214
RFR1	0720
RFR2	0736
RIF	6224
RROT	0441
RR1T	0604
RSL0	0600
RSL1	0436
RSTRT1	0211
RTN1	0213
SAVIF	1102
SETSR	2045
SETU1	1400
SHIFT	0141
SLMTS	1407
SOURCE	2522
SPING	1315
STALL	2102
STMV	2310
STNX	2447
STNXT	2425
STSR	2070
SUB1	2266
SUB2	2455
SW0	1311
SW1	1242
SW2	1233
TBLRAN	2156
TLIMT	1646
TNUM	0065
TSTL	1657
TSTN	2026

SYMBOL TABLE

TST1	0276
TST1A	0313
TST2	0330
TST2A	0346
TST3	0400
TST4	0503
WFR1	0654
WFR2	0662
WRB1	0671
WRB2	0704
WRLOP	1147
WROT	0414
WR1T	0520
WTCR	2060
XBAK	0132
XBAK2	0136
XBANK	0066
XCRLF	0122
XFILD	0103
XFWD	0131
XFWD2	0135
XHDR	0107
XHLT	0101
XLCAT	1552
XLWTS	0022
XMOVE	0053
XMVE	2324
XONES	0140
XPERR	0110
XpHDR	2044
XPING	0111
XPRER	0104
XRROR	0073
XRTN	0102
XRT4	0652
XSALL	1065
XSETU	0054
XSLØ	0552
XSRCE	2323
XSTSR	0275
XST4	0653
XTBNK	0067
XTLIM	1551
XTMV	2325
XTST1	0047
XTST2	0050
XTST3	0051
XTST4	0052
XT4	0551
XWRB	0133
XWRB2	0137
XWRF	0130
XWRF2	0134

SYMBOL TABLE

SYMBOL TABLE

DATFLD	0020
FLAGS	0021
XLMTS	0022
INSFLD	0023
ERTBL	0024
ENTBL	0025
ERWRD	0026
MCWA	0037
K10	0040
K740	0041
K400	0042
K200	0043
K100	0044
K40	0045
K20	0046
XTST1	0047
XTST2	0050
XTST3	0051
XTST4	0052
XMOVE	0053
XSETU	0054
K261	0055
K262	0056
K263	0057
K264	0060
M20	0061
M40	0062
M4	0063
M5	0064
TNUM	0065
XBANK	0066
XTBNK	0067
COUNT	0070
FLCNT	0071
LOOP	0072
XRROR	0073
MEMADR	0074
FIRST1	0075
LAST1	0076
KCDF	0077
KCIF	0100
XHLT	0101
XRTN	0102
XFILD	0103
XPRER	0104
K7	0105
CHAR	0106
XHDR	0107
XPERR	0110
XPING	0111
M13	0112
M14	0113
M10	0114

SYMBOL TABLE

K260	0115
K215	0116
K377	0117
K370	0120
K277	0121
XCRLF	0122
K1	0123
NXLOC	0124
EXIT	0125
PATR	0126
COMPR	0127
XWRF	0130
XFWD	0131
XBAK	0132
XWRB	0133
XWRF2	0134
XFWD2	0135
XBAK2	0136
XWRB2	0137
XONES	0140
SHIFT	0141
M1	0142
DATA	0143
BEGIN	0200
RSTRT1	0211
RTN1	0213
ALAW	0220
EXAM1	0237
EXAM2	0244
EXAM3	0251
EXAM4	0256
XSTSR	0275
TST1	0276
TST1A	0313
TST2	0330
TST2A	0346
TST3	0400
WROT	0414
RSL1	0436
RROT	0441
CKDN1	0470
EXT3	0501
TST4	0503
WR1T	0520
XT4	0551
XSL0	0552
RSL0	0600
RR1T	0604
CKDN0	0642
EXT4	0650
XRT4	0652
XST4	0653
WFR1	0654

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WFR2	0662
WRB1	0671
WRB2	0704
RFR1	0720
RFR2	0736
RBK1	1000
LBK1	1007
RBK2	1030
LBK2	1036
ONES	1057
XSALL	1065
CBANK	1066
SAVIF	1102
NXTBNK	1103
FIELD	1125
OVER	1145
WRLOP	1147
CFLD	1161
ERROR	1200
SW2	1233
SW1	1242
EREXT	1246
EPRNT	1254
SW0	1311
SPING	1315
PROCTL	1326
POSITN	1331
PRERR	1346
CRLF	1354
BAD	1363
GOOD	1364
OCADR	1365
LAST	1366
K207	1367
K240	1370
K212	1371
SETU1	1400
SLMTS	1407
OKAS	1456
ALOK	1473
KEYIN	1503
LEGAL	1514
QUERY	1544
XTLIM	1551
XLCAT	1552
K254	1553
LOCAT	1600
PLOCT	1612
PRGAM	1617
FLON	1644
TLIMT	1646
PLIMT	1652
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PHDR	1674
PFILD	1700
POCDR	1712
PGOOD	1724
FILD	1732
OTLDR	1741
GODD	1755
EXHDR	1763
BSPCE	2000
PBAD	2005
PTSTN	2017
TSTN	2026
BADD	2034
HALT	2041
XPHDR	2044
SETSR	2045
PSTSR	2052
WTCR	2060
STSR	2070
STALL	2102
K17	2116
GENRAN	2117
RANTAD	2135
RANCON	2142
RANDEX	2143
RANTBL	2144
RANTAB	2155
TBLRAN	2156
CMOVE	2200
CKERR	2231
CNXT	2237
EQUAL	2253
SUB1	2266
STMV	2310
XSRCE	2323
XMVE	2324
XTMV	2325
NXTMV	2400
CHNXT	2403
CKNXT	2411
STNXT	2425
CKNT	2442
STNX	2447
SUB2	2455
NXTHI	2475
MVBK	2502
MOVE	2507
SOURCE	2522
DESTN	2524
CDF	6201
CIF	6202
RDF	6214
RIF	6224

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