

IDENTIFICATION  
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PRODUCT CODE: MAINDEC-8E-D0FC-D  
PRODUCT NAME: RANDOM ISZ TEST  
DATE CREATED: JUNE 11, 1971  
MAINTAINER: DIAGNOSTIC GROUP  
AUTHOR: BRUCE HANSEN

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1.

2.

3.

4.

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  
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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  
-----

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 | R | NNNN | NS |
|---|------|---|------|---|------|----|
| 0 | ZZZZ | F | MMMM |   |      |    |

6.2.1 PRINTOUT EXPLANATION  
-----

|           |        |                                                           |
|-----------|--------|-----------------------------------------------------------|
| (FROM)    | F XXXX | -THE ISZ INSTRUCTION IN LOCATION XXXX<br>FAILED.          |
| (TO)      | T YYYY | -THE OPERAND ADDRESS OF THE ISZ INSTRU-<br>TION WAS YYYY. |
| (OPERAND) | 0 ZZZZ | -THE STARTING COUNT IN THE ISZ LOOP WAS<br>ZZZZ.          |
| (FAILED)  | F MMMM | -THE FAILURE OCCURRED TRYING TO ISZ THE<br>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 SETTING 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.

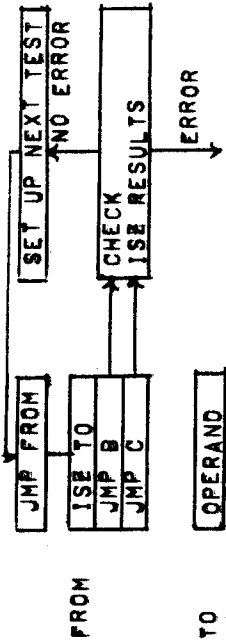
8. MISCELLANEOUS  
-----

8.1 EXECUTION TIME  
-----

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

# 9. ) PROGRAM DESCRIPTION -----

THE TEST LOOP IS SHOWN BELOW:



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 ISE IS CHECKED BY DUPLICATING ISE WITH TAD, JAC, 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 ISE IS PERFORMED ON EACH OPERAND ONLY ONCE INSTEAD OF INCREMENTING IT UNTIL THE ISE INSTRUCTION SKIPS.
- B. FROM = 621 TO = 625 REPEAT THE SET OF OPERANDS USED IN (A) ABOVE.

THIS SEQUENCE CONTINUES UNTIL IT 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 ISE 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  
0000  
0001 5001  
0002 0002  
0003 0003  
0004 0000  
0005 0000  
0006 0202  
0007 0547  
0010 0007  
0011 0000  
0012 0000  
0013 7401  
0014 3607  
0015 0003

0  
JMP 1  
FRMLOC, 2  
LIMLO, 3  
0  
0  
LIMHI, -7576  
ASUC, SUC  
MSK7, 0007  
WORK, 0  
WORK1, 0  
M377, -377  
NUM, 3607  
THREE, 3

/PERIPHERAL INTERRUPT  
/ISZ TEST INSTRUCTION LOCATION  
/LOW LIMIT TEST AREA

/HIGH LIMIT TEST AREA

/OCTAL CONVERSION MASK  
/IR0  
/IR1

/THE RANDOM NUMBER LOCATION

0016 2421  
0017 5116  
0020 5141  
0021 0000  
0022 0000  
0023 0000  
0024 0000  
0025 0004  
0026 0400  
0027 0200  
0030 0100  
0031 0000  
0032 0257  
0033 0201  
0034 0206  
0035 0413  
0036 1014  
0037 0600

ISZ 1 TOLOC  
JMP BACK  
JMP2, JMP BAKBRN  
0  
PATRN, 0  
BEFOR, 0  
AFTER, 0  
K4, 4  
K0400, 0400  
K0200, 0200  
K0100, 0100  
NOTE, 0  
PRINT, INF1-1  
AERR1, ERR1  
AERR2, ERR2  
APDR, PDR  
ITADNM, TAD NUM  
ATFCLF, TFCLF

/MOVING ISZ  
/TEST INSTRUCTION  
/GROUP.

/LOCATION TO BE ISZ'D  
/STARTING ISZ PATTERN  
/FAILING PATTERN BEFORE FAILING ISZ  
/PREDICTED RESULTS OF EACH ISZ  
/SWITCH REGISTER MASKS

/7'S=ERROR WITH NO SKIP  
/0'S=ERROR WITH SKIP

/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) = 00 ONE ISZ ONLY  
/SR11(1) = 00 TEST PART 2  
/

0040 4441  
0041 0614  
0042 0015

/PROGRAM START  
START, JMS I .+1  
PATCH  
AND THREE  
/ION  
/LAS

```

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
0047 7604 /CHECK FOR FIXED PATTERN
0050 0030 LAS
0051 7440 AND K0100
0052 5055 SZA
JMP CHEK2

```

CHEK1,

```

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

```

SELPAT,

```

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

```

CHEK2,

```

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

```

SELTO,

```

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

```

CHEK3,

```

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

```

SELFRM,

/PLACE FROM INSTRUCTIONS

```

0075 7240 PLCLNT, CLA CMA
0076 1002 TAD FRMLC
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

```

PLCLNT,

```

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

```

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

0116 7604 /RETURN FOR NO SKIP CONDITION
0117 7004 LAS
0120 7710 RAL
0121 5132 SPA CLA
0122 1421 JMP LAS1
0123 7041 TAD I TOLOC
0124 1024 CIA
0125 7640 TAD AFTER
0126 5433 SEA CLA
0127 1421 JMP I AERR1
0130 7650 TAD I TOLOC
0131 9433 SNA CLA
0132 7604 JMP I AERR1
0133 0025 LAS
0134 7650 AND K4
0135 5047 SNA CLA
0136 7001 JMP CHEK1
0137 1023 IAC
0140 5111 TAD BEFOR
                                JMP LUP1-1

0141 7604 /RETURN FOR SKIP CONDITION
0142 7004 LAS
0143 7710 RAL
0144 5047 SPA CLA
0145 1421 JMP CHEK1
0146 7640 TAD I TOLOC
0147 5434 SEA CLA
0150 5047 JMP I AERR2
                                JMP CHEK1

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

```

0164 0000
0165 1014
0166 7104
0167 7430
0170 1015
0171 3014
0172 1014
0173 5564
0174 1000
0175 0000

RANUM,
/RANDOM NUMBER GENERATOR
0
TAD NUM
RAL GLL
SEL
TAD THREE
DCA NUM
TAD NUM
JMP I RANUM
/AC=NEW RANDOM NUMBER

K1000, 1000
KP, 0

0200 0200
0200 5040
0201 1340
0202 3332
0203 7040
0204 3031
0205 5210

ERR1,
JMP START
/ERROR ROUTINE 1
TAD SKPDAT+6
DCA SKPDAT
CMA
DCA NOTE
JMP KPGO

ERR2,
TAD SKPDAT-1
DCA SKPDAT
TAD FRMLC
DCA WORK
TAD A3
JMS SETUP

0206 1331
0207 3332
0210 1002
0211 3011
0212 1370
0213 4342

0214 1021
0215 3011
0216 1371
0217 4342

0220 1022
0221 3011
0222 1372
0223 4342
0224 1023
0225 3011
0226 1373
0227 4342

0230 1421
0231 3011
0232 1374
0233 4342

TTY,
/TTY PRINT ROUTINE
IOF
TAD PRINT
DCA WORK
TAD I WORK

```

0240 6046  
0241 6041  
0242 5241  
0243 1013  
0244 7640  
0245 5237  
0246 6042  
0247 6001  
0250 7604  
0251 7700  
0252 7402

0253 1031  
0254 7650  
0255 5047  
0256 3031  
0257 5132

TLS  
TSF  
JMP \*-1  
TAD M377  
SZA CLA  
JMP TTY+3  
TCF  
ION  
LAS  
SMA CLA  
HLT

/HALT AFTER ERROR (SR0)

/RETURN TO NO SKIP ROUTINE

INF1, 0306  
INDATA, 0240

0260 0306  
0261 0240  
0262 0000  
0263 0000  
0264 0000  
0265 0000  
0266 0240  
0267 0240  
0270 0324  
0271 0240  
0272 0000  
0273 0000  
0274 0000  
0275 0000  
0276 0215  
0277 0212  
0300 0215  
0301 0215

/ERROR PRINT OUT LINE 1

/F FROM (INSTRUCTION LOCATION)

/SPACE

/X LOCATION

/X

/X

/X

/X

/SPACE

/SPACE

/T TO (OPERAND ADDRESS)

/SPACE

/X ADDRESS

/X

/X

/X

/X

/CR

/LF

/CR

/CR

/ERROR PRINTOUT LINE 2

/O OPERAND (STARTING COUNT)

/SPACE

/X PATTERN

/X

/X

/X

/X

/SPACE

/SPACE

/F FAILING COUNT

/SPACE

/X

/X

/X

/X

/SPACE

0302 0317  
0303 0240  
0304 0000  
0305 0000  
0306 0000  
0307 0000  
0310 0240  
0311 0240  
0312 0306  
0313 0240  
0314 0000  
0315 0000  
0316 0000  
0317 0000  
0320 0240

STDATA, 0

0

0

0

0

0

0

0

0

0

0

0

0

0

FLDATA, 0

0

0

0

0

0

0

0

0321 0240  
0322 0322  
0323 0240

240 /SPACE  
322 /R  
240 /SPACE

RESULT AFTER FAILURE

0324 0000  
0325 0000  
0326 0000  
0327 0000  
0330 0240  
0331 0240  
0332 0316  
0333 0323  
0334 0215  
0335 0212  
0336 0212  
0337 0377  
0340 0316  
0341 0323

RSDATA, 0 /X  
0 /X  
0 /X  
0 /X  
240 /SPACE  
240 /SPACE  
SKPDAT, 316 /N  
323 /S  
215 /CR  
212 /LF  
212 /LF  
377 /RUBOUT  
316 /N  
323 /S

PATTERN AFTER FAILING ISZ

NO  
SKIP

0342 0000  
0343 3012  
0344 1011  
0345 7006  
0346 7006  
0347 4362  
0350 7012  
0351 7012  
0352 7012  
0353 4362  
0354 7012  
0355 7010  
0356 4362  
0357 4362  
0360 7200  
0361 5742  
0362 0000  
0363 0010  
0364 1375  
0365 3412  
0366 1011  
0367 5762

SETUP, 0  
DCA WORK1  
TAD WORK  
RTL  
RTL  
JMS MORSU  
RTR  
RTR  
RTR  
JMS MORSU  
RTR  
RAR  
JMS MORSU  
JMS MORSU  
CLA  
JMP I SETUP  
MORSU, 0  
AND MSK7  
TAD TW6  
DCA I WORK1  
TAD WORK  
JMP I MORSU

0370 0261  
0371 0271  
0372 0303  
0373 0313  
0374 0323  
0375 0260

A3, /PAGE 1 CONSTANTS  
A4, INDATA-1  
A5, ONDATA-1  
A6, STDATA-1  
A7, FLDATA-1  
TW6, RSDATA-1  
0260

/PART 2 INITIALIZATION ROUTINE  
\*400

0400  
1003

TAD LIMLO

0401 7041  
0402 3310  
0403 1003  
0404 7040  
0405 3311  
0406 1346  
0407 3313  
0410 1314  
0411 3165

CIA FROM  
DCA LIMLO  
CMA TO  
DCA TO  
TAD A0  
DCA PATCYC  
TAD INST1  
DCA RANUM+1

/LOW LIMIT TO FROM

0412 5047

JMP CHEK1

/GO TO PAGE 0 START

0413 1164  
0414 7041  
0415 1305  
0416 7650  
0417 5303

/PATH DECISION ROUTINE

TAD RANUM

CIA

TAD GFROM

SNA CLA

JMP FRUT

/SKIP IF NOT REQUESTING FROM

/GO TO FROM ADDRESS ROUTINE

0420 1164  
0421 7041  
0422 1306  
0423 7650  
0424 5301  
0425 5226

/SKIP IF NOT REQUESTING TO

/GO TO TO ADDRESS ROUTINE

/GO TO PATTERN ROUTINE

0426 1713  
0427 3312  
0430 1312  
0431 7450  
0432 5240  
0433 7201  
0434 1313  
0435 3313  
0436 1312  
0437 5564

/SELECT PATTERN AND OTHER THINGS

TAD I PATCYC

DCA PATT

TAD PATT

SNA

JMP .+6

CLA IAC

TAD PATCYC

DCA PATCYC

TAD PATT

JMP I RANUM

/RETURN, AC=NEW PATTERN

/RESTOR START ADDRESS OF PATT. TABLE

/INCREMENT TO

/SKIP IF TO = FROM

/SKIP AROUND FROM

0440 1345  
0441 3313  
0442 7001  
0443 1311  
0444 3311  
0445 1311  
0446 7041  
0447 1310  
0450 7640  
0451 5255  
0452 1311  
0453 1015  
0454 3311  
0455 1311  
0456 7500  
0457 5276

TAD AK7776

DCA PATCYC

IAC

TAD TO

DCA TO

TAD TO

CIA

TAD FROM

SZA CLA

JMP .+4

TAD TO

TAD THREE

DCA TO

TAD TO

SMA

JMP GOUT

|                      |      |                   |                              |
|----------------------|------|-------------------|------------------------------|
| 0440                 | 1006 | TAD LIMHI         |                              |
| 0461                 | 7710 | SPA CLA           |                              |
| 0462                 | 5276 | JMP GOUT          | /SKIP IF END TEST AREA       |
| 0463                 | 7201 | CLA IAC           |                              |
| 0464                 | 1310 | TAD FROM          |                              |
| 0465                 | 3310 | DCA FROM          | /ADVANCE FROM                |
| 0466                 | 1003 | TAD LIMLO         |                              |
| 0467                 | 7041 | CIA TO            |                              |
| 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 | CLA               |                              |
| 0477                 | 1312 | TAD PATT          |                              |
| 0500                 | 5564 | JMP I RANUM       |                              |
| GOUT,                |      |                   |                              |
| /SELECT TO ROUTINE   |      |                   |                              |
| 0501                 | 1311 | TAD TO            |                              |
| 0502                 | 5564 | JMP I RANUM       |                              |
| /SELECT FROM ROUTINE |      |                   |                              |
| 0503                 | 1310 | TAD FROM          |                              |
| 0504                 | 5564 | JMP I RANUM       |                              |
| /PAGE 3 CONSTANTS    |      |                   |                              |
| 0505                 | 0072 | GFROM, SELFRM+1   | /STORED RETURN ADDRESS WHEN  |
| 0506                 | 0062 | GTO, SELTO+1      | /RANDOM FROM IS REQUESTED    |
| 0507                 | 0054 | GPAT, SELPAT+1    | /STORED RETURN ADDRESS WHEN  |
| 0510                 | 0000 | FROM, 0           | /RANDOM PATTERN IS REQUESTED |
| 0511                 | 0000 | TO, 0             | /CURRENT FROM ADDRESS        |
| 0512                 | 0000 | PATT, 0           | /CURRENT TO ADDRESS          |
| 0513                 | 0000 | PATCYC, 0         | /CURRENT PATTERN             |
| 0514                 | 5435 | INST1, JMP I APDR | /CURRENT PATTERN ADDRESS     |
| 0515                 | 7776 | K7776,            |                              |
| 0516                 | 7775 |                   |                              |
| 0517                 | 7773 |                   |                              |
| 0520                 | 7767 |                   |                              |
| 0521                 | 7757 |                   |                              |
| 0522                 | 7737 |                   |                              |
| 0523                 | 7677 |                   |                              |
| 0524                 | 7577 |                   |                              |
| 0525                 | 7377 |                   |                              |
| 0526                 | 6777 |                   |                              |
| 0527                 | 5777 |                   |                              |
| 0530                 | 3777 |                   |                              |
| 0531                 | 0001 |                   |                              |
| 0532                 | 0003 |                   |                              |
| 0533                 | 0007 |                   |                              |
| 0534                 | 0017 |                   |                              |

|      |      |
|------|------|
| 0535 | 0037 |
| 0536 | 0077 |
| 0537 | 0177 |
| 0540 | 0377 |
| 0541 | 0777 |
| 0542 | 1777 |
| 0543 | 3777 |
| 0544 | 0000 |
| 0545 | 0515 |
| 0546 | 0544 |

K3777, 3777  
AK7776, K7776  
AØ, K3777+1

|      |      |      |
|------|------|------|
| 1375 | 0547 | 1375 |
| 7001 | 0550 | 7001 |
| 3375 | 0551 | 3375 |
| 1375 | 0552 | 1375 |
| 7640 | 0553 | 7640 |
| 9437 | 0554 | 9437 |
| 1175 | 0555 | 1175 |
| 1174 | 0556 | 1174 |
| 3175 | 0557 | 3175 |
| 1175 | 0560 | 1175 |
| 7640 | 0561 | 7640 |
| 5437 | 0562 | 5437 |
| 6002 | 0563 | 6002 |
| 1376 | 0564 | 1376 |
| 3011 | 0565 | 3011 |
| 5767 | 0566 | 5767 |
| 7602 | 0567 | 7602 |
| 0215 | 0570 | 0215 |
| 0212 | 0571 | 0212 |
| 0306 | 0572 | 0306 |
| 0303 | 0573 | 0303 |
| 0377 | 0574 | 0377 |
| 0000 | 0575 | 0000 |
| 0567 | 0576 | 0567 |

|       |              |  |
|-------|--------------|--|
| SUC,  | TAD CT       |  |
|       | IAC          |  |
|       | DCA CT       |  |
|       | TAD CT       |  |
|       | SZA CLA      |  |
|       | JMP I ATFCLE |  |
|       | TAD KP       |  |
|       | TAD K1000    |  |
|       | DCA KP       |  |
|       | TAD KP       |  |
|       | SZA CLA      |  |
|       | JMP I ATFCLE |  |
|       | IOF          |  |
|       | TAD INF2     |  |
|       | DCA WORK     |  |
|       | JMP I .+1    |  |
|       | 7602         |  |
|       | 215          |  |
|       | 212          |  |
|       | 306          |  |
|       | 303          |  |
|       | 377          |  |
|       | 0            |  |
|       | 567          |  |
| CT,   |              |  |
| INF2, |              |  |

0600

#600

/CHECK FOR TO=FROM CONFLICT

|      |      |
|------|------|
| 0600 | 1021 |
| 0601 | 7041 |
| 0602 | 1002 |
| 0603 | 7450 |
| 0604 | 5055 |
| 0605 | 7001 |
| 0606 | 7450 |
| 0607 | 5055 |
| 0610 | 7001 |
| 0611 | 7650 |
| 0612 | 5055 |

```

TFCLF,  TAD  TOLOC
        CIA
        TAD  FRMLOC
        SNA
        JMP  CHEK2
        IAC
        SNA
        JMP  CHEK2
        IAC
        SNA  CLA
        JMP  CHEK2

```

|      |      |              |                       |
|------|------|--------------|-----------------------|
| 0613 | 5402 | JMP I FRMLOC | /RESTORE THEN GO AWAY |
| 0614 | 0000 | PATCH, 0     |                       |
| 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,           |                       |
| 0633 | 0000 | X1,          |                       |
| 0634 | 7157 | X2,          |                       |
| 0635 | 6001 | X3,          |                       |
| 0636 | 7604 | X4,          |                       |
| 7602 | 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        |                       |
| 7617 | 6042 | OVR,         |                       |
| 7620 | 6001 | TCF          |                       |
| 7621 | 5437 | ION          |                       |
|      |      | JMP I ATFCLE |                       |

S