)   )   )   [

IDENTIFICATION

PRODUCT CODE: MAINDEC-8E-D0FC-D

PRODUCT NAME: RANDOM ISZ TEST

DATE CREATED: JUNE 11, 1971

MAINTAINER: DIAGNOSTIC GROUP

AUTHOR: BRUCE HANSEN

)   )   )   '

1.   ABSTRACT

       THIS PROGRAM IS WRITTEN TO TEST THE ISZ INSTRUCTION OF THE
       PDP-8E. AN ISZ INSTRUCTION IS PLACED IN A FROM LOCATION, AND
       A TO LOCATION CONTAINS THE OPERAND. PART 1 OF THE PROGRAM
       SELECTS FROM, TO, AND OPERAND FROM A RANDOM NUMBER GENERATOR,
       WITH THE OPTION OF HOLDING ANY OR ALL CONSTANT. PART 2 USES
       A FIXED SET OF FROM, TO, AND OPERAND NUMBERS.

2.   REQUIREMENTS

2.1   EQUIPMENT

       ONE PDP-8E EQUIPPED WITH TELETYPE.

2.2   STORAGE

       THIS PROGRAM USES LOCATIONS 0000-7600(8). THE BINARY LOADER
       MUST BE STORED IN THE LAST MEMORY PAGE.

2.3   PRELIMINARY PROGRAM

       MAINDEC-8E-D0A(N), AND MAINDEC-8E-D0B(N) MUST HAVE RUN SUCCESSFULLY.

3.   LOADING PROCEDURE

       THE STANDARD BINARY LOADER IS USED.

4.   STARTING PROCEDURE

4.1   SWITCH SETTINGS

       SR0(0) = HALT ON ERROR
       SR1(1) = ELIMINATE ERROR PRINTOUTS
       SR3   = FIXED FROMS (1)
                RANDOM FROMS (0)
       SR4   = FIXED TOS (1)
                RANDOM TOS (0)
       SR5   = FIXED OPERAND (1)
                RANDOM OPERAND (0)
       SR9(0) = DO ONE ISZ ONLY
       SR11(1)= DO TEST PART 2 SR3, 4, 5, MUST BE 0'S
       SR11(0)= DO TEST PART 1

4.2   STARTING ADDRESS

       200

4.3   OPERATOR ACTION

    A. SET SR (SWITCH REGISTER) TO 0200 AND PRESS LOAD ADDRESS.
    B. SET SR TO DESIRED MODE OF OPERATION; FOR MOST RUNS, SR9=0
        ALLOWS THE MOST TESTING IN THE LEAST AMOUNT OF TIME.

        FOR FIXED FROM, TO, OR OPERAND USAGE, THE FIXED NUMBER MAY
        BE SELECTED AND ENTERED INTO THE MEMORY LOCATIONS SHOWN
        BELOW:

        FROM   =0002
        TO   =0021
        OPERAND   =0022

    C. PRESS, CLEAR AND THEN CONTINUE.

5.   OPERATING PROCEDURE
    --------- ---------

    SAME AS PARAGRAPH 4.

6.   ERRORS

6.1   ERROR HALTS AND DESCRIPTION
    ----- ----- --- -----------

    C(PC)   CAUSE

    0002   PERIPHERAL INTERRUPT
    0254   HALT ON ERROR, SR0=0

6.2   ERROR PRINTOUTS
    ----- ---------

    F   XXXX   T   YYYY
    0   ZZZZ   F   MMMM   R   NNNN   NS

6.2.1 PRINTOUT EXPLANATION
    -------- -----------

    (FROM)   F XXXX   -THE ISZ INSTRUCTION IN LOCATION XXXX
                   FAILED.

    (TO)   T YYYY   -THE OPERAND ADDRESS OF THE ISZ INSTRUC-
                   TION WAS YYYY.

    (OPERAND)   0 ZZZZ   -THE STARTING COUNT IN THE ISZ LOOP WAS
                   ZZZZ.

    (FAILED)   F MMMM   -THE FAILURE OCCURRED TRYING TO ISZ THE
                   NUMBER MMMM.

    (RESULT)   R NNNN   -THE RESULT OF THIS ISZ WAS NNNN.

             NS   -NO SKIP OCCURRED

             S,   -INDICATES A SKIP.

)   )   )

)   )   )

6.2.2   EXAMPLES

         A.   THE FOLLOWING IS A TYPICAL ERROR PRINTOUT.

              F 3003 T 5470
              0 3705 F 4777 R 5000 S

              LINE 1 OF THE PRINTOUT IS A STATEMENT OF THE PROBLEM. IT
              SAYS THAT LOCATED AT 3003 IS AN ISZ INSTRUCTION INCREMENTING
              AN OPERAND STORED IN LOCATION 5470. LINE 2 OF THE PRINTOUT
              GIVES INFORMATION FOR ERROR ANALYSIS. 3705 WAS THE INITIAL
              OPERAND, 4777 WAS THE OPERAND BEING INCREMENTED WHEN THE ERROR
              OCCURRED, AND 5000 IS THE OPERAND FOLLOWING THE FAILING
              INCREMENT. THE S INDICATES THAT THE INCREMENT RESULTED IN
              A SKIP. THE ERROR HERE IS OBVIOUSLY THAT THE SKIP SHOULD NOT
              HAVE OCCURRED.

         B.   THE FOLLOWING IS ANOTHER TYPICAL ERROR PRINTOUT.

              F 3003 T 5470
              0 3705 F 4777 R 5020 NS

              THIS IS IDENTICAL TO EXAMPLE (A) EXCEPT THAT A DIFFERENT
              TYPE OF ERROR HAS OCCURRED. THE RESULT OF INCREMENTING 4777
              SHOULD BE 5000, NOT 5020.

6.3   ERROR RECOVERY
         ----- --------

         THE PROGRAM CONTINUES ON, FOLLOWING AN ERROR PRINTOUT UNLESS
         SR0=0. AFTER A HALT ON ERROR, PUSH CONTINUE TO RESUME TESTING.
         WHEN ERRORS EXIST, A FAILING CONDITION CHOSEN FROM THOSE TYPED
         OUT MUST BE USED WITH THE SCOPE MODE. FOR THE SCOPE MODE,
         PERFORM THE FOLLOWING STEPS:

         A.   STOP THE PROGRAM.

         B.   INSERT CHOSEN FROM INTO LOCATION 0002.

         C.   INSERT CHOSEN TO INTO LOCATION 0021.

         D.   INSERT CHOSEN FAILING OPERAND INTO LOCATION 0022

         E.   RESTART PROGRAM WITH CONTROL SWITCHES 1,3,4,5, SET TO
              1 AND 9 SET TO A 0.

         NOTE: BY SETTTING SR0 TO A 0, THE PROGRAM HALTS FOLLOWING
         THE ERROR PRINTOUT. THE OPERATOR MAY AT THIS TIME SET
         SWITCHES 1, 3, 4, 5, TO A 1 AND 9 TO A 0 AND PUSH CONTINUE.
         THE PROGRAM ENTERS A SCOPE MODE USING THE FAILING CONDITIONS
         JUST PRINTED.

7.   RESTRICTIONS

7.1   STARTING RESTRICTIONS
      --------- ------------

      NONE.

7.2   OPERATING RESTRICTIONS
      ---------- ------------

      THE INTERRUPT IS ENABLED DURING PROGRAM OPERATION. ANY ATTACHED
      DEVICE WHICH MIGHT CAUSE SPURIOUS INTERRUPTS, MUST BE DISABLED.

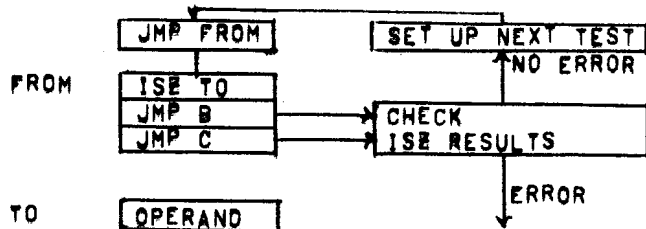8.   MISCELLANEOUS

8.1   EXECUTION TIME
      --------- ----

      SR9 = 1. 11,000 ISZ OPERATIONS/SECOND.
      SR9 = 0.   3,500 ISZ OPERATIONS/SECOND.

)   )   )

PROGRAM DESCRIPTION

THE TEST LOOP IS SHOWN BELOW:

```
              ┌─────────┐      ┌──────────────────┐
              │ JMP FROM│ ◄────┤ SET UP NEXT TEST │
              └─────────┘      └──────────────────┘
                                      ▲ NO ERROR
      FROM    ┌─────────┐             │
              │ ISZ TO  │      ┌───────────────┐
              │ JMP B   │─────►│ CHECK         │
              │ JMP C   │─────►│ ISZ RESULTS   │
              └─────────┘      └───────────────┘
                                      │ ERROR
      TO      ┌─────────┐             ▼
              │ OPERAND │
              └─────────┘
```

PART 1 OF THE PROGRAM USES A RANDOM NUMBER GENERATOR TO SELECT
THE FROM, TO, AND OPERAND NUMBERS. ONCE SELECTED, THE OPERAND
IS INCREMENTED UNTIL IT REACHES ZERO. EACH ISZ IS CHECKED BY
DUPLICATING ISZ WITH TAD, IAC, DCA. EACH ITERATION IS ALSO
CHECKED FOR THE PROPER SKIP OR NO-SKIP CONDITION.

PART 2 OF THE PROGRAM IS ACTUALLY PART 1, WITH THE RANDOM NUMBER
GENERATED REPLACED BY A FIXED NUMBER GENERATOR. SEQUENCING OF
EVENTS IS AS FOLLOWS:

(NOTE: 621(8)<MEMORY TEST AREA<7600(8)):

A. FROM = 621 TO = 624 TEST A SET OF 24 SELECTED OPERANDS.
    TO SAVE TIME IT IS SUGGESTED THAT SR9 = 0, SO THAT THE ISZ
    IS PERFORMED ON EACH OPERAND ONLY ONCE INSTEAD OF INCREMENT-
    ING IT UNTIL THE ISZ INSTRUCTION SKIPS.

B. FROM = 621 TO =625 REPEAT THE SET OF OPERANDS USED IN (A)
    ABOVE.

    THIS SEQUENCE CONTINUES UNTIL TO REACHES THE UPPER LIMIT OF
    THE MEMORY TEST AREA. FROM IS THEN INCREMENTED BY 1 AND
    THE PROCESS IS REPEATED. WHEN FROM REACHES THE UPPER LIMIT
    OF THE MEMORY TEST AREA, THE TEST IS COMPLETE.

    IDEALLY, IT IS DESIRABLE TO ISZ EVERY LOCATION FROM EVERY
    OTHER LOCATION IN THE TEST AREA AND, IN DOING SO, USE ALL 24
    OF THE SELECTED WORST CASE OPERANDS FOR EACH SET OF
    ADDRESSES. THIS IS WHAT PART 2 DOES, BUT IT TAKES MANY
    DAYS TO COMPLETE THE TEST. IT IS FOR THIS REASON THAT THE
    PROGRAM USES THE RANDOM NUMBER GENERATOR SYSTEM OF PART 1.
    PART 2 IS AN ADDITIONAL FEATURE OF THE PROGRAM WITH VERY
    LIMITED USE.

    A FC IS PRINTED AFTER EACH GROUP OF 32,000 TESTS.

)   )   )

```
                        /PDP-8E ISZ TEST
                        /COPYRIGHT 1970, DIGITAL EQUIPMENT CORP., MAYNARD, MASS.  01754
                        /
                        /CONSTANTS AND VARIABLES
             0000       *0
0000  0000                      0
0001  5001                      JMP 1                   /PERIPHERAL INTERRUPT
0002  0002              FRMLOC, 2                       /ISZ TEST INSTRUCTION LOCATION
0003  0003              LIMLO,  3                       /LOW LIMIT TEST AREA
0004  0000                      0
0005  0000                      0
0006  0202              LIMHI,  -7576                   /HIGH LIMIT TEST AREA
0007  0547              ASUC,   SUC
0010  0007              MSK7,   0007                    /OCTAL CONVERSION MASK
0011  0000              WORK,   0                       /IR0
0012  0000              WORK1,  0                       /IR1
0013  7401              M377,   -377
0014  3607              NUM,    3607                    /THE RANDOM NUMBER LOCATION
0015  0003              THREE,  3

0016  2421              ISZ1,   ISZ I TOLOC             /MOVING ISZ
0017  5116              JMP1,   JMP BACK                        /TEST INSTRUCTION
0020  5141              JMP2,   JMP BAKBRN              /GROUP.
0021  0000              TOLOC,  0                       /LOCATION TO BE ISZ'D
0022  0000              PATRN,  0                       /STARTING ISZ PATTERN
0023  0000              BEFOR,  0                       /FAILING PATTERN BEFORE FAILING ISZ
0024  0000              AFTER,  0                       /PREDICTED RESULTS OF EACH ISZ
0025  0004              K4,     4                       /SWITCH REGISTER MASKS
0026  0400              K0400,  0400
0027  0200              K0200,  0200
0030  0100              K0100,  0100
0031  0000              NOTE,   0                       /7'S=ERROR WITH NO SKIP
0032  0257              PRINT,  INF1-1                  /0'S=ERROR WITH SKIP
0033  0201              AERR1,  ERR1
0034  0206              AERR2,  ERR2
0035  0413              APDR,   PDR
0036  1014              ITADNM, TAD NUM
0037  0600              ATFCLF, TFCLF


                        /SR0(0)=HALT AFTER ERROR PRINTOUT
                        /SR1(1)=NO PRINTOUTS
                        /SR3(1) = HOLD FROM CONSTANT
                        /SR4(1) = HOLD TO CONSTANT
                        /SR5(1) = HOLD PATTERN CONSTANT
                        /SR9(0) = DO ONE ISZ ONLY
                        /SR11(1) = DO TEST PART 2
                        /
                        /

                        /PROGRAM START
0040  4441              START,  JMS I .+1               /ION
0041  0614                      PATCH                   /LAS
0042  0015                      AND THREE
```

```
         0043   7640              SZA CLA              /SKIP IF PART 1
         0044   5426              JMP I K0400          /GO TO PART 2
         0045   1036              TAD ITADNM
         0046   3165              DCA RANUM+1
                                  /CHECK FOR FIXED PATTERN
         0047   7604    CHEK1,    LAS
         0050   0030              AND K0100
         0051   7440              SZA
         0052   5055              JMP CHEK2


                                  /SELECT THE PATTERN
         0053   4164    SELPAT,   JMS RANUM
         0054   3022              DCA PATRN

                                  /CHECK FOR FIXED TO
         0055   7604    CHEK2,    LAS
         0056   0027              AND K0200
         0057   7640              SZA CLA
         0060   5065              JMP CHEK3

                                  /SELECT THE TO LOCATION
         0061   4164    SELTO,    JMS RANUM
         0062   3021              DCA TOLOC
         0063   1021              TAD TOLOC
         0064   4151              JMS LIMTST

                                  /CHECK FOR FIXED FROM
         0065   7604    CHEK3,    LAS
         0066   0026              AND K0400
         0067   7640              SZA CLA
         0070   5075              JMP PLCINT

                                  /SELECT THE FROM LOCATION
         0071   4164    SELFRM,   JMS RANUM
         0072   3002              DCA FRMLOC
         0073   1002              TAD FRMLOC
         0074   4151              JMS LIMTST

                                  /PLACE FROM INSTRUCTIONS

         0075   7240    PLCINT,         CLA CMA
         0076   1002              TAD FRMLOC
         0077   3011              DCA WORK
         0100   1016              TAD ISZ1
         0101   3411              DCA I WORK
         0102   1017              TAD JMP1
         0103   3411              DCA I WORK
         0104   1020              TAD JMP2
         0105   3411              DCA I WORK


                                  /DEPOSIT PATTERN IN TO LOCATION
         0106   1022              TAD PATRN
         0107   3421              DCA I TOLOC
```

```
                            /STORE PREDICTED ISZ RESULT
      0110  1022            TAD PATRN
      0111  3023            DCA BEFOR
      0112  1023    LUP1,   TAD BEFOR
      0113  7001            IAC
      0114  3024            DCA AFTER
      0115  5407            JMP I ASUC

                            /RETURN FOR NO SKIP CONDITION
      0116  7604    BACK,   LAS
      0117  7004            RAL
      0120  7710            SPA CLA
      0121  5132            JMP LAS1
      0122  1421            TAD I TOLOC
      0123  7041            CIA
      0124  1024            TAD AFTER
      0125  7640            SZA CLA
      0126  5433            JMP I AERR1      /ERROR IN ISZ OPERATION
      0127  1421            TAD I TOLOC
      0130  7650            SNA CLA
      0131  5433            JMP I AERR1      /ERROR IN ISZ SKIP DETECTION
      0132  7604    LAS1,   LAS
      0133  0025            AND K4
      0134  7650            SNA CLA          /SKIP IF NOT ONE ISZ (SR9)
      0135  5047            JMP CHEK1
      0136  7001            IAC
      0137  1023            TAD BEFOR
      0140  5111            JMP LUP1-1

                            /RETURN FOR SKIP CONDITION
      0141  7604    BAKBRN, LAS
      0142  7004            RAL
      0143  7710            SPA CLA
      0144  5047            JMP CHEK1
      0145  1421            TAD I TOLOC
      0146  7640            SZA CLA          /SKIP IF TO LOCATION OK
      0147  5434            JMP I AERR2      /ERROR IN ISZ LOCATION
      0150  5047            JMP CHEK1

                    /TEST HIGH-LOW LIMITS

      0151  0000    LIMTST, 0
      0152  7510            SPA
      0153  5160            JMP .+5
      0154  1003            TAD LIMLO
      0155  7700            SMA CLA
      0156  5551            JMP I LIMTST
      0157  5165            JMP RANUM+1
      0160  1006            TAD LIMHI
      0161  7700            SMA CLA
      0162  5165            JMP RANUM+1
      0163  5551            JMP I LIMTST
```

```
                              /RANDOM NUMBER GENERATOR
         0164   0000    RANUM,   0
         0165   1014            TAD NUM
         0166   7104            RAL CLL
         0167   7430            SEL
         0170   1015            TAD THREE
         0171   3014            DCA NUM
         0172   1014            TAD NUM          /AC=NEW RANDOM NUMBER
         0173   5564            JMP I RANUM

         0174   1000    K1000,   1000
         0175   0000    KP,      0


                0200    *200
         0200   5040            JMP      START
                              /ERROR ROUTINE 1
         0201   1340    ERR1,    TAD SKPDAT+6
         0202   3332            DCA SKPDAT
         0203   7040            CMA
         0204   3031            DCA NOTE
         0205   5210            JMP KPGO


                              /ERROR ROUTINE 2
         0206   1331    ERR2,    TAD SKPDAT-1
         0207   3332            DCA SKPDAT
         0210   1002    KPGO,    TAD FRMLOC
         0211   3011            DCA WORK
         0212   1370            TAD A3
         0213   4342            JMS SETUP

         0214   1021            TAD TOLOC
         0215   3011            DCA WORK
         0216   1371            TAD A4
         0217   4342            JMS SETUP

         0220   1022            TAD PATRN
         0221   3011            DCA WORK
         0222   1372            TAD A5
         0223   4342            JMS SETUP
         0224   1023            TAD BEFOR
         0225   3011            DCA WORK
         0226   1373            TAD A6
         0227   4342            JMS SETUP

         0230   1421            TAD I TOLOC
         0231   3011            DCA WORK
         0232   1374            TAD A7
         0233   4342            JMS SETUP

                              /TTY PRINT ROUTINE
         0234   6002    TTY,     IOF
         0235   1032            TAD PRINT
         0236   3011            DCA WORK
         0237   1411            TAD I WORK
```

)   )   )

```
          0240   6046              TLS
          0241   6041              TSF
          0242   5241              JMP .-1
          0243   1013              TAD M377
          0244   7640              SZA CLA
          0245   5237              JMP TTY+3
          0246   6042              TCF
          0247   6001              ION
          0250   7604              LAS
          0251   7700              SMA CLA
          0252   7402              HLT                  /HALT AFTER ERROR (SR0)

          0253   1031              TAD NOTE
          0254   7650              SNA CLA
          0255   5047              JMP CHEK1
          0256   3031              DCA NOTE
          0257   5132              JMP LAS1                  /RETURN TO NO SKIP ROUTINE


                                   /ERROR PRINT OUT LINE 1
          0260   0306     INF1,    306                  /F      FROM (INSTRUCTION LOCATION)
          0261   0240              240                  /SPACE
          0262   0000     INDATA,  0                    /X      LOCATION
          0263   0000              0                    /X
          0264   0000              0                    /X
          0265   0000              0                    /X
          0266   0240              240                  /SPACE
          0267   0240              240                  /SPACE
          0270   0324              324                  /T      TO (OPERAND ADDRESS)
          0271   0240              240                  /SPACE
          0272   0000     ONDATA,  0                    /X      ADDRESS
          0273   0000              0                    /X
          0274   0000              0                    /X
          0275   0000              0                    /X
          0276   0215              215                  /CR
          0277   0212              212                  /LF
          0300   0215              215                  /CR
          0301   0215              215                  /CR


                                   /ERROR PRINTOUT LINE 2
          0302   0317              317                  /O      OPERAND (STARTING COUNT)
          0303   0240              240                  /SPACE
          0304   0000     STDATA,  0                    /X      PATTERN
          0305   0000              0                    /X
          0306   0000              0                    /X
          0307   0000              0                    /X
          0310   0240              240                  /SPACE
          0311   0240              240                  /SPACE
          0312   0306              306                  /F      FAILING COUNT
          0313   0240              240                  /SPACE
          0314   0000     FLDATA,  0                    /X      PATTERN BEFORE FAILING ISZ
          0315   0000              0                    /X
          0316   0000              0                    /X
          0317   0000              0                    /X
          0320   0240              240                  /SPACE
```

```
       0321  0240                240              /SPACE
       0322  0322                322              /R         RESULT AFTER FAILURE
       0323  0240                240              /SPACE


       0324  0000       RSDATA,  0                /X         PATTERN AFTER FAILING ISZ
       0325  0000                0                /X
       0326  0000                0                /X
       0327  0000                0                /X
       0330  0240                240              /SPACE
       0331  0240                240              /SPACE
       0332  0316       SKPDAT,  316              /N         NO
       0333  0323                323              /S         SKIP
       0334  0215                215              /CR
       0335  0212                212              /LF
       0336  0212                212              /LF
       0337  0377                377              /RUBOUT
       0340  0316                316              /N
       0341  0323                323              /S

       0342  0000       SETUP,   0
       0343  3012                DCA WORK1
       0344  1011                TAD WORK
       0345  7006                RTL
       0346  7006                RTL
       0347  4362                JMS MORSU
       0350  7012                RTR
       0351  7012                RTR
       0352  7012                RTR
       0353  4362                JMS MORSU
       0354  7012                RTR
       0355  7010                RAR
       0356  4362                JMS MORSU
       0357  4362                JMS MORSU
       0360  7200                CLA
       0361  5742                JMP I SETUP
       0362  0000       MORSU,   0
       0363  0010                AND MSK7
       0364  1375                TAD TW6
       0365  3412                DCA I WORK1
       0366  1011                TAD WORK
       0367  5762                JMP I MORSU

                        /PAGE 1 CONSTANTS
       0370  0261       A3,      INDATA-1
       0371  0271       A4,      ONDATA-1
       0372  0303       A5,      STDATA-1
       0373  0313       A6,      FLDATA-1
       0374  0323       A7,      RSDATA-1
       0375  0260       TW6,     0260


                        /PART 2 INITIALIZATION ROUTINE
             0400       *400
       0400  1003                TAD LIMLO
```

)   )   )

```
        0401  7041          CIA
        0402  3310          DCA FROM                /LOW LIMIT TO FROM
        0403  1003          TAD LIMLO
        0404  7040          CMA
        0405  3311          DCA TO
        0406  1346          TAD A0
        0407  3313          DCA PATCYC
        0410  1314          TAD INST1
        0411  3165          DCA RANUM+1

        0412  5047          JMP CHEK1               /GO TO PAGE 0 START

                            /PATH DECISION ROUTINE
        0413  1164    PDR,  TAD RANUM
        0414  7041          CIA
        0415  1305          TAD GFROM
        0416  7650          SNA CLA        /SKIP IF NOT REQUESTING FROM
        0417  5303          JMP FRUT               /GO TO FROM ADDRESS ROUTINE

        0420  1164          TAD RANUM
        0421  7041          CIA
        0422  1306          TAD GTO
        0423  7650          SNA CLA        /SKIP IF NOT REQUESTING TO
        0424  5301          JMP TORUT              /GO TO TO ADDRESS ROUTINE
        0425  5226          JMP PRUT              /GO TO PATTERN ROUTINE


                            /SELECT PATTERN AND OTHER THINGS
        0426  1713    PRUT, TAD I PATCYC
        0427  3312          DCA PATT
        0430  1312          TAD PATT
        0431  7450          SNA            /NO SKIP IF END OF PATTERN TABLE
        0432  5240          JMP .+6        /END PATTERN TABLE LOOK AROUND
        0433  7201          CLA IAC
        0434  1313          TAD PATCYC
        0435  3313          DCA PATCYC
        0436  1312          TAD PATT
        0437  5564          JMP I RANUM    /RETURN, AC=NEW PATTERN
                            /
        0440  1345          TAD AK7776
        0441  3313          DCA PATCYC     /RESTOR START ADDRESS OF PATT. TABLE
        0442  7001          IAC
        0443  1311          TAD TO
        0444  3311          DCA TO         /INCREMENT TO
        0445  1311          TAD TO
        0446  7041          CIA
        0447  1310          TAD FROM
        0450  7640          SZA CLA        /SKIP IF TO = FROM
        0451  5255          JMP .+4
        0452  1311          TAD TO
        0453  1015          TAD THREE
        0454  3311          DCA TO         /SKIP AROUND FROM
        0455  1311          TAD TO
        0456  7500          SMA
        0457  5276          JMP GOUT
```

```
        0460  1006          TAD LIMHI
        0461  7710          SPA CLA           /SKIP IF END TEST AREA
        0462  5276          JMP GOUT
        0463  7201          CLA IAC
        0464  1310          TAD FROM
        0465  3310          DCA FROM                      /ADVANCE FROM
        0466  1003          TAD LIMLO
        0467  7041          CIA
        0470  3311          DCA TO            /RESET TO ADDRESS
        0471  1310          TAD FROM
        0472  1006          TAD LIMHI
        0473  7710          SPA CLA
        0474  5276          JMP GOUT
        0475  5200          JMP 400
        0476  7200   GOUT,  CLA
        0477  1312          TAD PATT
        0500  5564          JMP I RANUM


                           /SELECT TO ROUTINE
        0501  1311   TORUT, TAD TO
        0502  5564          JMP I RANUM

                           /SELECT FROM ROUTINE
        0503  1310   FRUT,  TAD FROM
        0504  5564          JMP I RANUM

                           /PAGE 3 CONSTANTS
        0505  0072   GFROM, SELFRM+1            /STORED RETURN ADDRESS WHEN
                                               /RANDOM FROM IS REQUESTED
        0506  0062   GTO,   SELTO+1            /STORED RETURN ADDRESS WHEN
                                               /RANDOM TO IS REQUESTED
        0507  0054   GPAT,  SELPAT+1            /STORED RETURN ADDRESS WHEN
                                               /RANDOM PATTERN IS REQUESTED
        0510  0000   FROM,  0                 /CURRENT FROM ADDRESS
        0511  0000   TO,    0                 /CURRENT TO ADDRESS
        0512  0000   PATT,  0                 /CURRENT PATTERN
        0513  0000   PATCYC, 0                /CURRENT PATTERN ADDRESS
        0514  5435   INST1, JMP I APDR
        0515  7776   K7776, 7776
        0516  7775          7775
        0517  7773          7773
        0520  7767          7767
        0521  7757          7757
        0522  7737          7737
        0523  7677          7677
        0524  7577          7577
        0525  7377          7377
        0526  6777          6777
        0527  5777          5777
        0530  3777          3777
        0531  0001          0001
        0532  0003          0003
        0533  0007          0007
        0534  0017          0017
```

)   )   )

```
            0535  0037              0037
            0536  0077              0077
            0537  0177              0177
            0540  0377              0377
            0541  0777              0777
            0542  1777              1777
            0543  3777    K3777,    3777
            0544  0000              0
            0545  0515    AK7776,   K7776
            0546  0544    A0,       K3777+1


            0547  1375    SUC,      TAD CT
            0550  7001              IAC
            0551  3375              DCA CT
            0552  1375              TAD CT
            0553  7640              SZA CLA
            0554  5437              JMP I ATFCLF
            0555  1175              TAD KP
            0556  1174              TAD K1000
            0557  3175              DCA KP
            0560  1175              TAD KP
            0561  7640              SZA CLA
            0562  5437              JMP I ATFCLF
            0563  6002              IOF
            0564  1376              TAD INF2
            0565  3011              DCA WORK
            0566  5767              JMP I .+1
            0567  7602              7602
            0570  0215              215
            0571  0212              212
            0572  0306              306
            0573  0303              303
            0574  0377              377
            0575  0000    CT,       0
            0576  0567    INF2,     567



            0600              *600

                        /CHECK FOR TO=FROM CONFLICT

            0600  1021    TFCLF,    TAD TOLOC
            0601  7041              CIA
            0602  1002              TAD FRMLOC
            0603  7450              SNA
            0604  5055              JMP CHEK2
            0605  7001              IAC
            0606  7450              SNA
            0607  5055              JMP CHEK2
            0610  7001              IAC
            0611  7650              SNA CLA
            0612  5055              JMP CHEK2
```

```
       0613  5402              JMP I FRMLOC

       0614  0000      PATCH,  0              /RESTORE THEN GO AWAY
       0615  3000              DCA 0
       0616  1232              TAD X
       0617  3001              DCA 1
       0620  1233              TAD X1
       0621  3002              DCA 2
       0622  1234              TAD X2
       0623  3003              DCA 3
       0624  1235              TAD X3
       0625  3040              DCA START
       0626  1236              TAD X4
       0627  3041              DCA START+1
       0630  6001              ION
       0631  5614              JMP I PATCH

       0632  7402      X,      7402
       0633  0000      X1,     0
       0634  7157      X2,     7157
       0635  6001      X3,     ION
       0636  7604      X4,     LAS

       7602              *7602
       7602  1411              TAD I WORK
       7603  6046              TLS
       7604  6041              TSF
       7605  5204              JMP .-1
       7606  1013              TAD M377
       7607  7640              SZA CLA
       7610  5202              JMP .-6
       7611  5217              JMP OVR

       7617              *7617
       7617  6042      OVR,    TCF
       7620  6001              ION
       7621  5437              JMP I ATFCLF
```

                              S