

FPP 12B

/ / IDENTIFICATION

/ / PRODUCT CODE: MAINDEC 12-D8NB=0  
/ / PRODUCT NAME: FPP-12 INSTRUCTION TEST 2B  
/ / DATE CREATED: DECEMBER 15, 1970  
/ / MAINTAINER: DIAGNOSTIC GROUP  
/ / AUTHOR: BOB ARMSTRONG

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## /1. ABSTRACT

FPP-12 INSTRUCTION TEST 2B IS DESIGNED TO TEST ALL FPP JUMP INSTRUCTIONS. AT THE START OF THE TEST THE USER IS GIVEN THE OPTION OF SELECTING ONE OF TWO POSSIBLE MODES OF OPERATION:

- A. RANDOM MODE WHERE THE ADDRESS JUMPED TO IS GENERATED RANDOMLY OUTSIDE THE AREA OF CORE OCCUPIED BY THE PROGRAM.
- B. NON-RANDOM MODE WHERE THE ADDRESS JUMPED TO IS SELECT VIA THE SWITCH REGISTER AT THE OPERATORS DISCRETION. THE SPECIFIED ADDRESS IS TESTED TO DETERMINE IF IT IS A LEGAL ADDRESS OUTSIDE THE AREA OF CORE OCCUPIED BY THE PROGRAM.

ALL JUMP INSTRUCTIONS FOR THE FPP ARE TESTED IN A SIMILAR MANNER:

- A. ADDRESS TO BE JUMPED TO IS FORMED:
  1. BY A RANDOM GENERATOR IN RANDOM MODE
  2. BY THE SWITCH REGISTER IN NON-RANDOM MODE
- B. THE ADDRESS IS TESTED TO DETERMINE THAT IT IS OUTSIDE THE AREA OF CORE MEMORY OCCUPIED BY THE PROGRAM.
- C. AN FPP-FEXIT INSTRUCTION IS PLACED IN THE SELECTED ADDRESS LOCATION. ALL OTHER CORE LOCATIONS OUTSIDE THE PROGRAM CONTAIN FPP HALT INSTRUCTIONS.
- D. THE FPP EXECUTES THE FEXIT INSTRUCTIONS AND THEN THE FPC AND OTHER REGISTERS ARE TESTED FOR EXPECTED VALUES.

## /2. REQUIREMENTS

### /2.1 EQUIPMENT

- 1) A FPP-12 FLOATING POINT PROCESSOR
- 2) A STANDARD BASIC (PDP-8 OR PDP-12)
- 3) AN ASR-33 TELETYPE OR EQUIVALENT

### /2.2 STORAGE

THIS PROGRAM IS DESIGNED TO RUN IN MEMORY BANK 0 AND MAY CLEAR OR USE ALL OF MEMORY NOT OCCUPIED BY THE PROGRAM.

### /2.3 PRELIMINARY PROGRAMS

ALL PDP-8 AND/OR PDP-12 MODE BASIC INSTRUCTION DIAGNOSTICS AND EXERCISERS MUST HAVE BEEN SUCCESSFULLY RUN PRIOR TO RUNNING THE PROGRAM.

/3. LOADING PROCEDURE

/3.1 REFER TO LOADING PROCEDURES FOR PARTICULAR MACHINE BEING USED  
IF PDP-8I, 8L OR 8E.

/3.2 METHOD FOR PDP-12

THIS PROGRAM MUST BE LOADED WITH THE BINARY LOADER. IF YOU ARE UNFAMILIAR WITH THE PROPER BINARY LOADING PROCEDURES REFER TO APPENDIX A OF THIS DOCUMENT, OTHERWISE PROCEDE WITH THE FOLLOWING:

- A) SET THE TELETYPE READER SWITCH TO FREE OR DO NOTHING IF A HIGH SPEED READER IS BEING USED
- B) OPEN THE TELETYPE READER AND INSERT THE PROGRAM TAPE SO THAT THE ARROWS ON THE TAPE ARE VISIBLE AND POINTING IN THE DIRECTION OF TAPE MOVEMENT.
- C) CLOSE THE READER AND SET THE READER SWITCH TO START.
- D) SET THE TELETYPE FRONT PANEL SWITCH TO START.
- E) SET THE LEFT SWITCHES TO 7777.
- F) SET THE RIGHT SWITCHES TO 40001 0000 FOR HIGH SPEED READER
- G) SET THE MODE SWITCH TO 8 MODE.
- H) DEPRESS I/O PRESET.
- I) DEPRESS START LS.
- J) WHEN THE PROGRAM TAPE HAS BEEN READ IN THE ACCUMULATOR MUST BE 0000, IF IT IS NOT, A READ-IN ERROR HAS OCCURRED AND ONE MIGHT TRY RELOADING THE BINARY LOADER.

SEE APPENDIX A.

- K) REMOVE THE PROGRAM TAPE FROM THE READER.

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/4. STARTING PROCEDURE

THIS PRELIMINARY SET UP PROCEDURE IS CRITICAL AND ANY OMISSION WILL RESULT IN AN ERROR.

- 1) SET THE SWITCH REGISTER TO 0001 IF THE FPP IS USED WITH A PDP-8I  
OTHERWISE FOR ANY OTHER PDP-8 OR 12 SET THE SWITCH REGISTER EQUAL TO 0000.  
-----  
2) SET THE MODE SWITCH TO 8-MODE
- 3) DEPRESS I/O PRESET
- 4) DEPRESS START 20

THE PROGRAM IS RUNNING.

## CONTROL SWITCH SETTINGS

SWITCH 0 OF THE SWITCH REGISTER DETERMINES THE MODE OF OPERATION.

SR0=0 RANDOM MODE  
SR0=1 NON-RANDOM MODE

IF NON-RANDOM MODE IS SELECTED THE PROGRAM HALTS AND WAITS FOR OPERATOR INTERVENTION, THE ADDRESS IS SPECIFIED IN THE SWITCH REGISTER AND KEY CONTINUE IS HIT.

ONE INITIAL SWITCH SETTING IS USED BY THE PROGRAM TO DETERMINE WHETHER OR NOT THE COMPUTER USED WITH THE FPP-12 IS A PDP-8I.

SR11=0 NOT A PDP-8I (ANY OTHER PDP-8 OR 12)  
SR11=1 PDP-8I

IF SR11=1 THE PROGRAM WILL CHANGE THE TIME OUT CONSTANT WHICH FAILS ON A PDP-8I DUE TO DIFFERENCES IN THE DATA BREAK INTERFACE TIMING.

## /5. MESSAGE FORMAT

- 1) THERE ARE TWO ERROR TYPEOUTS IN THE PROGRAM, THE DIAGNOSTIC IS OF THE FORM OF AN INSTRUCTION TEST AND ERROR HALTS HAVE BEEN USED PRIMARILY WITH A WELL DOCUMENTED LISTING.
  - A. IN NON-RANDOM MODE, IF THE SWITCH REGISTER ADDRESS IS IN THE MAIN PROGRAM A TELETYPE MESSAGE INFORMS THE OPERATOR AND THE PROGRAM HALTS FOR OPERATOR INTERVENTION.
  - B. IF THE FPP DOES NOT INTERRUPT WITHIN A SPECIFIED TIME LIMIT TIME OUT OCCURS. THE ADDRESS WHICH FAILED AND MAJOR STATE ARE TYPED OUT.
- 2) THE TELETYPE BELL RINGS AFTER EVERY PASS THROUGH THE PROGRAM.

## /6. MAINTENANCE INSTRUCTIONS

FPP-12 MAINTENANCE INSTRUCTIONS ARE NOT USED IN THE PROGRAM.

## APPENDIX A

## PDP-8 MODE PERFORATED - TAPE LOADER

## READIN MODE LOADER

THE READIN MODE (RIM) LOADER IS A MINIMUM LENGTH, BASIC, PERFORATED-TAPE PROGRAM FOR THE 33 ASR. IT IS INITIALLY STORED IN MEMORY BY MANUAL USE OF THE OPERATOR CONSOLE KEYS AND SWITCHES. THE LOADER IS PERMANENTLY STORED IN 18 LOCATIONS OF PAGE 37.

THE RIM LOADER CAN ONLY BE USED IN CONJUNCTION WITH THE 33ASR READER (NOT THE HIGH-SPEED PERFORATED-TAPE READER). BECAUSE A TAPE IN RIM FORMAT IS, IN EFFECT, TWICE AS LONG AS IT NEED BE, IT IS SUGGESTED THAT THE RIM LOADER BE USED ONLY TO READ THE BINARY LOADER WHEN USING THE 33 ASR. (NOTE! SOME PDP-12 DIAGNOSTIC PROGRAM TAPES ARE IN RIM FORMAT).

THE COMPLETE PDP-12 RIM LOADER (SA = 7756 IS AS FOLLOWS:)

ABSOLUTE ADDRESS	OCTAL CONTENT	INSTRUCTION TAG	I E	COMMENTS
7756,	6032	BEG,	KCC	/CLEAR AC AND FLAG
7757,	6031		KSF	/SKIP IF FLAG = 1
7760,	5357		JMP-1	/LOOKING FOR CHARACTER
7761,	6036		KRB	/READ BUFFER
7762,	7186		CLL RTL	
7763,	7006		RTL	/CHANNEL 8 IN ACO
7764,	7510		SPA	/CHECKING FOR LEADER
7765,	5357		JMP BEG+1	/FOUND LEADER
7766,	7006		RTL	/OK; CHANNEL 7 IN LINK
7767,	6031		KSF	
7770,	5367		JMP-1	
7771,	6034		KRS	/READ, DO NOT CLEAR
7772,	7420		SNL	/CHECKING FOR ADDRESS
7773,	3776		DCA I TEMP	/STORE CONTENT
7774,	3376		DCA TEMP	/STORE ADDRESS
7775,	5356		JMP BEG	/NEXT WORD
7776,	0	TEMP,	0	/TEMP STORAGE
7777,	5XXX		JMP X	/JMP START OF BIN LOADER

PDP-12 ONLY

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PLACING THE RIM LOADER IN CORE MEMORY BY WAY OF THE OPERATOR CONSOLE KEYS AND SWITCHES IS ACCOMPLISHED AS FOLLOWS:

- A) SET THE STARTING ADDRESS 7756 IN THE LEFT SWITCHES.
- B) SET THE FIRST INSTRUCTION (6032) IN THE RIGHT SWITCHES.
- C) PRESS THE FILL SWITCH.
- D) PRESS THE FILL STEP SWITCH
- E) SET THE NEXT INSTRUCTION (6031) IN THE RIGHT SWITCHES,
- F) PRESS THE FILL STEP SWITCH.
- G) REPEAT STEPS D AND E UNTIL ALL 16 INSTRUCTIONS HAVE BEEN DEPOSITED.

TO LOAD A TAPE IN RIM FORMAT, PLACE THE TAPE IN THE READER, SET THE LEFT SWITCHES TO THE STARTING ADDRESS 7756 OF THE RIM LOADER (NOT OF THE PROGRAM BEING READ), PRESS THE START LS KEY, AND START THE TELETYPE READER.

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1 /  
2 /  
3 /INST2B, MAINDEC-12-D0NB  
4 //COPYRIGHT 1970, DIGITAL EQUIPMENT CORP., MAYNARD, MASS.  
5 //THIS TEST IS DESIGNED TO VERIFY THE EXECUTION  
6 //OF ALL FORMS OF JUMPS ON THE FPP12:  
7 // CONDITIONAL JUMPS  
8 // JUMP ON ALIGNMENT  
9 // JUMP ON INDEX=0 (OPTIONAL INCREMENT)  
10 // TWO SUBROUTINE CALLS  
11 // RETURN ADDRESS STORED:  
12 // IN BASE REGISTER  
13 // IN CODE AT JUMP LOCATION  
14 // JUMP TO CONTENTS OF FAC  
15 //  
16 //AUTHOR: BOB ARMSTRONG  
17 //  
18 //MAJOR START: PDP12  
19 //I/O PRESET, 8 MODE  
20 //SET LEFT SWITCHES TO 0200  
21 //SET RIGHT SWITCHES TO DESIRED OPTION  
22 //DEPRESS START LSW  
23 //  
24 //MAJOR START: 8 FAMILY  
25 //SET SWITCHES TO 0200  
26 //DEPRESS LOAD ADDRESS  
27 //SET SWITCHES TO DESIRED OPTION  
28 //START  
29 //  
30 //SWITCH SETTING (NORMALLY 0080)  
31 //SW00=0, JUMP TO RANDOM ADDRESS  
32 //SW00=1, JUMP TO SPECIFIED ADDRESS  
33 //SW11=0, PDP=8E, BL OR 12  
34 //SW11=1 PDP=8I  
35 //  
36 //PROGRAM OPERATION:  
37 //IF SW00=1, THE PROGRAM WILL HALT TO ALLOW THE  
38 //SPECIFIED ADDRESS TO BE SET IN THE SWITCHES  
39 //AFTER SETTING, HIT CONTINUE  
40 //  
41 //RESTART LOCATION = 220  
42 //  
43 //SOME IOT DEFINITIONS FOR FPP12  
44 //  
45 6552 FPICL=6552 //CLEAR FPP  
46 6553 FPCOM=6553 //LOAD FPP COMMAND REGISTER  
47 6555 FPST=6555 //START THE FPP: SKIP NEXT INST IF EXECUTED  
48 6562 FSTATE=6562 //READ THE MAJOR STATES OF THE FPP INTO AC  
49 0000 FEXIT=0000 //FPP INST TO CAUSE AN EXIT  
50 //PMODE  
51 0001 #0001  
52 0001 6552 FPICL //CLEAR FPP  
53 0002 5403 JMP I ,+1 //RETURN FROM INTERRUPT  
54 0003 0000 RTADD, 0 //RETURN ADDRESS  
55 0004 0000 TOUT, 0 //TIME OUT

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56 0020 \*0020  
57 0020 5421 JMP I .+1 /IN CASE STARTED  
58 0021 0200 0200 /BY START 20  
59 /  
60 // PAGE ZERO CONSTANTS  
61 /  
62 0022 0001 K0001, 0001  
63 0023 0003 K0003, 0003  
64 0024 0007 K0007, 0007  
65 0025 0027 K0027, 0027  
66 0026 0100 K0100, 0100  
67 0027 0207 K0207, 0207  
68 0030 0212 K0212, 0212  
69 0031 0215 K0215, 0215  
70 0032 0260 K0260, 0260  
71 0033 0400 K0400, 0400  
72 0034 1000 K1000, 1000  
73 0035 1010 K1010, 1010  
74 0036 1020 K1020, 1020  
75 0037 1030 K1030, 1030  
76 0040 1040 K1040, 1040  
77 0041 1050 K1050, 1050  
78 0042 1060 K1060, 1060  
79 0043 1070 K1070, 1070  
80 0044 1120 K1120, 1120  
81 0045 1130 K1130, 1130  
82 0046 2000 K2000, 2000  
83 0047 4000 K4000, 4000  
84 0050 7602 K7602, 7602  
85 0051 7752 K7752, 7752  
86 0052 7757 K7757, 7757  
87 0053 7764 K7764, 7764  
88 0054 7765 K7765, 7765  
89 0055 7770 K7770, 7770  
90 0056 7774 K7774, 7774  
91 0057 7776 K7776, 7776  
92 /  
93 // CROSS PAGE REFERENCES  
94 /  
95 0060 0152 JTSTA, JTST /SUBROUTINES ADDRS.  
96 0061 0140 RESETA, RESET  
97 0062 1657 FPERRA, FPERR  
98 0063 1600 RANDA, RANDOM  
99 0064 2005 SWERRA, SWERR  
100 0065 0100 OADD, OADD-1  
101 0066 2040 LASTAD, LSTLOC+1  
102 0067 0173 JTAGA, JINST /ADDRESSES  
103 0070 0231 START, TJEQ  
104 0071 1700 TYPEA, TYPE  
105 0072 1756 RTNADA, RTNADD  
106 0073 1771 MSTATA, MSTATE  
107 0074 0075 APTADD, APT /ADDRESS OF TABLE  
108 // ACTIVE PARAMETER TABLE  
109 /  
110 0075 0000 APT, 0 /ACTIVE TABLE

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111 0076 0000 FPC, 0  
112 0077 0107 XADD, X00  
113 0100 0117 BADD, B00  
114 0101 0000 DADD, 0  
115 0102 0000 FEXP, 0  
116 0103 0000 AMSW, 0  
117 0104 0000 ALSW, 0  
118 /  
119 //ARGUMENTS-RESET EACH PASS  
120 /  
121 0105 0000 JTEMP, 0 /TEMP STORAGE  
122 0106 0000 RANADD, 0  
123 //INDEX REGISTER  
124 0107 0000 X00, 0  
125 0110 0000 X1, 0  
126 0111 0000 X2, 0  
127 0112 0000 0  
128 0113 0000 0  
129 0114 0000 0  
130 0115 0000 0  
131 0116 0000 X7, 0  
132 //BASE REGISTER  
133 0117 0000 B00, 0  
134 0120 0000 0  
135 0121 0000 0  
136 /  
137 //VARIABLES-NOT RESET  
138 /  
139 0122 0000 CNTR, 0  
140 0123 0000 CNTR1, 0  
141 0124 0000 DONE, 0  
142 0125 0000 XREG, 0  
143 /  
144 //TEMP AC FOR CONDITIONAL JUMPS  
145 /  
146 0126 0000 TFEXP, 0  
147 0127 0000 TAMSW, 0  
148 0130 0001 TALSW, 0001  
149 //TEMP INDEX REG FOR JXN  
150 0131 0000 TXREG, 0  
151 0132 0000 INDEX, 0  
152 0133 0000 BITS, 0  
153 //FLAG FOR RANDOM NUMBER GENERATOR  
154 0134 0000 RNDFLG, 0  
155 //ARGUMENTS FOR RANDOM NUM GEN  
156 0135 0002 HX, 0002  
157 0136 0100 HY, 0100  
158 0137 0770 Hz, 0770  
159 //SUBROUTINE TO RESET TESTS EACH PASS  
160 /  
161 0140 0000 RESET, 0  
162 0141 7300 CLA CLL  
163 0142 1052 TAD K7757 /-17(19)  
164 0143 3122 DCA CNTR /COUNTER  
165 0144 1065 TAD DADD ADR /STARTING ADDR

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166 0145 3011 DCA 0011 /AUTO INDEX  
167 0146 3411 DCA I 0011 /SET TO B  
168 0147 2122 ISZ CNTR /DONE?  
169 0150 5146 JMP .-2 /LOOP  
170 0151 5540 JMP I RESET  
  
171 //  
172 // SUBROUTINE TO SET UP THE JUMP INST,  
173 // START THE FPP, AND INTERRUPT TO THE  
174 // NEXT LOCATION IN CORE  
175 //  
176 // FIRST IT GETS THE RETURN ADDRESS  
177 // AND STORES IT IN LOC 0003, GETS THE  
178 // ADDRESS OF THE JUMP INST AND STORES  
179 // IT IN THE FPP PROGRAM COUNTER(FFC)  
180 // THEN IT SETS A COUNTER TO ALLOW THE  
181 // FPP A MINIMUM NUMBER OF BREAKS TO  
182 // PREVENT CORE DESTRUCTION, IT STARTS  
183 // THE FPP AND WAITS FOR AN INTERRUPT,  
184 // JUMPING TO AN ERROR ROUTINE IF THE  
185 // FPP DOESNT INTERRUPT IN A PRESCRIBED  
186 // TIME, WHICH PRINTS OUT THE STATE OF  
187 // FPP AND THE ADDRESS OF THE TEST IT  
188 // WAS ATTEMPTING  
189 //  
190 0152 0000 JTST, 0  
191 0153 7300 CLA CLL /CLEAR AC:LINC  
192 0154 1152 TAD JTST /GET RTADD  
193 0155 3003 DCA RTADD /LOAD FOR INTERRUPT  
194 0156 1067 TAD JTAGA /LD INST ADDR  
195 0157 3076 DCA FPC /STOR FPC  
196 0160 1004 TAD TOUT /ALLOW 24(8) BREAKS IF PDP-8E; 8L OR 12  
197 0161 3105 DCA JTEMP /OR ALTERED BREAK CONSTANT IF PDP-8I  
198 0162 6001 ION  
199 0163 1074 TAD APTADD /SET APT  
200 0164 6555 FPST /START FPP  
201 0165 7402 HLT /ALREADY GOING  
202 0166 2105 ISZ JTEMP /INCREMENT COUNTER  
203 0167 5166 JMP .-1 /DONE?  
204 0170 6002 IOF /INT OFF  
205 0171 5462 JMP I FPERRA /ERROR-NO INTERRUPT  
  
206 //  
207 //LOCATION OF JUMP INSTRUCTION EXECUTED BY FPP  
208 //INSTRUCTION AND ADDRESS LOADED BY PROGRAM PRIOR  
209 //TO EXECUTION  
210 //FPP EXITS EITHER AT ZEROED CORE FOLLOWING PROGRAM  
211 //OR ZEROS FOLLOWING JUMP INSTRUCTION  
212 //  
213 0173 \*0173  
214 0173 0000 JINST, 0 /JUMP INST  
215 0174 0000 JMPADD, 0 /ADDRESS  
216 0175 0000 0000 /EXIT  
217 0176 0000 0000 /INSURANCE EXIT  
218 0177 0000 FEXIT /INSURANCE EXIT  
  
219 //  
220 //START OF PROGRAM

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221                    /GET RIGHT SWITCHES  
222                    /  
223        0200        +200  
224        0200        7604        LAS        /LOAD SWITCHES  
225        0201        0022        AND        K0001     /MASK BIT 11  
226        0202        7450        SNA        /SKIP IF AC NOT = 0  
227        0203        5210        JMP        ,+5  
228        0204        7300        CLA CLL  
229        0205        1051        TAD        K7752  
230        0206        3004        DCA        TOUT      /TIME OUT SET UP FOR PDP=8!  
231        0207        5212        JMP        ,+3  
232        0210        1054        TAD        K7763  
233        0211        3004        DCA        TOUT      /TIME OUT SET UP FOR PDP=8E, 8L OR 12  
234        0212        7604        LAS        /LOAD SWITCHES  
235        0213        0047        AND        K4000     /MASK BIT 0  
236        0214        3134        DCA RNDFLG    /STOR FLAG  
237        0215        1134        TAD RNDFLG    /GET IT BACK  
238        0216        7440        SEA        /SKIP IF RANDOM  
239        0217        7482        HLT        /HALT TO RESET SWITCHES TO JUMP ADDRESS  
240                    /  
241                    /SET REST OF MEMORY TO ZEROS  
242                    /TO FORM FPP EXIT INSTRUCTIONS  
243                    /  
244        0220        7500        CLA CLL      /CLEAR  
245        0221        1066        TAD LASTAD    /GET LAST ADDRESS  
246        0222        3122        DCA CNTR     /STOR IN COUNTER  
247        0223        3522        DCA I CNTR    /DEPOSIT ZERO IN THAT ADDRESS  
248        0224        2122        ISZ CNTR     /THROUGH MEMORY  
249        0225        5223        JMP ,+2      /NOT YET-GO ON  
250        0226        6532        PICL       /DONE-CLEAR FPP  
251        0227        1033        TAD K0400     /INTERRUPT ENABLE BIT  
252        0230        6553        FPCOM      /LOAD COMMAND REGISTER  
253                    // START TESTS  
254                    /  
255                    /  
256                    /TEST JEQ INSTRUCTION  
257                    /  
258                    /JUMP IF FAC EQUALS ZERO  
259                    /  
260        0231        4461        TJEQ:      JMS I RESETA    /RESET  
261        0232        1034        TAD K1000     /INST  
262        0233        3173        DCA JINST     /STORE INST  
263        0234        4463        JMS I RANDA   /GET RANDOM ADDR  
264        0235        3174        DCA JMPADD    /STOR AS ADDR  
265        0236        1126        TAD TFEXP     /GET TEMP EXP  
266        0237        3102        DCA FEXP      /STORE  
267        0240        1127        TAD TAMSW     /GET TEMP MSW  
268        0241        3103        DCA AMSW      /STORE  
269        0242        1130        TAD TALSW     /GET TEMP LSW  
270        0243        3104        DCA ALSW      /STORE  
271        0244        4460        JMS I JTSTA    /START FPP  
272        0245        7300        CLA CLL      /CLEAR  
273        0246        1102        TAD FEXP      /GET EXPON.  
274        0247        7041        CIA        /COMPUTE - AND SUBTRACT  
275        0250        1126        TAD TFEXP    /SAME

276 0251 7440 SZA  
 277 /TO LOOP TEST INSERT (JMP TJEG)  
 278 0252 7402 HLT /EXponent ALTERED BY JUMP  
 279 0253 1103 TAD AMSW /GET MSW  
 280 0254 7041 CIA /COMPLEMENT AND INCREMENT  
 281 0255 1127 TAD TAMSW /SAME?  
 282 0256 7440 SZA  
 283 /TO LOOP TEST INSERT (JMP TJEG)  
 284 0257 7402 HLT /MSW ALTERED BY JUMP  
 285 0260 1104 TAD ALSW /GET LSW  
 286 0261 7041 CIA /COMPLEMENT AND INCREMENT  
 287 0262 1130 TAD TALSW /SAME?  
 288 0263 7440 SZA  
 289 /TO LOOP TEST INSERT (JMP TJEG)  
 290 0264 7402 HLT /LSW ALTERED BY JUMP  
 291 0265 1103 TAD AMSW /CHECK MSW  
 292 0266 7440 SZA /ZEROT  
 293 0267 5304 JMP NJMP1 /NO-NO JUMP  
 294 0270 1104 TAD ALSW /CHECK LSW  
 295 0271 7440 SZA /ZERO  
 296 0272 5304 JMP NJMP1 /NO-NO JMP  
 297 0273 1106 JMP1, TAD RANADD /RANDOM ADDRESS  
 298 0274 7001 IAC /\*1  
 299 0275 7041 CIA /MINUS  
 300 0276 1076 TAD FPC /THE PG  
 301 0277 7450 SNA /ZEROT  
 302 0300 5314 JMP OKAY1 /ALL RIGHT  
 303 0301 7300 CLA CLL /CLEAR  
 304 0302 1076 TAD FPC /GET FPC  
 305 /TO LOOP TEST INSERT (JMP TJEG)  
 306 0303 7402 HLT /HLT-FPC INCORRECT  
 307 0304 7300 NJMP1, CLA CLL /NO JUMP  
 308 0305 1076 TAD FPC /GET FPC  
 309 0306 1050 TAD K7602 /IS IT 176  
 310 0307 7450 SNA /0 MEANS IT IS  
 311 0318 5314 JMP OKAY1 /OKAY  
 312 0311 7300 CLA CLL /CLEAR  
 313 0312 1076 TAD FPC /ERROR-GET FPC  
 314 /TO LOOP TEST INSERT (JMP TJEG)  
 315 0313 7402 HLT /HALT-FPC INCORRECT  
 316 0314 1124 OKAY1, TAD DONE /FINISHED?  
 317 0315 7440 SZA  
 318 0316 5336 JMP SETUP1 /YES  
 319 /  
 320 //FLOAT FAC BIT LEFT ONCE  
 321 /  
 322 0317 7100 CLL  
 323 0320 1130 TAD TALSW /GET LSN  
 324 0321 7004 RAL /ROTATE LEFT  
 325 0322 5130 DCA TALSW /SAVE  
 326 0323 1127 TAD TAMSW /GET MSW  
 327 0324 7004 RAL /ROTATE LEFT  
 328 0325 3127 DCA TAMSW /SAVE  
 329 0326 1126 TAD TFEXP /GET EXP  
 330 0327 7004 RAL /ROTATE LEFT

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331 0330 3126      DCA TFEXP   /SAVE
332 0331 7420      SNL        /DONE ROTATING?
333 0332 5231      JMP TJEQ    /LOOP PRESENT TEST
334 0333 1033      TAD K0400
335 0334 3124      DCA DONE   /NON-ZERO
336 0335 5231      JMP TJEQ    /LOOP PRESENT TEST ONCE MORE
337 0336 7300      SETUP1, CLA CLL
338 0337 7001      IAC        /SET LSW = 1
339 0340 3130      DCA TALSH  /TO START ROTATION
340 0341 3124      DCA DONE   /RESET DONE
341
342
343
344
345 0342 4461      TJGE,   JMS I RESETA /RESET
346 0343 1035      TAD K1010 /INST
347 0344 3173      DCA JINST   /STORE INST
348 0345 4463      JMS I RANDA /GET RANDOM NUM
349 0346 3174      DCA JMPADD /STOR AS ADDR
350 0347 1126      TAD TFEXP   /GET TEMP EXP
351 0350 3102      DCA FEXP    /STORE
352 0351 1127      TAD TAMSH   /GET TEMP MSW
353 0352 3183      DCA AMSW    /STORE
354 0353 3130      TAD TALSH   /GET TEMP LSW
355 0354 3184      DCA ALSW    /STORE
356 0355 8460      JMS I JTSTA /START FPP
357 0356 7300      CLA CLL    /CLEAR
358 0357 3102      TAD FEXP    /GET EXPONENT
359 0360 7041      CIA        /COMPLEMENT AND INCREMENT
360 0361 1126      TAD TFEXP   /SAME
361 0362 7440      SZA
362
363 0363 7402      /TO LOOP TEST INSERT (JMP TJGE)
364 0364 1103      HLT        /EXponent ALTERED BY JUMP
365 0365 7041      TAD AMSW   /GET MSW
366 0366 1127      CIA        /COMPLEMENT AND INCREMENT
367 0367 7440      TAD TAMSH   /SAME?
368
369 0370 7402      SZA
370 0371 1104      /TO LOOP TEST INSERT (JMP TJGE)
371 0372 7041      HLT        /MSW ALTERED BY JUMP
372 0373 1130      TAD ALSW   /GET LSW
373 0374 7440      CIA        /COMPLEMENT AND INCREMENT
374
375 0375 7402      TAD TALSH   /SAME?
376 0376 1103      SZA
377 0377 7510      /TO LOOP TEST INSERT (JMP TJGE)
378 0400 5213      SPA        /LSW ALTERED BY JUMP
379 0401 7300      JMP NJNP2  /CHECK MSW
380 0402 1106      JMP2,   CLA CLL  /POSITIVE?
381 0403 7001      TAD RANADD /NO-NO JUMP
382 0404 7041      IAC        /RANDOM ADDR
383 0405 1076      CIA        /*+1
384 0406 7450      TAD FPC   /MINUS
385 0407 5223      SNA        /*THE FC
                                /ZERO?
                                /PER0?
                                /ALL RIGHT
  
```

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386 0410 7300 CLA CLL /CLEAR  
387 0411 1076 TAD FPC /GET FPC  
388 /TO LOOP TEST INSERT (JMP I(TJGE))  
389 0412 7402 HLT /HLT ON ERROR  
390 0413 7300 NJMP2, CLA CLL /NO JUMP  
391 0414 1076 TAD FPC /GET FPC  
392 0415 1050 TAD K7602 /IS IT 176  
393 0416 7450 SNA /0 MEANS IT IS  
394 0417 5223 JMP OKAY2 /OKAY  
395 0420 7300 CLA CLL /CLEAR  
396 0421 1076 TAD FPC /ERROR-GET FPC  
397 /TO LOOP TEST INSERT (JMP I(TJGE))  
398 0422 7402 HLT /HALT ON ERROR  
399 0423 1124 OKAY2, TAD DONE /FINISHED?  
400 0424 7440 SZA  
401 0425 5246 JMP SETUP2 /YES  
  
402 /  
403 /FLOAT FAC BIT LEFT ONCE  
404 /  
405 0426 7100 CLL  
406 0427 1130 TAD TALSW /GET LSW  
407 0430 7004 RAL /ROTATE LEFT  
408 0431 3130 DCA TALSW /SAVE  
409 0432 1127 TAD TAMSW /GET MSW  
410 0433 7004 RAL /ROTATE LEFT  
411 0434 3127 DCA TAMSW /SAVE  
412 0435 1126 TAD TFEXP /GET EXP  
413 0436 7004 RAL /ROTATE LEFT  
414 0437 3126 DCA TFEXP /SAVE  
415 0440 7420 SNL /DONE ROTATING?  
416 0441 5645 JMP I ,\*4 /LOOP PRESENT TEST  
417 0442 1033 TAD K0400  
418 0443 3124 DCA DONE /NON-ZERO  
419 0444 5645 JMP I ,\*1 /LOOP PRESENT TEST ONCE MORE  
420 0445 0342 TJGE /IND ADDR  
421 0446 7300 SETUP2, CLA CLL  
422 0447 7001 IAC /SET LSW = 1  
423 0450 3130 DCA TALSW /TO START ROTATION  
424 0451 3124 DCA DONE /RESET DONE  
  
425 /TEST JLE INSTRUCTION  
426 /  
427 /JUMP IF FAC LESS THAN OR EQUAL TO ZERO  
428 /  
429 0452 4461 TJLE, JMS I RESETA /RESET  
430 0453 1036 TAD K1020 /INST  
431 0454 3173 DCA JINST /STORE INST  
432 0455 4463 JMS I RANDA /GET RANDOM NUM  
433 0456 3174 DCA JMPADD /STOR AS ADDR  
434 0457 1126 TAD TFEXP /GET TEMP EXP  
435 0460 3102 DCA FEXP /STORE  
436 0461 1127 TAD TAMSW /GET TEMP MSW  
437 0462 3103 DCA AMSW /STORE  
438 0463 1130 TAD TALSW /GET TEMP LSW  
439 0464 3104 DCA ALSW /STORE  
440 0465 4460 JMS I JTSTA /START FPP

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441 0466 7300 CLA CLL /CLEAR  
442 0467 1102 TAD FEXP /GET EXPONENT  
443 0470 7041 CIA /COMPLEMENT AND INCREMENT  
444 0471 1126 TAD TFEXP /SAME  
445 0472 7440 SZA  
446 /TO LOOP TEST INSERT (JMP TJLE)  
447 0473 7402 HLT /EXponent ALTERED BY JUMP  
448 0474 1103 TAD AMSW /GET MSW  
449 0475 7041 CIA /COMPLEMENT AND INCREMENT  
450 0476 1127 TAD TAMSW /SAME?  
451 0477 7440 SZA  
452 /TO LOOP TEST INSERT (JMP TJLE)  
453 0500 7402 HLT /MSW ALTERED BY JUMP  
454 0501 1104 TAD ALSW /GET LSW  
455 0502 7041 CIA /COMPLEMENT AND INCREMENT  
456 0503 1130 TAD TALSW /SAME?  
457 0504 7440 SZA  
458 /TO LOOP TEST INSERT (JMP TJLE)  
459 0505 7402 HLT /LSW ALTERED BY JUMP  
460 0506 1103 TAD AMSW /CHECK MSW  
461 0507 7500 SMA /NEGATIVE?  
462 0510 5312 JMP ,+2 /NOT NEG  
463 0511 5317 JMP3 /NEG-JUMP  
464 0512 7448 SZA /ZERO?  
465 0513 5331 JMP NJMP3 /NOR ZERO  
466 0514 5104 TAD ALSW /CHECK LSH  
467 0515 7442 SZA /ZERO  
468 0516 5331 JMP NJHP3 /NO-NO JMP  
469 0517 7300 CLA CLL  
470 0520 1106 TAD RANADD /RANDOM ADDR  
471 0521 7001 IAC /+1  
472 0522 7041 CIA /MINUS  
473 0523 1076 TAD FPC /THE PC  
474 0524 7450 SNA /ZERO?  
475 0525 5341 JMP OKAYS /ALL RIGHT  
476 0526 7300 CLA CLL /CLEAR  
477 0527 1076 TAD FPC /GET FPC  
478 /TO LOOP TEST INSERT (JMP TJLE)  
479 0530 7402 HLT /HLT ON ERROR  
480 0531 7300 NJMP3, CLA CLL /NO JUMP  
481 0532 1076 TAD FPC /GET FPC  
482 0533 1050 TAD K7602 /IS IT 176  
483 0534 7450 SNA /0 MEANS IT IS  
484 0535 5341 JMP OKAY3 /OKAY  
485 0536 7300 CLA CLL /CLEAR  
486 0537 1076 TAD FPC /ERROR-GET FPC  
487 /TO LOOP TEST INSERT (JMP TJLE)  
488 0540 7402 HLT /HALT ON ERROR  
489 0541 1124 OKAYS, TAD DONE /FINISHED?  
490 0542 7440 SZA /0 MEANS NO  
491 0543 5363 JMP SETUP3 /YES-GO TO NEXT TEST  
492 /  
493 /FLOAT FAC BIT 16<sup>7</sup> CLEAR  
494 /  
495 0544 7100 CLL /NOT DECODED 101

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496 0545 1130 TAD TALSW /GET LEAST SIG WORD  
497 0546 7004 RAL /ROTATE ONCE LEFT  
498 0547 3130 DCA TALSW /STORE  
499 0550 1127 TAD TAMSW /GET MOST SIG WORD-LINK THE SAME  
500 0551 7004 RAL /ROTATE LEFT  
501 0552 3127 DCA TAMSW /STORE  
502 0553 1126 TAD TFEXP /GET EXP-LINK SAME  
503 0554 7004 RAL /ROTATE ONCE LEFT  
504 0555 3126 DCA TFEXP /STORE  
505 0556 7420 SNL /HAS BIT FALLEN OUT LEFT END YET?  
506 0557 5252 JMP TJLE /NO-KEEP GOING  
507 0560 1033 TAD K0400 /YES  
508 0561 3124 DCA DONE /MAKE DONE NON-ZERO  
509 0562 5252 JMP TJLE /ONE MORE PASS WITH AC=0  
510 0563 7301 SETUP3, CLA CLL IAC /AC=1  
511 0564 3130 DCA TALSW /STOR 1 IN AC  
512 0565 3124 DCA DONE /DONE=0  
513 /TEST JA INSTRUCTION  
514 /  
515 //JUMP ALWAYS- NORMAL JUMP  
516 /  
517 0566 4461 TJA, JMS I RESETA /RESET  
518 0567 1037 TAD K1038 /INST  
519 0570 3173 DCA JINST /STORE INST  
520 0571 4463 JMS I RANDA /GET RANDOM NUM  
521 0572 3174 DCA JMPADD /STOR AS ADDR  
522 0573 1126 TAD TFEXP /GET TEMP EXP  
523 0574 3102 DCA FEXP /STORE  
524 0575 1127 TAD TAMSW /GET TEMP MSW  
525 0576 3103 DCA AMSW /STORE  
526 0577 1130 TAD TALSW /GET TEMP LSW  
527 0600 3104 DCA ALSW /STORE  
528 0601 4460 JMS I JTSTA /START FPP  
529 0602 7300 CLA CLL /CLEAR  
530 0603 1102 TAD FEXP /GET EXPONENT  
531 0604 7041 CIA /COMPLEMENT AND INCREMENT  
532 0605 1126 TAD TFEXP /SAME  
533 0606 7440 SZA  
534 /TO LOOP TEST INSERT (JMP I(TJA))  
535 0607 7402 HLT /EXponent ALTERED BY JUMP  
536 0610 1103 TAD AMSW /GET HSW  
537 0611 7041 CIA /COMPLEMENT AND INCREMENT  
538 0612 1127 TAD TAMSW /SAME?  
539 0613 7440 SZA  
540 /TO LOOP TEST INSERT (JMP I(TJA))  
541 0614 7402 HLT /MSW ALTERED BY JUMP  
542 0615 1104 TAD ALSW /GET LSW  
543 0616 7041 CIA /COMPLEMENT AND INCREMENT  
544 0617 1130 TAD TALSW /SAME?  
545 0620 7440 SZA  
546 /TO LOOP TEST INSERT (JMP I(TJA))  
547 0621 7402 HLT /LSW ALTERED BY JUMP  
548 0622 7300 JMP4, CLA CLL /RANDOM ADDR  
549 0623 1106 TAD RANADD /  
550 0624 7001 IAC /\*1

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551 0625 7041 CIA /MINUS  
552 0626 1076 TAD FPC /THE PC  
553 0627 7450 SNA /ZERO?  
554 0630 5234 JMP OKAY4 /ALL RIGHT  
555 0631 7300 CLA CLL /CLEAR  
556 0632 1076 TAD FPC /GET FPC  
557 /TO LOOP TEST INSERT (JMP I(TJA))  
558 0633 7402 HLT /HLT ON ERROR  
559 0634 1124 OKAY4, TAD DONE /FINISHED?  
560 0635 7440 SZA /0 MEANS NO  
561 0636 5257 JMP SETUP4 /SETUP FOR NEXT TEST  
562 /  
563 /FLOAT FAC BIT LEFT ONCE  
564 /  
565 0637 7100 CLL /CLEAR LINK  
566 0640 1130 TAD TALSW /GET LEAST SIG WORD  
567 0641 7004 RAL /ROTATE LEFT ONCE  
568 0642 3130 DCA TALSW /STORE  
569 0643 1127 TAD TAMSW /GET MOST SIG WORD-SAME LINK  
570 0644 7004 RAL /ROTATE LEFT-LINK INTO 11  
571 0645 3127 DCA TAMSW /STORE  
572 0646 1126 TAD TFEXP /GET EXP  
573 0647 7204 RAL /ROTATE LEFT-LINK INTO 11  
574 0650 3126 DCA TFEXP /STORE  
575 0651 7428 SNL /HAS BIT FALLEN OUT BUT 0 YET  
576 0652 0653 JMP I .44 /NOT YET  
577 0653 1053 TAD KB400 /DONE  
578 0654 3124 DCA DONE /SET DONE NON-ZERO  
579 0655 0656 JMP I .41 /ONE MORE PASS WITH  
580 0656 0656 TJA /AC=0  
581 0657 7301 SETUP4, CLA CLL JAC /AC=1  
582 0660 3130 DCA TALSW /STORE IN FAC  
583 0661 3124 DCA DONE /RESET DONE=0  
584 /TEST JNE INSTRUCTION  
585 /  
586 /JUMP IF FAC NOT EQUAL TO ZERO  
587 /  
588 0662 4461 TJNE, JMS I RESETA /RESET  
589 0663 1040 TAD K1040 /INST  
590 0664 3173 DCA JINST /STORE INST  
591 0665 4463 JMS I RANDA /GET RANDOM NUM  
592 0666 3174 DCA JMPADD /STOR AS ADDR  
593 0667 1126 TAD TFEXP /GET TEMP EXP  
594 0670 3102 DCA FEXP /STORE  
595 0671 1127 TAD TAMSW /GET TEMP MSW  
596 0672 3103 DCA AMSW /STORE  
597 0673 1130 TAD TALSW /GET TEMP LSW  
598 0674 3104 DCA ALSW /STORE  
599 0675 4460 JMS I JTSTA /START FPP  
600 0676 7300 CLA CLL /CLEAR  
601 0677 1102 TAD FEXP /GET EXPONENT  
602 0700 7041 CIA /COMPLEMENT AND INCREMENT  
603 0701 1126 TAD TFEXP /AC=1  
604 0702 7440 SZA /  
605 /TO LOOP TEST INSERT (JMP TJNE)

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606 0703 7482 HLT /EXponent ALTERED BY JUMP  
607 0704 1123 TAD AMSW /GET MSW  
608 0705 7041 CIA /COMPLEMENT AND INCREMENT  
609 0706 1127 TAD TAMSW /SAME?  
610 0707 7440 SZA  
611 /TO LOOP TEST INSERT (JMP TJNE)  
612 0710 7402 HLT /MSW ALTERED BY JUMP  
613 0711 1124 TAD ALSW /GET LSW  
614 0712 7041 CIA /COMPLEMENT AND INCREMENT  
615 0713 1130 TAD TALSW /SAME?  
616 0714 7440 SZA  
617 /TO LOOP TEST INSERT (JMP TJNE)  
618 0715 7402 HLT /LSW ALTERED BY JUMP  
619 0716 1103 TAD AMSW /CHECK MSW  
620 0717 7440 SZA /ZERO?  
621 0720 9324 JMP JMP5 /NO-JUMP  
622 0721 1104 TAD ALSW /CHECK LSW  
623 0722 7450 SNA /NON-ZERO  
624 0723 9336 JMP NJMP5 /NO-MUST BE ZERO-NO JMP  
625 0724 7300 JMP5, CLA CLL  
626 0725 1106 TAD RANADD /RANDOM ADDR  
627 0726 7001 IAC /\*1  
628 0727 7041 CIA /MINUS  
629 0730 1076 TAD FPC /THE PC  
630 0731 7450 SNA /ZERO?  
631 0732 9346 JMP OKAY5 /ALL RIGHT  
632 0733 7300 CLA CLL /CLEAR  
633 0734 1076 TAD FPC /GET FPC  
634 /TO LOOP TEST INSERT (JMP TJNE)  
635 0735 7402 HLT /HLT ON ERROR  
636 0736 7300 NJMP5, CLA CLL /NO JUMP  
637 0737 1076 TAD FPC /GET FPC  
638 0740 1050 TAD K7602 /IS IT 176  
639 0741 7450 SNA /0 MEANS IT IS  
640 0742 9346 JMP OKAY5 /OKAY  
641 0743 7300 CLA CLL /CLEAR  
642 0744 1076 TAD FPC /ERROR-GET FPC  
643 /TO LOOP TEST INSERT (JMP TJNE)  
644 0745 7402 HLT /HALT ON ERROR  
645 0746 1124 OKAY5, TAD DONE /FINISHED?  
646 0747 7440 SZA /0 MEANS NO  
647 0750 9370 JMP SETUP5 /SET UP NEXT TEST  
648 /  
649 //FLOAT FAC BIT LEFT ONCE  
650 //  
651 0751 7100 CLL /CLEAR LINK  
652 0752 1130 TAD TALSW /GET LEAST SIG WORD  
653 0753 7004 RAL /ROTATE ONCE LEFT-LINK INTO 11  
654 0754 3130 DCA TALSW /STORE  
655 0755 1127 TAD TAMSW /GET MOST SIG WORD  
656 0756 7004 RAL /ROTATE LINK INTO 11  
657 0757 3127 DCA TAMSW /STORE  
658 0760 1126 TAD TFEXP /GET EXP  
659 0761 7024 RAL /ROTATE LINK INTO 11  
660 0762 3126 DCA TFEXP /STORE

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661 0763 7420 SNL /DID BIT FALL OUT 0 YET?  
662 0764 5262 JMP TJNE /NO ANOTHER PASS  
663 0765 1033 TAD K0400 /MAKE DONE NON-  
664 0766 3124 DCA DONE /ZERO  
665 0767 5262 JMP TJNE /ONE MORE PASS, AC=0  
SETUPS, CLA CLL IAC /AC=1  
666 0770 7301 DCA TALSW /FAC=1  
667 0771 3130 DCA DONE /RESET DONE=0  
668 0772 3124  
  
669 /TEST JLT INSTRUCTION  
/  
670 /JUMP IF FAC LESS THAN 0  
/  
673 0773 4461 TJLT, JMS I RESETA /RESET  
674 0774 1041 TAD K1050 /INST  
675 0775 3173 DCA JINST /STORE INST  
676 0776 4463 JMS I RANDA /GET RANDOM NUM  
677 0777 3174 DCA JMPADD /STOR AS ADDR  
678 1000 1126 TAD TFEXP /GET TEMP EXP  
679 1001 3102 DCA FEXP /STORE  
680 1002 1127 TAD TAMSW /GET TEMP MSW  
681 1003 3103 DCA AMSW /STORE  
682 1004 1128 TAD TALSW /GET TEMP LSW  
683 1005 3104 DCA ALSW /STORE  
684 1006 6268 JMS I JTSTA /START FPP  
685 1007 7300 CLA CLL /CLEAR  
686 1010 1129 TAD FEXP /GET EXPONENT  
687 1011 7612 CIA /COMPLEMENT AND INCREMENT  
688 1012 9123 TAD TFEXP /SAME  
689 1013 7648 SZA  
  
690 /TO LOOP TEST INSERT (JMP I(TJLT))  
691 1014 7402 HLT /EXponent ALTERED BY JUMP  
692 1015 1103 TAD AMSW /GET MSW  
693 1016 7041 CIA /COMPLEMENT AND INCREMENT  
694 1017 1127 TAD TAMSW /SAME?  
695 1020 7440 SZA  
  
696 /TO LOOP TEST INSERT (JMP I(TJLT))  
697 1021 7402 HLT /MSW ALTERED BY JUMP?  
698 1022 1104 TAD ALSW /GET LSW  
699 1023 7041 CIA /COMPLEMENT AND INCREMENT  
700 1024 1130 TAD TALSW /SAME?  
701 1025 7440 SZA  
  
702 /TO LOOP TEST INSERT (JMP I(TJLT))  
703 1026 7402 HLT /LSW ALTERED BY JUMP  
704 1027 1103 TAD AMSW /CHECK MSW  
705 1030 7500 SMA /ZERO?  
706 1031 5244 JMP NJMP6 /NO-NO JUMP  
707 1032 7300 JMP6, CLA CLL  
708 1033 1106 TAD RANADD /RANDOM ADDR  
709 1034 7001 IAC /\*1  
710 1035 7041 CIA /MINUS  
711 1036 1076 TAD FPC /THE PC  
712 1037 7450 SNA /ZERO?  
713 1040 5254 JMP OKAY /ALL RIGHT?  
714 1041 7300 CLA CLL /CLEAR  
715 1042 1076 TAD FPC /GET FPC

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716 /TO LOOP TEST INSERT (JMP I(TJLT))  
717 1043 7402 HLT /HLT ON ERROR  
718 1044 7300 NJMP6, CLA CLL /NO JUMP  
719 1045 1076 TAD FPC /GET FPC  
720 1046 1050 TAD K7602 /IS IT 176  
721 1047 7450 SNA /0 MEANS IT IS  
722 1050 5254 JMP OKAY6 /OKAY  
723 1051 7300 CLA CLL /CLEAR  
724 1052 1076 TAD FPC /ERROR-GET FPC  
725 /TO LOOP TEST INSERT (JMP I(TJLT))  
726 1053 7402 HLT /HALT ON ERROR  
727 1054 1124 OKAY6, TAD DONE /FINISHED?  
728 1055 7440 SZA /0 MEANS NO  
729 1056 5277 JMP SETUP6 /SETUP NEXT TEST  
730 /  
731 /FLOAT FAC BIT LEFT ONCE  
732 /  
733 1057 7100 CLL /CLEAR LINK  
734 1060 1130 TAD TALSH /GET LEAST SIG WORD  
735 1061 7004 RAL /ROTATE 0 INTO LINK  
736 1062 3130 DCA TALSH /STORE  
737 1063 1127 TAD TAMSH /GET MOST SIG WORD  
738 1064 7004 RAL /ROTATE 0 INTO LINK  
739 1065 3127 DCA TAMSW /STORE  
740 1066 1126 TAD TFEXP /GET EXP  
741 1067 7004 RAL /ROTATE 0 INTO LINK  
742 1070 3126 DCA TFEXP /STORE  
743 1071 7420 SNL /BIT FALLEN OUT 0 YET  
744 1072 5676 JMP I .+4 /NO ANOTHER PASS  
745 1073 1033 TAD KB400 /MAKE DONE  
746 1074 3124 DCA DONE /NON-ZERO  
747 1075 5676 JMP I .+1 /ANOTHER PASS-AC#0  
748 1076 0773 TJLT  
749 1077 7301 SETUP6, CLA CLL IAC /AC=1  
750 1100 3130 DCA TALSH /FAC=1  
751 1101 3124 DCA DONE /RESET DONE=0  
752 /TEST JGT INSTRUCTION  
753 /  
754 /JUMP IF FAC GREATER THAN 0  
755 /  
756 1102 4461 TJGT, JMS I RESETA /RESET  
757 1103 1042 TAD K1060 /  
758 1104 3173 DCA JINST /STORE INST  
759 1105 4463 JMS I RANDA /GET RANDOM NUM  
760 1106 3174 DCA JMPADD /STOR AS ADDR  
761 1107 1126 TAD TFEXP /GET TEMP EXP  
762 1110 3102 DCA FEXP /STORE  
763 1111 1127 TAD TAMSW /GET TEMP MSW  
764 1112 3103 DCA AMSW /STORE  
765 1113 1130 TAD TALSH /GET TEMP LSW  
766 1114 3104 DCA ALSW /STORE  
767 1115 4460 JMS I JTSTA /START FPP  
768 1116 7300 CLA CLL /CLEAR  
769 1117 1102 TAD FEXP /GET EXPONENT  
770 1120 7041 CIA /COMPLEMENT AND INCREMENT

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771 1121 1126 TAD TFEXP /SAME  
772 1122 7440 SZA  
773 1123 7402 /TO LOOP TEST INSERT (JMP TJGT)  
774 1124 1103 HLT /EXponent ALTERED BY JUMP  
775 1125 7041 TAD AMSW /GET MSW  
776 1126 1127 CIA /COMPLEMENT AND INCREMENT  
777 1127 7440 TAD TAMSW /SAME?  
778 1127 7440 SZA  
779 1130 7402 /TO LOOP TEST INSERT (JMP TJGT)  
780 1131 1104 HLT /MSW ALTERED BY JUMP  
781 1132 7041 TAD ALSW /GET LSW  
782 1133 1130 CIA /COMPLEMENT AND INCREMENT  
783 1134 7440 TAD TALSW /SAME?  
784 1134 7440 SZA  
785 1135 7402 /TO LOOP TEST INSERT (JMP TJGT)  
786 1136 1103 HLT /LSW ALTERED BY JUMP  
787 1137 7510 TAD AMSW /CHECK MSW  
788 1138 5361 SPA /POSITIVE?  
789 1140 5361 JMP NJMP7 /NO-NO JUMP  
790 1141 7440 SZA /ZERO?  
791 1142 5346 JMP JMP7 /NO-AND NEG-JMP  
792 1143 7440 TAD ALSW /CHECK LSW  
793 1144 7430 SNA /ZERO?  
794 1145 5361 JMP NJMP7 /NO-ZERO-NO JMP  
795 1146 7380 JMP7, CLA CLL  
796 1147 5186 TAD RANADS /RANDOM ADDR  
797 1158 7281 IAC /+1  
798 1151 7281 CIA /MINUS  
799 1152 1076 TAD FPC /THE PC  
800 1153 7430 SNA /ZERO?  
801 1154 5769 JMP 1 .+4 /ALL RIGHT  
802 1155 7300 CLA CLL /CLEAR  
803 1156 1076 TAD FPC /GET FPC  
804 1157 7402 /TO LOOP TEST INSERT (JMP TJGT)  
805 1160 1172 HLT /HLT ON ERROR  
806 1161 7300 OKAY7 /IND ADDR  
807 1161 7300 NJMP7, CLA CLL /NO JUMP  
808 1162 1076 TAD FPC /GET FPC  
809 1163 1050 TAD K7602 /IS IT 176  
810 1164 7450 SNA /0 MEANS IT IS  
811 1165 5372 JMP OKAY7 /OKAY  
812 1166 7300 CLA CLL /CLEAR  
813 1167 1076 TAD FPC /ERROR-GET FPC  
814 1170 7402 /TO LOOP TEST INSERT (JMP TJGT)  
815 1171 1215 HLT /HALT ON ERROR  
816 1172 1124 SETUP7  
817 1172 1124 OKAY7, TAD DONE /FINISHED  
818 1173 7440 SZA /0 MEANS NO  
819 1174 5771 JMP 1 .+3 /SETUP FOR NEXT TEST  
820 /  
821 /FLOAT FAC BIT LEFT ONCE  
822 /  
823 1175 7100 CLL /CLEAR CLL  
824 1176 1130 TAD TALSW /CLEAR LAST TWO BITS  
825 1177 7004 RAL /ROTATE @ INDEX

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826 1200 3130 DCA TALSW /STORE  
827 1201 1127 TAD TAMSW /GET MOST SIG WORD  
828 1202 7004 RAL /ROTATE 0 INTO LINK  
829 1203 3127 DCA TAMSW /STORE  
830 1204 1126 TAD TFEXP /GET EXP  
831 1205 7004 RAL /ROTATE 0 INTO LINK  
832 1206 3126 DCA TFEXP /STORE  
833 1207 7420 SNL /HAS BIT FALLEN OUT OF 0 YET?  
834 1210 5614 JMP I .+4 /NO-ANOTHER PASS  
835 1211 1033 TAD K0400 /YES-SET DONE  
836 1212 3124 DCA DONE /NON-ZERO  
837 1213 5614 JMP I .+1 /ONE MORE PASS AC=0  
838 1214 1102 TJGT  
839 1215 7301 SETUP7, CLA CLL IAC /AC=1  
840 1216 3130 DCA TALSW /FAC=1  
841 1217 3124 DCA DONE /RESET DONE=0  
  
842 // TEST JAL INSTRUCTION  
843 //  
844 //JUMP ON ABILITY TO ALIGN A FP NUMBER  
845 //  
846 //REMEMBER! JUMP WHEN NUMBER CANT BE ALIGNED.  
847 //WHEN EXPONENT IS GREATER THAN 23(10)  
848 //  
849 1220 4461 TJAL, JMS I RESETA /RESET  
850 1221 1043 TAD K1070 /INST  
851 1222 3173 DCA JINST /STORE INST  
852 1223 4463 JMS I RANDA /GET RANDOM NUM  
853 1224 3174 DCA JMPADD /STOR AS ADDR  
854 1225 1126 TAD TFEXP /GET TEMP EXP  
855 1226 3102 DCA FEXP /STORE  
856 1227 4460 JMS I JTSTA /START FPP  
857 1230 7300 CLA CLL /CLEAR  
858 1231 1102 TAD FEXP /GET EXPONENT  
859 1232 7041 CIA /COMPLEMENT AND INCREMENT  
860 1233 1126 TAD TFEXP /SAME  
861 1234 7440 SZA  
  
862 //TO LOOP TEST INSERT (JMP TJAL)  
863 1235 7402 HLT /EXponent ALTERED BY JUMP  
864 1236 1102 TAD FEXP /GET EXP  
865 1237 7510 SPA /NEGATIVE?  
866 1240 5257 JMP NJMPB /YES-NO JUMP  
867 1241 7041 CIA /POSITIVE-TEST-COMPLEMENT AND INCREMENT  
868 1242 1025 TAD K0027 /ADD 23(10)  
869 1243 7500 SMA /NEGATIVE?  
870 1244 5257 JMP NJMPB /EXP LE 23(10)  
871 1245 7300 JMPB, CLA CLL /RANDOM ADDR  
872 1246 1106 TAD RANADD /+1  
873 1247 7001 IAC /MINUS-COMPLEMENT AND INCREMENT  
874 1250 7041 CIA /THE FPC  
875 1251 1076 TAD FPC /ZERO?  
876 1252 7450 SNA /ALL RIGHT  
877 1253 5267 JMP OKAYB /CLAR  
878 1254 7300 CLA CLL /CLEAR  
879 1255 1076 TAD FPC /GET FPC  
  
880 //TO LOOP TEST INSERT (JMP TJAL)

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881	1256	7482	HLT	/HLT ON ERROR
882	1257	7300	NJMP8, CLA CLL	/NO JUMP
883	1260	1076	TAD FPC	/GET FPC
884	1261	1050	TAD K7602	/IS IT 176
885	1262	7450	SNA	/0 MEANS IT IS
886	1263	9267	JMP OKAY8	/OKAY
887	1264	7300	CLA CLL	/CLEAR
888	1265	1076	TAD FPC	/ERROR-GET FPC
889			/TO LOOP TEST INSERT (JMP TJAL)	
890	1266	7422	HLT	/HALT ON ERROR
891	1267	2126	OKAY8, ISZ TPEXP	
892	1270	5220	JMP TJAL	
893			/TEST JXN INSTRUCTION	
894			/	
895			/LIKE1 ISZ INDEX	
896			/ JMP ADDR	
897			/	
898			/REMEMBER! JUMP ON NON-ZERO INDEX	
899			/	
900	1271	7300	TJXN, CLA CLL	/SET COUNTER = -2 TO
901	1272	1057	TAD K7776	/LOOP ROUTINE TWICE,ONCE
902	1273	1123	DCA CNTR1	/BITS5=0,ONCE #1
903	1274	1133	DCA BITS	/INITIALLY 0
904	1275	1055	LOOP1, TAD K7776	/SET COUNTER TO LOOP
905	1276	1132	DCA INDEX	/ALL INDEX VALUES,B-7
906	1277	1132	TAD INDEX	/FORM INDEX REG FOR INST
907	1306	85124	AND K0007	/EQUALS B-7 IN BITS 9,10,11
908	1301	85127	TAD XADD	/ADD INDEX ADDRESS TO FORM REGISTER ADDRESS
909	1302	85128	DCA XREG	/STORE
910	1303	85132	TAD INDEX	/FORM INDEX REGISTER
911	1304	8524	AND K0007	/MASK
912	1305	7100	CLL	/ROTATE TO BITS
913	1306	7004	RAL	/B-6
914	1307	7006	RTL	
915	1310	1046	TAD K2000	/OP CODE
916	1311	1133	TAD BITS	/SET ABOVE
917	1312	3173	DCA JINST	/STORE INST
918	1313	4461	JMS I RESETA	/RESET
919	1314	4463	JMS I RANDA	/GET RANDOM ADDR
920	1315	3174	DCA JMPADD	/STOR AS JUMP ADDR
921	1316	1131	TAD TXREG	/GET TEMP INDEX REG
922	1317	35225	DCA I XREG	/STORE IN INDEX REG
923	1320	4460	JMS I JTSTA	/START FPP
924	1321	7200	CLA CLA	/CLEAR
925	1322	1173	TAD JINST	/GET INST
926	1323	0026	AND K0100	/MASK BITS
927	1324	7041	CIA	/COMPLEMENT AND INCREMENT
928	1325	1133	TAD BITS	/ADD BITS
929	1326	7440	SZA	/EQUAL
930	1327	7402	HLT	/BIT 5 ALTERED BY JUMP
931	1330	1133	TAD BITS	/INCREMENT?
932	1331	7440	SZA	/0 MEANS NO
933	1332	7301	CLA CLI	/YES
934	1333	1131	TAD TXREG	/ADD IF YES
935	1334	7041	CIA	/MINUS =COMPLEMENT

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936 1335 1525 TAD I XREG /ADD RETURNED XREG  
937 1336 7440 SEA /0 MEANS OKAY  
938 /TO LOOP TEST INSERT (JMP LOOP9)  
939 1337 7402 HLT /C(INDEX REG) RETURNED INCORRECT  
940 / NOT INCREMENTED PROPERLY OR ALTERED  
941 1340 1525 TAD I XREG /JUMP?  
942 1341 7450 SNA /0 MEANS NO  
943 1342 5355 JMP NJMP9 /0-SHOULDNT JUMP  
944 1343 7300 CLA CLL /NON-ZERO-SHOULD JUMP  
945 1344 1106 TAD RANADD /GET RANDOM JUMP ADDR  
946 1345 7001 IAC /\*1  
947 1346 7041 CIA /NEGATE -COMPLEMENT AND INCREMENT  
948 1347 1076 TAD FPC /\*=RETURNED FPC  
949 1350 7450 SNA /SHOULD BE ZERO  
950 1351 5365 JMP OKAY9 /OKAY  
951 1352 7300 CLA CLL /FPC WRONG  
952 1353 1076 TAD FPC /GET IT  
953 /TO LOOP TEST INSERT (JMP LOOP9)  
954 1354 7402 HLT /HALT  
955 1355 7300 NJMP9, CLA CLL /INDEX ZERO-NO JUMP  
956 1356 1076 TAD FPC /GET FPC  
957 1357 1050 TAD K7602 /\*-176  
958 1360 7450 SNA /SHOULD BE ZERO  
959 1361 5365 JMP OKAY9 /0-OKAY  
960 1362 7300 CLA CLL /ERROR-FPC INCORRECT  
961 1363 1076 TAD FPC /GET IT  
962 /TO LOOP TEST INSERT (JMP LOOP9)  
963 1364 7402 HLT /HALT  
964 1365 2131 OKAY9, ISE TXREG /INCREMENT CONTENTS OF INDEX REG  
965 1366 5313 JMP LOOP9 /REPEAT USING THE SAME BITS, INDEX REG  
966 1367 2132 ISE INDEX /NOW LOOP USING THE NEXT INDEX REG  
967 1370 5277 JMP LOOPX /LOOP  
968 1371 1026 TAD KB100 /SET BIT 9  
969 1372 5133 DCA BITS /STORE  
970 1373 2123 ISE CNTR1 /INC COUNTER FOR SECOND PASS  
971 1374 5275 JMP LOOP1 /LOOP  
972 1375 5376 JMP TJMK /ALL DONE-GO TO NEXT INSTRUCTION  
973 /TEST JMK-RETURN ADDR STORED IN BASE  
974 /THIS INSTRUCTION IS CALLED JBR ON THE CARD AND IN THE MANUAL  
975 /ALSO CALLED JMK ON THE FLOWS AND IN THE PRINTS  
976 /THEY ARE ONE AND THE SAME  
977 /  
978 1376 7300 TJMK, CLA CLL /CLEAR  
979 1377 1045 TAD K1130 /FORM INST  
980 1400 5173 DCA JINST /STORE  
981 1401 4461 LOOP10, JMS I RESETA /RESET  
982 1402 4463 JMS I RANDA /GET RANDOM ADDRESS  
983 1403 5174 DCA JMPADD /STORE  
984 1404 4460 JMS I JTSTA /START FPP  
985 1405 7300 CLA CLL /CLEAR  
986 1406 1106 TAD RANADD /GET RANM ADDR  
987 1407 7001 IAC /\*1  
988 1410 7041 CIA /\*= =COMPLEMENT AND INCREMENT  
989 1411 1076 TAD FPC /FPC?  
990 1412 7440 SEA /0 MEANS YES

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991                    /TO LOOP TEST INSERT (JMP I(LOOP10))  
992    1413 7402        HLT                    /NO-FPC RETURNED INCORRECT  
993    1414 1100        TAD BADD              /GET BASE ADDR  
994    1415 7001        IAC                    /\*+1  
995    1416 3105        DCA JTEMP            /STORE TEMP  
996    1417 1505        TAD I JTEMP          /C(B0+1)  
997    1420 7041        CIA                    /\*=? -COMPLEMENT AND INCREMENT  
998    1421 1037        TAD K1030            /JUMP INST  
999    1422 7440        SZA                    /\*0 MEANS YES  
  
1000                    /TO LOOP TEST INSERT (JMP I(LOOP10))  
1001    1423 7402        HLT                    /INST STORED INCORRECTLY  
1002    1424 1100        TAD BADD              /B0  
1003    1425 7001        IAC                    /B0+2  
1004    1426 7001        IAC                    /STORE  
1005    1427 3125        DCA JTEMP            /GET JUMP INST ADDR  
1006    1430 1067        TAD JTAGA            /GET JUMP INST ADDR  
1007    1431 7001        IAC                    /JTAGA+2  
1008    1432 7001        IAC                    /\*=? -COMPLEMENT AND INCREMENT  
1009    1433 7041        CIA                    /C(B0+2)  
1010    1434 1505        TAD I JTEMP          /C(B0+2)  
  
1011                    /TO LOOP TEST INSERT (JMP I(LOOP10))  
1012    1435 7440        SZA                    /\*0 MEANS YES  
1013    1436 7402        HLT                    /NO-RETURN ADDR STORED INCORRECTLY  
1014    1437 3125        ISE CNTR1            /EVERYTHING OKAY FOR THAT ADDR  
1015    1440 5281        JMP LOPP10            /LOOP 4096 TIME  
  
1016                    /TEST JSB-RETURN ADDR STORED IN FIRST TWO  
1017                    /LOCATIONS OF ADDR JUMPED TO  
1018                    /THIS INSTRUCTION IS CALLED JSB ON THE CARD AND IN THE MACHINES  
1019                    /ALSO CALLED JSB ON THE FLOWS AND IN THE PRINTS  
1020                    /THEY ARE ONE AND THE SAME  
1021                    /  
1022    1441 7300        TJSB, CLA CLL        /CLEAR  
1023    1442 1044        TAD K1124            /FORM ADDR  
1024    1443 3173        DCA JINST            /STORE  
1025    1444 4461        LOPP11, JMS I RESET, SZA    /RESET  
1026    1445 4463        JMS I RANDA          /GET RANDOM ADDR  
1027    1446 3174        DCA JMPADD            /STORE  
1028    1447 4460        JMS I JTSTA          /START FPP  
1029    1450 7320        CLA CLL                /CLEAR  
1030    1451 1106        TAD RANADD          /GET RANDOM ADDR  
1031    1452 1023        TAD K0003            /\*+3  
1032    1453 7041        CIA                    /\*=? -COMPLEMENT AND INCREMENT  
1033    1454 1076        TAD FPC                /RETURNED FPC  
1034    1455 7440        SZA                    /\*0 MEANS YES  
  
1035                    /TO LOOP TEST INSERT (JMP LOOP11)  
1036    1456 7402        HLT                    /NO-FPC RETURNED INCORRECTLY  
1037    1457 1037        TAD K1030            /GET JUMP INST  
1038    1460 7041        CIA                    /\*=? -COMPLEMENT AND INCREMENT  
1039    1461 1506        TAD I RANADD        /C(JUMP ADDR)  
1040    1462 7440        SZA                    /\*0 MEANS YES  
  
1041                    /TO LOOP TEST INSERT (JMP LOOP11)  
1042    1463 7402        HLT                    /NO-RETURN JUMP JSB INCORRECT  
1043    1464 3506        DCA I RZ, A1        CIA, RZ, A1, JTAGA  
1044    1465 2106        ISE RANADD          INC RZ, A1 TO 1000000000  
1045    1466 1067        TAD JTAGA            /JUMP INST ADJ

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1046 1467 7001 IAC  
1047 1470 7001 IAC  
1048 1471 7041 CIA /\*? -COMPLEMENT AND INCREMENT  
1049 1472 1526 TAD I RANADD /RETURN ADDR  
1050 1473 7440 SZA /\*0 MEANS YES  
1051 /TO LOOP TEST INSERT (JMP LOOP11)  
1052 1474 7402 HLT /NO-RETURN ADDR STORED INCORRECT  
1053 1475 3506 DCA I RANADD /OKAY-ZERO THE LOC  
1054 1476 2123 ISE CNTR1 /INC COUNTER  
1055 1477 5244 JMP LOOP11 /LOOP 4096 TIMES  
1056 /TEST JAC-JUMP TO CONTENTS OF FAC  
1057 /  
1058 1500 7300 TJAC, CLA CLL /CLEAR  
1059 1501 1024 TAD K0007 /FORM INST  
1060 1502 3173 DCA JINST /STORE  
1061 1503 4461 LOOPAC, JMS I RESETA /RESET  
1062 1504 4463 JMS I RANDA /GET RANDOM ADDR  
1063 1505 3104 DCA ALSW /STORE IN AC  
1064 1506 4460 JMS I JTSTA /START FPP  
1065 1507 7300 CLA CLL /CLEAR  
1066 1510 1106 TAD RANADD /GET JUMP ADDR  
1067 1511 7001 IAC /\*1  
1068 1512 7041 CIA /\*? -COMPLEMENT AND INCREMENT  
1069 1513 1076 TAD FPC /RETURNED FPC  
1070 1514 7440 SZA /\*0 MEANS YES  
1071 /TO LOOP TEST INSERT (JMP LOOPAC)  
1072 1515 7402 HLT /NO-FPC RETURNED INCORRECTLY  
1073 1516 2123 ISE CNTR1 /INC COUNTER  
1074 1517 5303 JMP LOOPAC /LOOP 4096 TES  
1075 1520 1027 TAD K0207 /GET BELL  
1076 1521 4471 JMS I TYPEA /TYPE IOUT  
1077 1522 5470 JMP I START /DO IT AGAIN  
1078 1600 #1600 /  
1079 /SUBROUTINE TO RETURN RANDOM NUMBERS OR  
1080 /THE CONTENTS OF THE RIGHT SWITCHES  
1081 /  
1082 RANDOM, 0 /RETURN ADDR  
1083 1600 0000 CLA CLL /CLEAR  
1084 1601 7300 TAD RNDFLG /CHECK FLAG  
1085 1602 1134 SNA /\*ZERO?  
1086 1603 7450 JMP RAND /YES-GET RANDOM NUM  
1087 1604 5207 SWITCH, LAS /GET SWITCHES  
1088 1605 7604 JMP TEST /TEST IF OKAY  
1089 1606 5223 RAND, TAD HX /GET HX  
1090 1607 1135 TAD HY /\* HY  
1091 1610 1136 RTL /ROTATE  
1092 1611 7006 DCA HY /STORE  
1093 1612 3136 TAD HZ /\* HZ  
1094 1613 1137 TAD HX /\*HX  
1095 1614 1135 RAR /ROTATE  
1096 1615 7010 DCA HX /STORE  
1097 1616 3135 TAD HX /GET BACK  
1098 1617 1135 TAD HY /\* HY  
1099 1620 1136 TAD HZ /\* HZ  
1100 1621 1137

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1101	1622	7006		RTL	/ROTATE
1102	1623	3137	TEST,	DCA H2	/STORE
1103	1624	1137		TAD H2	/GET BACK
1104	1625	7510		SPA	/+ OR -
1105	1626	5234		JMP NEG	/NEG
1106	1627	7041	POS,	CIA	/SUB FROM LSTLOC
1107	1630	1066		TAD LASTAD	
1108	1631	7510		SPA	/SHOULD BE NEG
1109	1632	5241		JMP DONE1	/OKAY
1110	1633	5246		JMP INPROG	/NO GOOD
1111	1634	7001	NEG,	IAC	/ADD 3
1112	1635	7001		IAC	
1113	1636	7001		IAC	
1114	1637	7500		SMA	/STILL NEG
1115	1640	5246		JMP INPROG	/NO GOOD
1116	1641	7300	DONE1,	CLA CLL	/GOOD NUMBER
1117	1642	1137		TAD H2	/GET BACK
1118	1643	3126		DCA RANADD	/STORE
1119	1644	1106		TAD RANADD	/GET BACK
1120	1645	5600		JMP I RANDOM	/RETURN
1121	1646	7300	INPROG,	CLA CLL	/CLEAR
1122	1647	5254		TAD RNDFLG	/RANDOM?
1123	1650	7400		SNA	/0 MEANS RANDOM
1124	1651	5287		JMP RAND	/YES-GET ANOTHER RANDOM NUMBER
1125	1652	7200		CLA	/CLEAR
1126	1653	5162		TAD I SHERKA	/GET MESSAGE
1127	1654	6071		JMS NAME	/PRINT IT OUT
1128	1655	7400		HLT	/HLT TO CHANGE SWITCHES
1129	1656	5000		JMP SWITCH	/SET NEW SWITCHES
1130	1657	7200	FPERR,	CLA	/CLEAR
1131	1660	1356		TAD RTNADD	/GET CHAR STRING ADDR
1132	1661	4271		JMS NAME	/PRINT IT OUT
1133	1662	1003		TAD RTADD	/GET RETURN ADDR
1134	1663	4307		JMS ACTYPE	/TYPE IT OUT
1135	1664	1371		TAD MSTATE	/GET MAJOT STATE VRING ADDR
1136	1665	4271		JMS NAME	/PRINT IT OUT
1137	1666	6562		FSTATE	/FFF STATE
1138	1667	4333		JMS BITYP	/TYPE OUT BITS
1139	1670	7402		HLT	/DONE
1140	1671	0000	NAME,	0	
1141	1672	3010		DCA 0010	/STORE ADD IN AUTO INDEX REG
1142	1673	1410		TAD I 0010	/GET CHAR
1143	1674	7450		SNA	/DONE IF ZERO
1144	1675	5671		JMP I NAME	/DONE-RETURN
1145	1676	4300		JMS TYPE	/TYPE IT OUT
1146	1677	5273		JMP ."4	/REPEAT-ANOTHER CHAR
1147	1700	0000	TYPE,	0	
1148	1701	6046		TLS	/TYPE IT
1149	1702	6041		TSF	
1150	1703	5302		JMP ."1	
1151	1704	6042		TCF	
1152	1705	7300		CLA CLL	/CLEAR AC
1153	1706	5700		JMP I TV	/SET TV
1154	1707	0000	ACTYPE,	0	
1155	1710	3105		DCA JTEMP	/STORE WORD

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1156	1711	1056	TAD K7774	/COUNTER =
1157	1712	3122	DCA CNTR	/ -4
1158	1713	1105	TYPGO, TAD JTEMP	/GET WORD
1159	1714	7004	RAL	/ROTATE LEFT
1160	1715	7006	RTL	/THREE TIMES
1161	1716	3105	DCA JTEMP	/STORE
1162	1717	1105	TAD JTEMP	/GET IT BACK
1163	1720	7004	RAL	/GET BIT11 FROM LINK
1164	1721	0024	AND K0007	/MASK OF REST
1165	1722	1032	TAD K0260	/MAKE CHAR
1166	1723	4300	JMS TYPE	/TYPE
1167	1724	2122	ISZ CNTR	/DONE YET
1168	1725	5313	JMP TYPGO	/REPEAT
1169	1726	1031	TAD K0215	/CR
1170	1727	4300	JMS TYPE	/DO IT
1171	1730	1030	TAD K0212	/LF
1172	1731	4300	JMS TYPE	/DO IT
1173	1732	5707	JMP I ACTYPE	/RETURN
1174	1733	0000	BITVP,	0
1175	1734	3105	DCA JTEMP	/SAVE WORD
1176	1735	1053	TAD K7764	/CNTR =
1177	1736	3122	DCA CNTR	/-14(8)
1178	1737	1105	BITLO, TAD JTEMP	/GET WORD
1179	1740	7100	CLL	/CLEAR LINK
1180	1741	7004	RAL	/ROTATE LEFT
1181	1742	3105	DCA JTEMP	/STORE
1182	1743	7430	SZL	/LINK ZERO
1183	1744	7001	IAC	/INC
1184	1745	1032	TAD K0260	/CHAR = 0 OR 1
1185	1746	4300	JMS TYPE	/TYPE IT
1186	1747	2122	ISE CNTR	/DONE?
1187	1750	5337	JMP BITLO	/NOT YET-LOOP
1188	1751	1031	TAD K0215	/CR
1189	1752	4300	JMS TYPE	/DO IT
1190	1753	1030	TAD K0212	/LF
1191	1754	4300	JMS TYPE	/DO IT
1192	1755	5733	JMP I BITVP	/RETURN
1193	1756	1756	RTNADD,	.
1194	1757	0322	0322	/R
1195	1760	0324	0324	/T
1196	1761	0316	0316	/N
1197	1762	0240	0240	/
1198	1763	0301	0301	/A
1199	1764	0304	0304	/D
1200	1765	0304	0304	/D
1201	1766	0322	0322	/R
1202	1767	0240	0240	/
1203	1770	0000	0000	
1204	1771	1771	MSTATE,	.
1205	1772	0306	0306	/F
1206	1773	0320	0320	/P
1207	1774	0320	0320	/P
1208	1775	0240	0240	/
1209	1776	0323	0323	/S
1210	1777	0324	0324	/T

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1211	2000	0301	0301	/A
1212	2001	0324	0324	/T
1213	2002	0305	0305	/E
1214	2003	0240	0240	/
1215	2004	0000	0000	
1216	2005	2025	.	
1217	2006	0322	0322	/R
1218	2007	0323	0323	/S
1219	2010	0240	0240	/
1220	2011	0311	0311	/I
1221	2012	0316	0316	/N
1222	2013	0240	0240	/
1223	2014	0320	0320	/P
1224	2015	0322	0322	/R
1225	2016	0317	0317	/O
1226	2017	0307	0307	/G
1227	2020	0215	0215	/CR
1228	2021	0212	0212	/LF
1229	2022	0322	0322	/R
1230	2023	0305	0305	/E
1231	2024	0323	0323	/S
1232	2025	0305	0305	/E
1233	2026	0324	0324	/
1234	2027	0273	0273	/
1235	2030	0240	0240	/
1236	2031	0303	0303	/C
1237	2032	0317	0317	/D
1238	2033	0316	0316	/N
1239	2034	0324	0324	/T
1240	2035	0215	0215	/CR
1241	2036	0212	0212	/LF
1242	2037	0000	0000	
1243				
1244				
1245				

LST LOC.

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4000  
4100

4200  
4300

4400  
4500

4600  
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5000  
5100

5200  
5300

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5500

5600  
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6100

6200  
6300

6400  
6500

6600  
6700

7000  
7100

7200  
7300

7400  
7500

7600  
7700

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ACTYPE	1707	K0400	0033	POS	1627
ALSW	0104	K1000	0034	RANADD	0106
AMSW	0103	K1010	0035	RAND	1607
APT	0075	K1020	0036	RANDA	0063
APTADD	0074	K1030	0037	RANDOM	1600
B00	0117	K1040	0040	RESET	0140
BADD	0100	K1050	0041	RESETA	0061
BITS	0133	K1060	0042	RNDFLG	0134
BITLO	1737	K1070	0043	RTADD	0063
BITYP	1733	K1120	0044	RTNADA	0072
CNTR	0122	K1130	0045	RTNADD	1756
CNTR1	0123	K2000	0046	SETUP1	0336
DONE	0124	K4000	0047	SETUP2	0446
DONE1	1641	K7602	0050	SETUP3	0563
FEXIT	0000	K7752	0051	SETUP4	0657
FEXP	0102	K7757	0052	SETUP5	0770
FPC	0076	K7764	0053	SETUP6	1077
FPCOM	6553	K7765	0054	SETUP7	1215
FPERR	1697	K7770	0055	START	0070
FPERRA	0062	K7774	0056	SHERR	2005
FPICL	6552	K7776	0057	SHERRA	0064
FPST	6555	LASTAD	0066	SWITCH	1603
FSTATE	6562	LOOP10	1401	TALSW	0130
HX	0135	LOOP11	1444	TAMSW	0127
HY	0136	LOOP9	1313	TEST	1623
HZ	0137	LOOPAC	1503	TFEXP	0126
INDEX	0132	LOOPI	1275	TJA	0566
INPROG	1646	LOOPX	1277	TJAC	1500
JINST	0173	LSTLOC	2037	TJAL	1220
JMP1	0273	MSTATATA	0073	TJEO	0231
JMP2	0401	MSTATE	1771	TJGE	0342
JMP3	0517	NAME	1671	TJGT	1102
JMP4	0622	NEG	1634	TJLE	0432
JMP5	0724	NJMP1	0394	TJLT	0773
JMP6	1032	NJMP2	0413	TJMK	1376
JMP7	1146	NJMP3	0531	TJNE	0662
JMP8	1245	NJMP5	0736	TJSB	1441
JMP9	1343	NJMP6	1044	TJXN	1271
JMPADD	0174	NJMP7	1161	TOU	0004
JTAGA	0067	NJMP8	1257	TXREG	0131
JTEMP	0105	NJMP9	1355	TYPE	1700
JTST	0152	OADD	0101	TYPEA	0071
JTSTA	0060	OADDAA	0065	TYPGO	1713
K0001	0022	OKAY1	0314	X00	0107
K0003	0023	OKAY2	0423	X1	0110
K0007	0024	OKAY3	0541	X2	0111
K0027	0025	OKAY4	0634	X7	0116
K0100	0026	OKAY5	0746	XADD	0077
K0207	0027	OKAY6	1054	XREG	0125
K0212	0030	OKAY7	1172		
K0215	0031	OKAY8	1267		
K0260	0032	OKAY9	1365		

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ERRORS DETECTED: 0

LINKS GENERATED: 0

RUN-TIME: 15 SECONDS

2K CORE USED



K0027	65#	868							
K0100	66#	926	968						
K0207	67#	1075							
K0212	68#	1171	1190						
K0215	69#	1169	1188						
K0260	70#	1165	1184						
K0400	71#	251	334	417	507	577	663	745	835
K1000	72#	261							
K1010	73#	346							
K1020	74#	430							
K1030	75#	518	998	1037					
K1040	76#	589							
K1050	77#	674							
K1060	78#	757							
K1070	79#	850							
K1120	80#	1023							
K1130	81#	979							
K2000	82#	915							
K4000	83#	235							
K7602	84#	309	392	482	638	720	809	884	957
K7752	85#	229							
K7757	86#	163							
K7764	87#	1176							
K7765	88#	232							
K7770	89#	904							
K7774	90#	1156							
K7776	91#	901							
LASTAD	101#	245	1107						
LOOP10	981#	1015							
LOOP11	1025#	1055							
LOOP9	918#	965							
LOOPAC	1061#	1074							
LOOPI	904#	971							
LOOPX	906#	967							
LSTLOC	101	1242#							
MSTATATA	106#								
MSTATE	106	1135	1284#						
NAME	1127	1132	1136	1140#	1164				
NEG	1105	1111#							
NJMP1	293	296	387#						
NJMP2	378	390#							
NJMP3	465	468	488#						
NJMP5	624	636#							
NJMP6	706	718#							
NJMP7	789	794	807#						
NJMP8	866	870	882#						
NJMP9	943	955#							
OADD	100	114#							
OADDA	100#	165							
OKAY1	302	311	316#						
OKAY2	385	394	399#						
OKAY3	475	484	489#						
OKAY4	554	559#							

OKAY5	631	640	645#											
OKAY6	713	722	727#											
OKAY7	806	811	817#											
OKAY8	877	886	891#											
OKAY9	950	959	964#											
POS	1106#													
RANADD	122#	297	380	470	549	626	708	796	872	945	986	1030	1039	1043
	1044	1049	1053	1066	1118	1119								
RAND	1087	1090#	1124											
RANDA	98#	263	348	432	520	591	676	759	852	919	982	1026	1062	
RANDOM	98	1083#	1120											
RESET	96	161#	176											
RESETA	96#	260	345	429	517	588	673	756	849	918	981	1025	1061	
RNDFLG	154#	236	237	1085	1122									
RTADD	54#	193	1133											
RTNADA	105#													
RTNADD	105	1131	1193#											
SETUP1	318	337#												
SETUP2	401	421#												
SETUP3	491	510#												
SETUP4	561	581#												
SETUP5	647	666#												
SETUP6	729	749#												
SETUP7	816	839#												
START	103#	1077												
SWERR	99	1216#												
SWERRA	99#	1126												
SWITCH	1088#	1129												
TALSW	148#	269	287	323	325	339	354	372	404	408	423	438	456	496
	498	511	526	544	566	568	582	597	619	652	654	667	682	700
	734	736	750	765	783	824	826	840						
TAMSW	147#	267	281	326	328	352	366	409	411	436	450	499	501	524
	538	569	571	595	609	655	657	680	694	737	739	763	777	827
	829													
TEST	1089	1102#												
TFEXP	146#	265	275	329	381	358	360	412	414	434	444	502	504	522
	532	572	574	593	603	658	660	678	688	740	742	761	771	830
	832	854	860	891										
TJA	517#	580												
TJAC	1058#													
TJAL	849#	892												
TJEQ	103	260#	333	336										
TJGE	345#	420												
TJGT	756#	838												
TJLE	429#	506	509											
TJLT	673#	748												
TJMK	972	978#												
TJNE	588#	662	665											
TJSB	1022#													
TJXN	900#													
TOUT	55#	196	230	233										
TXREG	150#	921	934	964										
TYPE	104	1145	1147#	1153	1166	1170	1172	1185	1189	1191				

TY-A	104#	1076
TYPGO	1158#	1168
X00	112	124#
X1	125#	
X2	126#	
X7	131#	
XADD	112#	908
XREG	142#	909
	922	936
		941

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