

FPP I2B

IDENTIFICATION

PRODUCT CODE: MAINDEC 12-D0NB-D
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-EXIT INSTRUCTION IS PLACED IN THE SELECTED ADDRESS LOCATION. ALL OTHER CORE LOCATIONS OUTSIDE THE PROGRAM CONTAIN FPP HALT INSTRUCTIONS.
- D. THE FPP EXECUTES THE EXIT 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 PROCEED 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

E 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 TIMEOUTS 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	TAG	INSTRUCTION I Z	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,	7106		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

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 0000)
31 /SW00=0, JUMP TO RANDOM ADDRESS
32 /SW00=1, JUMP TO SPECIFIED ADDRESS
33 /SW11=0, PDP-8E, 8L 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          /
61          / PAGE ZERO CONSTANTS
62          /
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          /
94          / CROSS PAGE REFERENCES
95          /
95      0060  0152  JTSTA,  JTST          /SUBROUTINES ADDR.
96      0061  0140  RESEA,  RESET
97      0062  1657  FPERRA, FPERR
98      0063  1600  RANDA,  RANDOM
99      0064  2005  SWERRA, SWERR
100     0065  0100  OADDA,  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 OADD, 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 /K77(10)
164 0143 3122 DCA CNTR /COUNTER
165 0144 1065 TAD OADDA /STARTING ADDR

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166 0145 3011          DCA 0011          /AUTO INDEX
167 0146 3411          DCA I 0011         /SET TO 0
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(FPC)
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 INTERUPT
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          *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          FEEXIT        /INSURANCE EXIT
219 //
220 //START OF PROGRAM

```

```

221
222
223          0200
224    0200  7604
225    0201  0022
226    0202  7450
227    0203  5210
228    0204  7300
229    0205  1051
230    0206  3004
231    0207  0212
232    0210  1054
233    0211  3004
234    0212  7604
235    0213  0047
236    0214  3134
237    0215  1134
238    0216  7440
239    0217  7402
240
241
242
243
244    0220  7300
245    0221  1066
246    0222  3122
247    0223  3522
248    0224  2122
249    0225  0222
250    0226  6552
251    0227  1033
252    0230  6553
253
254
255
256
257
258
259
260    0231  4461
261    0232  1034
262    0233  3173
263    0234  4463
264    0235  3174
265    0236  1126
266    0237  3102
267    0240  1127
268    0241  3103
269    0242  1130
270    0243  3104
271    0244  4460
272    0245  7300
273    0246  1102
274    0247  7041
275    0250  1126

/GET RIGHT SWITCHES
/
*200
LAS          /LOAD SWITCHES
AND    K0001 /MASK BIT 11
SNA          /SKIP IF AC NOT = 0
JMP    .+5
CLA CLL
TAD    K7752
DCA    TOUT   /TIME OUT SET UP FOR PDP-8I
JMP    .+3
TAD    K7765
DCA    TOUT   /TIME OUT SET UP FOR PDP-8E, 8L OR 12
LAS          /LOAD SWITCHES
AND    K4000 /MASK BIT 0
DCA RNDFLG  /STOR FLAG
TAD RNDFLG  /GET IT BACK
SEA          /SKIP IF RANDOM
HLT         /HALT TO RESET SWITCHES TO JUMP ADDRESS

/SET REST OF MEMORY TO ZEROS
/TO FORM FPP EXIT INSTRUCTIONS
/
CLA CLL     /CLEAR
TAD LASTAD /GET LAST ADDRESS
DCA CNTR   /STOR IN COUNTER
DCA I CNTR /DEPOSIT ZERO IN THAT ADDRESS
ISE CNTR   /THROUGH MEMORY
JMP    .-2  /NOT YET-GO ON
FPICL     /DONE-CLEAR FPP
TAD K0400 /INTERUPT ENABLE BIT
FPCOM     /LOAD COMMAND REGISTER

// START TESTS
/
/TEST JEQ INSTRUCTION
/JUMP IF FAC EQUALS ZERO
/
TJEG.    JMS I RESETA /RESET
          TAD K1000   /INST
          DCA JINST   /STORE INST
          JMS I RANDA /GET RANDOM ADDR
          DCA JMPADD  /STOR AS ADDR
          TAD TFEXP   /GET TEMP EXP
          DCA FEXP    /STORE
          TAD TAMSW   /GET TEMP MSW
          DCA AMSW   /STORE
          TAD TALS   /GET TEMP LSW
          DCA ALSW   /STORE
          JMS I JTSTA /START FPP
          CLA CLL    /CLEAR
          TAD FEYP   /GET REPORT
          CIA        /COMPLETE AND ...
          TAD TFEXP  /SAME

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276 0251 7440          SZA
277                    /TO LOOP TEST INSERT (JMP TJEQ)
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 TMSW                 /SAME?
282 0256 7440          SZA
283                    /TO LOOP TEST INSERT (JMP TJEQ)
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 TJEQ)
290 0264 7402          HLT                    /LSW ALTERED BY JUMP
291 0265 1103          TAD AMSW                 /CHECK MSW
292 0266 7440          SZA                    /ZERO?
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 PC
301 0277 7450          SNA                    /ZERO?
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 TJEQ)
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 0310 5314          JMP OKAY1                 /OKAY
312 0311 7300          CLA CLL                    /CLEAR
313 0312 1076          TAD FPC                    /ERROR-GET FPC
314                    /TO LOOP TEST INSERT (JMP TJEQ)
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 LSW
324 0321 7004          RAL                    /ROTATE LEFT
325 0322 5130          DCA TALSW                 /SAVE
326 0323 1127          TAD TMSW                 /GET MSW
327 0324 7004          RAL                    /ROTATE LEFT
328 0325 5127          DCA TMSW                 /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 TALS	/TO START ROTATION
340	0341	3124	DCA DONE	/RESET DONE
341			/TEST JGE INSTRUCTION	
342			/	
343			/JUMP IF FAC GREATER THAN OR EQUAL TO ZERO	
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 TMSW	/GET TEMP MSW
353	0352	3103	DCA AMSW	/STORE
354	0353	1130	TAD TALS	/GET TEMP LSW
355	0354	3104	DCA ALSW	/STORE
356	0355	4465	JMS I JTSTA	/START FPP
357	0356	7300	CLA CLL	/CLEAR
358	0357	1102	TAD FEXP	/GET EXPONENT
359	0360	7041	CIA	/COMPLEMENT AND INCREMENT
360	0361	1126	TAD TFEXP	/SAME
361	0362	7440	SEA	
362			/TO LOOP TEST INSERT (JMP TJGE)	
363	0363	7402	HLT	/EXPONENT ALTERED BY JUMP
364	0364	1103	TAD AMSW	/GET MSW
365	0365	7041	CIA	/COMPLEMENT AND INCREMENT
366	0366	1127	TAD TMSW	/SAME?
367	0367	7440	SEA	
368			/TO LOOP TEST INSERT (JMP TJGE)	
369	0370	7402	HLT	/MSW ALTERED BY JUMP
370	0371	1104	TAD ALSW	/GET LSW
371	0372	7041	CIA	/COMPLEMENT AND INCREMENT
372	0373	1130	TAD TALS	/SAME?
373	0374	7440	SEA	
374			/TO LOOP TEST INSERT (JMP TJGE)	
375	0375	7402	HLT	/LSW ALTERED BY JUMP
376	0376	1103	TAD AMSW	/CHECK MSW
377	0377	7510	SPA	/POSITIVE?
378	0400	5213	JMP NJMP2	/NO-NO JUMP
379	0401	7300	JMP2, CLA CLL	/CLEAR
380	0402	1106	TAD RANADD	/RANDOM ADDR
381	0403	7001	IAC	/+1
382	0404	7041	CIA	/MINUS
383	0405	1076	TAD FPC	/ONE FC
384	0406	7450	SNA	/ZERO?
385	0407	5223	JMP OKAY2	/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          SEA            /
401 0425 0246          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 0645          JMP I ,*4       /LOOP PRESENT TEST
417 0442 1033          TAD K0400
418 0443 3124          DCA DONE        /NON-ZERO
419 0444 0645          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 RESEA /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                      HLT             /EXPONENT ALTERED BY JUMP
448 0473 7402          TAD AMSW          /GET MSW
449 0474 1103          CIA             /COMPLEMENT AND INCREMENT
450 0475 7041          TAD TMSW          /SAME?
451 0476 1127          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 TALS          /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          JMP JMP3          /NEG-JUMP
464 0512 7440          SZA             /ZERO?
465 0513 5331          JMP NJMP3          /NOR ZERO
466 0514 1104          TAD ALSW          /CHECK LSW
467 0515 7442          SZA             /ZERO
468 0516 5331          JMP NJMP3          /NO-NO JMP
469 0517 7300          JMP3, CLA CLL          /RANDOM ADDR
470 0520 1106          TAD RANADD          /+1
471 0521 7001          IAC             /MINUS
472 0522 7041          CIA             /THE PC
473 0523 1076          TAD FPC           /ZERO?
474 0524 7450          SNA             /ALL RIGHT
475 0525 5341          JMP OKAY3          /CLEAR
476 0526 7300          CLA CLL           /GET FPC
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          OKAY3, TAD DONE          /FINISHED?
490 0542 7440          SZA             /0 MEANS NO
491 0543 9363          JMP SETUP3          /YES-GO TO NEXT TEST
492
493                      /FLOAT FAC BIT TEST
494
495 0544 7100          CLL             /NOT DONE

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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 TAB 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 K1030 /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 MSW
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
549 0623 1106 TAD RANADD /RANDOM ADDR
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 7004      RAL           /ROTATE LEFT-LINK INTO 11
574 0650 1126      DCA TFEXP     /STORE
575 0651 7420      SNL           /HAS BIT FALLEN OUT BIT 0 YET
576 0652 0652      JMP I .04     /NOT YET
577 0653 1040      TAD K0400     /DONE
578 0654 3124      DCA DONE      /SET DONE NON-ZERO
579 0655 0656      JMP I .01     /ONE MORE PASS WITH
580 0656 0656      TJA           /AC=0
581 0657 7301      SETUP4, CLA CLL /AC=1
582 0660 3130      DCA TALSW     /STORE IN FAC
583 0661 3124      DCA DONE      /RESET DONE=0
584
585                /TEST JNE INSTRUCTION
586
587                /JUMP IF FAC NOT EQUAL TO ZERO
588
589 0662 4461      TJNE, JMS I RESETA /RESET
590 0663 1040      TAD K1040     /INST
591 0664 3173      DCA JINST     /STORE INST
592 0665 4463      JMS I RANDA   /GET RANDOM NUM
593 0666 3174      DCA JMPADD    /STOR AS ADDR
594 0667 1126      TAD TFEXP     /GET TEMP EXP
595 0670 3102      DCA FEXP      /STORE
596 0671 1127      TAD TAMSW     /GET TEMP MSW
597 0672 3103      DCA AMSW     /STORE
598 0673 1130      TAD TALSW     /GET TEMP LSW
599 0674 3104      DCA ALSW     /STORE
600 0675 4460      JMS I J1STA   /START FPP
601 0676 7300      CLA CLL       /CLEAR
602 0677 1102      TAD FEXP      /GET EXPONENT
603 0700 7041      CIA          /COMPLEMENT AND INCREMENT
604 0701 1126      TAD TFEXP     /TEMP
605 0702 7440      SZA
        /TO LOOP TEST INSERT (JMP TJNE)

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606 0703 7402 HLT /EXPONENT ALTERED BY JUMP
607 0704 1123 TAD AMSW /GET MSW
608 0705 7041 CIA /COMPLEMENT AND INCREMENT
609 0706 1127 TAD TMSW /SAME?
610 0707 7440 SZA
611 /TO LOOP TEST INSERT (JMP TJNE)
612 0710 7402 HLT /MSW ALTERED BY JUMP
613 0711 1104 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 5324 JMP JMP5 /NO-JUMP
622 0721 1104 TAD ALSW /CHECK LSW
623 0722 7450 SNA /NON-ZERO
624 0723 5336 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 5346 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 5346 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 5370 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 TMSW /GET MOST SIG WORD
656 0756 7004 RAL /ROTATE LINK INTO 11
657 0757 3127 DCA TMSW /STORE
658 0760 1126 TAD TFEXP /GET EXP
659 0761 7004 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
666	0770	7301	SETUPS, CLA CLL IAC	/AC=1
667	0771	3130	DCA TALSW	/FAC=1
668	0772	3124	DCA DONE	/RESET DONE=0
669			/TEST JLT INSTRUCTION	
670			/	
671			/JUMP IF FAC LESS THAN 0	
672			/	
673	0773	4461	TJLT, JMS I RESETA	/RESET
674	0774	1041	TAD K1000	/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	4460	JMS I JTSTA	/START FPP
685	1007	7300	CLA CLL	/CLEAR
686	1010	1129	TAD FEXP	/GET EXPONENT
687	1011	7042	CIA	/COMPLEMENT AND INCREMENT
688	1012	1130	TAD TFEXP	/SAME
689	1013	7440	SEA	
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	SEA	
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	SEA	
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     HLT /HLT ON ERROR
718     1043 7402 NJMP6, CLA CLL /NO JUMP
719     1044 7300     TAD FPC /GET FPC
720     1045 1076     TAD K7602 /IS IT 176
721     1046 1050     SNA 7450 /0 MEANS IT IS
722     1047 7450     JMP OKAY6 /OKAY
723     1050 5254     CLA CLL /CLEAR
724     1051 7300     TAD FPC /ERROR-GET FPC
725     1052 1076
726 /TO LOOP TEST INSERT (JMP I(TJLT))
727     HLT /HALT ON ERROR
728     1053 7402 OKAY6, TAD DONE /FINISHED?
729     1054 1124     SZA /0 MEANS NO
730     1055 7440     JMP SETUP6 /SETUP NEXT TEST
731     1056 5277
732 /
733     CLL /CLEAR LINK
734     1057 7100     TAD TALSW /GET LEAST SIG WORD
735     1060 1130     RAL /ROTATE 0 INTO LINK
736     1061 7004     DCA TALSW /STORE
737     1062 3130     TAD TAMSW /GET MOST SIG WORD
738     1063 1127     RAL /ROTATE 0 INTO LINK
739     1064 7004     DCA TAMSW /STORE
740     1065 3127     TAD TFEXP /GET EXP
741     1066 1126     RAL /ROTATE 0 INTO LINK
742     1067 7004     DCA TFEXP /STORE
743     1070 3126     SNL /BIT FALLEN OUT 0 YET
744     1071 7420     JMP I .+4 /NO ANOTHER PASS
745     1072 5676     TAD K0400 /MAKE DONE
746     1073 1033     DCA DONE /NON-ZERO
747     1074 3124     JMP I .+1 /ANOTHER PASS-ACW0
748     1075 5676     TJLT
749     1076 0773     SETUP6, CLA CLL IAC /AC=1
750     1077 7301     DCA TALSW /FAC=1
751     1100 3130     DCA DONE /RESET DONE=0
752     1101 3124
753 /TEST JGT INSTRUCTION
754 /
755 /JUMP IF FAC GREATER THAN 0
756 /
757     1102 4461 TJGT, JMS I RESETA /RESET
758     1103 1042     TAD K1060 /
759     1104 3173     DCA JINST /STORE INST
760     1105 4463     JMS I RANDA /GET RANDOM NUM
761     1106 3174     DCA JMPADD /STOR AS ADDR
762     1107 1126     TAD TFEXP /GET TEMP EXP
763     1110 3102     DCA FEXP /STORE
764     1111 1127     TAD TAMSW /GET TEMP MSW
765     1112 3103     DCA AMSW /STORE
766     1113 1130     TAD TALSW /GET TEMP LSW
767     1114 3104     DCA ALSW /STORE
768     1115 4460     JMS I JTSTA /START FPP
769     1116 7300     CLA CLL /CLEAR
770     1117 1102     TAD FEXP /GET EXPONENT
771     1120 7041     CIA /COMPLEMENT AND INCREMENT

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771 1121 1126          TAD TFEXP      /SAME
772 1122 7440          SZA
773                    /TO LOOP TEST INSERT (JMP TJGT)
774 1123 7402          HLT              /EXPONENT ALTERED BY JUMP
775 1124 1103          TAD AMSW      /GET MSW
776 1125 7041          CIA           /COMPLEMENT AND INCREMENT
777 1126 1127          TAD TAMSW     /SAME?
778 1127 7440          SZA
779                    /TO LOOP TEST INSERT (JMP TJGT)
780 1130 7402          HLT              /MSW ALTERED BY JUMP
781 1131 1104          TAD ALSW      /GET LSW
782 1132 7041          CIA           /COMPLEMENT AND INCREMENT
783 1133 1130          TAD TALSWS    /SAME?
784 1134 7440          SZA
785                    /TO LOOP TEST INSERT (JMP TJGT)
786 1135 7402          HLT              /LSW ALTERED BY JUMP
787 1136 1103          TAD AMSW      /CHECK MSW
788 1137 7510          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 7124          TAD ALSW      /CHECK LSW
793 1144 7400          SNA           /ZERO?
794 1145 5361          JMP NJMP7     /NO-ZERO-NO JUMP
795 1146 7300          JMP7,   CLA CLL
796 1147 7106          TAD RANADD     /RANDOM ADDR
797 1150 7201          IAC           /+1
798 1151 7241          CIA           /MINUS
799 1152 1376          TAD FPC       /THE PC
800 1153 7400          SNA           /ZERO?
801 1154 5760          JMP I ,+4    /ALL RIGHT
802 1155 7300          CLA CLL       /CLEAR
803 1156 1076          TAD FPC       /GET FPC
804                    /TO LOOP TEST INSERT (JMP TJGT)
805 1157 7402          HLT              /HLT ON ERROR
806 1160 1170          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 170
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                    /TO LOOP TEST INSERT (JMP TJGT)
815 1170 7402          HLT              /HALT ON ERROR
816 1171 1215          SETUP7
817 1172 1124          OKAY7,  TAD DONE    /FINISHED
818 1173 7440          SZA           /0 MEANS NO
819 1174 5771          JMP I ,+3    /SETUP FOR NEXT TEST
820                    /
821                    /FLOAT FAC BIT LEFT ONCE
822                    /
823 1175 7100          CLL           /CLEAR LSW
824 1176 1130          TAD TALSU     /GET TALSU
825 1177 7004          RAL           /ROTATE 0 INTO LSW

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826 1200 3130          DCA TALS          /STORE
827 1201 1127          TAD TAMS          /GET MOST SIG WORD
828 1202 7004          RAL              /ROTATE 0 INTO LINK
829 1203 3127          DCA TAMS          /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 TALS          /FAC=1
841 1217 3124          DCA DONE         /RESET DONE=0
842
843 / TEST JAL INSTRUCTION
844 /
845 /JUMP ON ABILITY TO ALIGN A FP NUMBER
846 /
847 /REMEMBER! JUMP WHEN NUMBER CANT BE ALIGNED:
848 /WHEN EXPONENT IS GREATER THAN 23(10)
849 /
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 NJMP0        /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 NJMP0        /EXP LE 23(10)
871 1245 7300          JMP0, CLA CLL
872 1246 1106          TAD RANADD       /RANDOM ADDR
873 1247 7001          IAC            /+1
874 1250 7041          CIA            /MINUS-COMPLEMENT AND INCREMENT
875 1251 1076          TAD FPC          /THE FPC
876 1252 7450          SNA            /ZERO?
877 1253 5267          JMP OKAY0        /ALL RIGHT
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 7402          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 5267          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 7402          HLT          /HALT ON ERROR
891 1267 2126  OKAY8,  ISZ TFEXP
892 1270 5220          JMP TJAL
893                /TEST JXN INSTRUCTION
894                /
895                /LIKE:  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 3123          DCA CNTR1     /BITS=0, ONCE #1
903 1274 3133          DCA BITS      /INITIALLY 0
904 1275 1055  LOOP1,  TAD K7776     /SET COUNTER TO LOOP
905 1276 3132          DCA INDEX     /ALL INDEX VALUES, 0-7
906 1277 3132  LOOPX,  TAD INDEX     /FORM INDEX REG FOR INST
907 1300 0024          AND K0007     /EQUALS 0-7 IN BITS 9,10,11
908 1301 1077          TAD XADD      /ADD INDEX ADDRESS TO FORM REGISTER ADDRESS
909 1302 3125          DCA XREG      /STORE
910 1303 3132          TAD INDEX     /FORM INDEX REGISTER
911 1304 0024          AND K0007     /MASK
912 1305 7100          CLL          /ROTATE TO BITS
913 1306 7004          RAL          /5-6
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  LOOP0,  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 3525          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 CLL      /CLEAR
934 1333 1131          TAD TXREG     /ADD TO JUMP
935 1334 7041          CIA          /MINUS -COMPLEMENT AND INCREMENT

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936 1335 1529 TAD I XREG /ADD RETURNED XREG
937 1336 7440 SZA /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 JMP9, 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 K0100 /SET BIT 0
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 JSR 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 3173 DCA JINST /STORE
981 1401 4461 LOOP10, JMS I RESETA /RESET
982 1402 4463 JMS I RANDA /GET RANDOM ADDRESS
983 1403 3174 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 SZA /0 MEANS YES

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991
 992 1413 7402
 993 1414 1100
 994 1415 7001
 995 1416 3105
 996 1417 1505
 997 1420 7041
 998 1421 1037
 999 1422 7440
 1000
 1001 1423 7402
 1002 1424 1100
 1003 1425 7001
 1004 1426 7001
 1005 1427 3105
 1006 1430 1067
 1007 1431 7001
 1008 1432 7001
 1009 1433 7041
 1010 1434 1505
 1011
 1012 1435 7440
 1013 1436 7402
 1014 1437 3105
 1015 1440 5201
 1016
 1017
 1018
 1019
 1020
 1021
 1022 1441 7300
 1023 1442 1044
 1024 1443 3173
 1025 1444 4461
 1026 1445 4463
 1027 1446 3174
 1028 1447 4460
 1029 1450 7300
 1030 1451 1100
 1031 1452 1023
 1032 1453 7041
 1033 1454 1076
 1034 1455 7440
 1035
 1036 1456 7402
 1037 1457 1037
 1038 1460 7041
 1039 1461 1506
 1040 1462 7440
 1041
 1042 1463 7402
 1043 1464 3506
 1044 1465 2106
 1045 1466 1067

/TO LOOP TEST INSERT (JMP I(LOOP10))
 HLT /NO-FPC RETURNED INCORRECT
 TAD BADD /GET BASE ADDR
 IAC /+1
 DCA JTEMP /STORE TEMP
 TAD I JTEMP /C(B0+1)
 CIA /=? -COMPLEMENT AND INCREMENT
 TAD K1030 /JUMP INST
 SZA /0 MEANS YES
 /TO LOOP TEST INSERT (JMP I(LOOP10))
 HLT /INST STORED INCORRECTLY
 TAD BADD /B0
 IAC
 IAC /B0+2
 DCA JTEMP /STORE
 TAD JTAGA /GET JUMP INST ADDR
 IAC
 IAC /JTAGA+2
 CIA /=? -COMPLEMENT AND INCREMENT
 TAD I JTEMP / C(B0+2)
 /TO LOOP TEST INSERT (JMP I(LOOP10))
 SZA /0 MEANS YES
 HLT /NO-RETURN ADDR STORED INCORRECTLY
 ISE CNTR1 /EVERYTHING OKAY FOR THAT ADDR
 JMP LOOP10 /LOOP 4096 TIME
 /TEST JSB-RETURN ADDR STORED IN FIRST TWO
 /LOCATIONS OF ADDR JUMPED TO
 /THIS INSTRUCTION IS CALLED ISA ON THE CARD AND IN THE MANUAL
 /ALSO CALLED JSB ON THE FLOWS AND IN THE PRINTS
 /THEY ARE ONE AND THE SAME
 /
 /JSB, CLA CLL /CLEAR
 TAD K1126 /FORM ADDR
 DCA JINST /STORE
 LOOP11, JMS I RES07A /RESET
 JMS I RAN0A /GET RANDOM ADDR
 DCA JMPADD /STORE
 JMS I JTAGA /START FPP
 CLA CLL /CLEAR
 TAD RANADD /GET RANDOM ADDR
 TAD K0003 /+3
 CIA /=? -COMPLEMENT AND INCREMENT
 TAD FPC /RETURNED FPC
 SZA /0 MEANS YES
 /TO LOOP TEST INSERT (JMP LOOP11)
 HLT /NO-FPC RETURNED INCORRECTLY
 TAD K1030 /GET JUMP INST
 CIA /=? -COMPLEMENT AND INCREMENT
 TAD I RANADD /C(JUMP ADDR)
 SZA /0 MEANS YES
 /TO LOOP TEST INSERT (JMP LOOP11)
 HLT /NO-RETURN JUMP INST INCORRECT
 DCA JINST /STORE
 ISE RANADD /INCREMENT TO GET NEXT ADDR
 TAD JTAGA /JUMP INST ADDR

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1046 1467 7001 IAC
1047 1470 7001 IAC /+2
1048 1471 7041 CIA /=*? -COMPLEMENT AND INCREMENT
1049 1472 1506 TAD I RANADD /RETURN ADDR
1050 1473 7440 SEA /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 ISZ 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 RESEA /RESET
1062 1504 4463 JMS I RANOA /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 SEA /0 MEANS YES
1071 /TO LOOP TEST INSERT (JMP LOOPAC)
1072 1515 7402 HLT /NO-FPC RETURNED INCORRECTLY
1073 1516 2123 ISZ 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
1079 /
1080 /SUBROUTINE TO RETURN RANDOM NUMBERS OR
1081 /THE CONTENTS OF THE RIGHT SWITCHES
1082 /
1083 1600 0000 RANDOM, 0 /RETURN ADDR
1084 1601 7300 CLA CLL /CLEAR
1085 1602 1134 TAD RNDFLG /CHECK FLAG
1086 1603 7450 SNA /ZERO?
1087 1604 5207 JMP RAND /YES-GET RANDOM NUM
1088 1605 7604 SWITCH, LAS /GET SWITCHES
1089 1606 5223 JMP TEST /TEST IF OKAY
1090 1607 1135 RAND, TAD HX /GET HX
1091 1610 1136 TAD HY /* HY
1092 1611 7006 RTL /ROTATE
1093 1612 3136 DCA HY /STORE
1094 1613 1137 TAD HZ /* HZ
1095 1614 1135 TAD HX /*HX
1096 1615 7010 RAR /ROTATE
1097 1616 3135 DCA HX /STORE
1098 1617 1135 TAD HX /GET BACK
1099 1620 1136 TAD HY /* HY
1100 1621 1137 TAD HZ /* HZ

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1101	1622	7006		RTL	/ROTATE
1102	1623	3137	TEST,	DCA WZ	/STORE
1103	1624	1137		TAD WZ	/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 WZ	/GET BACK
1118	1643	3106		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	2134		TAD RNDPLG	/RANDOM?
1123	1650	7450		SNA	/0 MEANS RANDOM
1124	1651	5207		JMP RAND	/YES-GET ANOTHER RANDOM NUMBER
1125	1652	7200		CLA	/CLEAR
1126	1653	1148		TAD I SHEPRA	/GET MESSAGE
1127	1654	0071		JMS NAME	/PRINT IT OUT
1128	1655	5400		HLT	/HLT TO CHANGE SWITCHES
1129	1656	5000		JMP SWITCH	/GET 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 MAJOR STATE STRING ADDR
1136	1665	4271		JMS NAME	/PRINT IT OUT
1137	1666	6562		FSTATE	/PPP 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 NAME	/GET NAME
1154	1707	0000	ACTYPE,	0	
1155	1710	3105		DCA JTEMP	/STORE WORD

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	BITYP, 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	ISZ 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 BITYP	/RETURN
1193	1756	1796	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

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	2005	SWERR, .	
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	/T
1234	2027	0273	0273	/I
1235	2030	0240	0240	/
1236	2031	0303	0303	/C
1237	2032	0317	0317	/O
1238	2033	0316	0316	/N
1239	2034	0324	0324	/T
1240	2035	0215	0215	/CR
1241	2036	0212	0212	/LF
1242	2037	0000	LSTLOC, 0000	
1243				
1244				
1245				

0000	01111000	00000000	11111111	11111111	11111111	11111111	11111111	11111111
0100	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111
0200	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111
0300	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111
0400	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111
0500	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111
0600	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111
0700	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111

1000	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111
1100	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111

1200	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111
1300	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111

1400	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111
1500	11111111	11111111	11100000	00000000	00000000	00000000	00000000	00000000

1600	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111
1700	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111

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

2200
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5000
5100

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5500

5600
5700

6000
6100

6200
6300

6400
6500

6600
6700

7000
7100

7200
7300

7400
7500

7600
7700

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	0003
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	K7732	0051	SETUP4	0697
FEXP	0102	K7737	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	SWERR	2005
FPICL	6552	K7776	0057	SWERRA	0064
FPST	6555	LASTAD	0066	SWITCH	1605
FSTATE	6562	LOOP10	1401	TALSW	0130
HX	0135	LOOP11	1444	TAMSW	0127
HY	0136	LOOP9	1313	TEST	1620
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	MSTATA	0073	TJEG	0231
JMP2	0401	MSTATE	1771	TJOE	0342
JMP3	0517	NAME	1671	TJGT	1102
JMP4	0622	NEG	1634	TJLE	0452
JMP5	0724	NJMP1	0304	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	TOUT	0004
JTAGA	0067	NJMP8	1257	TXREG	0131
JTEMP	0105	NJMP9	1355	TYPE	1700
JTST	0152	OADD	0101	TYPEA	0071
JTSTA	0060	OADDA	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		

DIAL10 V003

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0112

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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#							
MSTATA	106#								
MSTATE	106	1135	1204#						
NAME	1127	1132	1136	1140#	1164				
NEG	1105	1111#							
NJMP1	293	296	387#						
NJMP2	378	390#							
NJMP3	465	468	480#						
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#	170											
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	406	408	423	438	456	496
	498	511	526	544	566	568	582	597	615	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	331	350	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				

T
TYPGO
X00
X1
X2
X7
XADD
XREG

104# 1076
1158# 1168
112 124#
125#
126#
131#
112# 908
142# 909

922 936 941

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