

MAINDEC-
 PAGE 2

1. ABSTRACT

THIS IS A GROUP OF 12 TESTS THAT INCREMENTALLY TEST AND ISOLATE SIMPLE MALFUNCTIONS OF THE PDP 11. THE TESTS SHOULD BE RUN IN THE INDICATED NUMERICAL SEQUENCE. THE SEQUENCE IS 1. BRANCH 2. CONDITIONAL BRANCH 3. UNARY 4. UNARY AND BINARYS 5. ROTATE/SHIFT 6. COMPARE (EQUALITY) 7. COMPARE (NON EQUALITY) 8. MOVE 9. BIT SET, CLEAR AND TEST 10. ADD 11. SUBTRACT 12. JUMP

THERE IS A SECOND GROUP OF TESTS FOR MORE COMPLEX MALFUNCTIONS.

2. REQUIREMENTS

2.1 EQUIPMENT

PDP-11/20 STANDARD COMPUTER

2.2 STORAGE

2.2.1 PROGRAM STORAGE - THE PROGRAMS USE ALL OF A 4KW MEMORY WITH THE EXCEPTION OF 17500 TO 17776 (WHICH IS RESERVED FOR THE BOOT AND ABSOLUTE LOADER).

3. LOADING PROCEDURE

3.1 METHOD

PROCEDURE FOR NORMAL ABSOLUTE TAPES SHOULD BE FOLLOWED.

4. STARTING PROCEDURE

4.1 CONTROL SWITCH SETTING

ALL PROGRAMS START AT ADDRESS 200.

4.2 STARTING ADDRESS OR ADDRESSES

(A) 200 = START AND RESTART ADDRESS

4.3 PROGRAM AND/OR OPERATOR ACTION

LOAD PROGRAM INTO MEMORY. (BOTTOM 4K)
 SET SWITCH REGISTER TO STARTING ADDRESS. (200)
 LOAD ADDRESS.
 PRESS START.
 THE PROGRAM WILL LOOP, AND RING A BELL AFTER A FIXED NUMBER OF ITERATIONS.

5. OPERATING PROCEDURE
 - 5.1 OPERATIONAL SWITCH SETTINGS
 - 5.1.1 NO SWITCHES ARE USED
 - 5.1.3
 - 5.2 SUBROUTINE ABSTRACTS
 - 5.2.1 BEGIN SA 200
 - 5.2.2 SCOPE

IS A "NOP" THAT IS PLACED BETWEEN EACH SUBTEST
IN THE INSTRUCTION SECTION. IF A SCOPE LOOP IS NEEDED,
INSERT A BRANCH TO THE PREVIOUS SCOPE LOCATION
AT THE CURRENT SCOPE LOCATION. (NOTE NOP=240)
 - 5.2.3 HLT

INDICATES THE UNIQUE ADDRESS THAT TAGS THE
FAILING SUBTEST. THE INCORRECT DATA AT THE
TIME OF THE FAILURE MAY OR MAY NOT BE
DISPLAYED IN REGISTER ZERO, WHICH IS THE DATA
REGISTER ON A HALT.
 - 5.3 PROGRAM AND/OR OPERATOR ACTION
 - 5.3.1 LOADING AND STARTING AT 200 STARTS THE TEST. IF
AN ERROR IS DETECTED, THERE WILL BE A HALT.
WHEN A HALT OCCURS AND IT IS NECESSARY TO SCOPE ON
IT, PLACE INSERT A BRANCH INSTRUCTION IN THE
SCOPE LOCATION FOLLOWING THE HALT. THE BRANCH
INSTRUCTION SHOULD BRANCH YOU TO THE PREVIOUS
SCOPE LOCATION.
6. ERRORS
 - 6.1 ALL ERRORS WILL CAUSE A HALT.
 - 6.2 ERROR RECOVERY

ON TRAP ERRORS - RESTART AT 200.
DEPRESS CONTINUE TO CONTINUE TEST
7. RESTRICTIONS
 - 7.1 STARTING RESTRICTION

NONE

103
104
105
106
107
108
109
110
111
112
113
114
115
116
117
118
119
120
121
122
123
124
125
126
127
128
129
130
131
132
133
134
135
136
137
138
139
140
141
142
143
144
145
146
147
148
149
150
151
152
153
154
155
156
157
158
159
160

E01

MAIN. MACY11 27:732) 01-OCT-76 10:12 PAGE 5
DOGA.P11

161
162
163

7.2 OPERATIONAL RESTRICTION
NONE

8. MISCELLANEOUS

IF A HALT OCCURES IN THE TRAP OR INTERRUPT VECTOR AREA, REGISTER SIX SHOULD BE EXAMINED TO DETERMINE ITS CONTENTS, THEN USE REGISTER SIX CONTENTS AS AN ADDRESS TO DETERMINE THE LOCATION THE PROGRAM WAS AT, WHEN THE INTERRUPT OR TRAP OCCURRED. (MEMORY AS SPECIFIED BY R6 CONTAINS THE PC OF THE INSTRUCTION FOLLOWING THE INSTRUCTION WHERE THE TRAP OCCURED)

8.1 EXECUTION TIME

TIME BETWEEN BELLS

FOR TAPE 1	5	MINUTES
FOR TAPE 2	2.5	MINUTES
FOR TAPE 3	3	MINUTES
FOR TAPE 4	6	MINUTES
FOR TAPE 5	5	MINUTES
FOR TAPE 6	6	MINUTES
FOR TAPE 7	5	MINUTES
FOR TAPE 8	6	MINUTES
FOR TAPE 9	3	MINUTES
FOR TAPE 10	4	MINUTES
FOR TAPE 11	2	MINUTES
FOR TAPE 12	4	MINUTES

5. PROGRAM DESCRIPTION

TEST 1 THIS IS A TEST OF THE UNCONDITIONAL BRANCH INSTRUCTION. IT PROVES THAT A LONG PROGRAM CAN BE LOADED AND THE INSTRUCTIONS CAN BE EXECUTED THROUGHOUT MEMORY.

TEST 2 THIS IS A CONDITIONAL BRANCH TEST USING ALL OF THE CONDITIONAL BRANCH INSTRUCTIONS. IT TESTS THAT ALL COMBINATIONS OF CONDITION CODES ARE RESPONDED TO CORRECTLY. (THE CONDITION CODES ARE MANIPULATED WITH THE MICRO-PROGRAM OPERATIONS.)

TEST 3 THIS IS A TEST OF THE UNARY INSTRUCTIONS AND THEIR EFFECTS UPON THE CONDITION CODES ONLY. MOSTLY REGISTER OPERATIONS.

TEST 4 THIS IS A COMBINED USE OF UNARY AND BINARY INSTRUCTIONS TESTING THE RESULTS AND THE CONDITION CODES.

TEST 5 THIS TEST ROTATE AND SHIFT INSTRUCTION, BOTH THE REGISTERS AND MEMORY LOCATIONS, WORD AND BYTE, ARE TESTED.

TEST 6 THIS IS A TEST OF THE COMPARE INSTRUCTIONS FOR

GO1

.MAIN. MACY11 27.732) 01-OCT-76 10:12 PAGE 7
DOGA.P11

220
221
222

EQUALITY. ALL CONDITIONAL BRANCHES THAT WILL
BRANCH ON ANY FORM OF EQUALITY ARE ALSO TESTED.
BOTH WORD AND BYTE OPERATIONS ARE USED.

(9 CONT'D)

TEST 7 COMPARE NOT. THIS IS A TEST OF THE COMPARE INSTRUCTIONS WHERE NO VALUES ARE EQUAL. HERE BRANCHES FOR NOT EQUAL, GREATER THAN AND LESS THAN, ETC., ARE TESTED.

TEST 8 CHECKS THE MOVE INSTRUCTION BOTH TO MEMORY AND REGISTERS.

TEST 9 CHECK THE BIS, BIC AND BIT INSTRUCTION BOTH TO MEMORY AND TO REGISTERS.

TEST 10 TESTS THE ADD INSTRUCTION.

TEST 11 TESTS THE SUBTRACT INSTRUCTION.

TEST 12 TEST OF THE JUMP INSTRUCTION IN MOST MODES.

NOTE THAT STACK OPERATION AND INSTRUCTIONS THAT USE THEM ARE NOT TESTED IN THIS GROUP OF TEST.

10. LISTING
11. FLOW CHART(S)

223
224
225
226
227
228
229
230
231
232
233
234
235
236
237
238
239
240
241
242
243
244
245
246
247
248
249
250
251

MAIN. MACY11 27(732) 01-OCT-75 10:12 PAGE 9
 DOGA.P11

```

252                                     %
253
254                                     ;TEST 7 CMPNOT-PDP11
255                                     ;TEST COMBINATIONS OR CONDITIONAL BRANCH, WITH COMPARE
256                                     ;FOR GREATER AND LESS THAN AND SUB-COMBINATIONS
257                                     ;COPYRIGHT 1969, DIGITAL EQUIPMENT CORP., MAYNARD, MASS.
258
259                                     HLT=0
260                                     SCOPE=240
261                                     .=200
262
263                                     ;TEST COMPARE WORD FOR GREATER AND LESS THAN
264
265 000200 000240 SCOPE
266 000202 022727 000001 000000 CMP #1,#0 ;SOURCE GREATER THAN DESTINATION
267 000210 001001 BNE .+4 ;SHOULD NOT BE EQUAL
268 000212 000000 HLT ;SHOULD NOT BE EQUAL
269 000214 003001 BGT .+4 ;BGTA FAILED
270 000216 000000 HLT ;BGTA FAILED
271 000220 002001 BGE .+4 ;BGEA FAILED
272 000222 000000 HLT ;BGEA FAILED
273 000224 000240 SCOPE
274 000226 022727 000000 000001 CMP #0,#1 ;SOURCE LESS THAN DESTINATION
275 000234 001001 BNE .+4 ;SHOULD NOT BE EQUAL
276 000236 000000 HLT ;SHOULD NOT BE EQUAL
277 000240 002401 BLT .+4 ;0 IS LESS THAN 1
278 000242 000000 HLT ;0 IS LESS THAN 1
279 000244 003401 BLE .+4 ;0 IS LESS THAN 1
280 000246 000000 HLT ;0 IS LESS THAN 1
281 000250 000240 SCOPE
282 000252 022727 177777 100000 CMP #177777,#100000 ;SOURCE GREATER THAN DESTINATION
283 000260 001001 BNE .+4 ;SHOULD NOT BE EQUAL
284 000262 000000 HLT ;SHOULD NOT BE EQUAL
285 000264 003001 BGT .+4 ;BGTA FAILED
286 000266 000000 HLT ;BGTA FAILED
287 000270 002001 BGE .+4 ;BGEA FAILED
288 000272 000000 HLT ;BGEA FAILED
289 000274 000240 SCOPE
290 000276 022727 100000 177777 CMP #100000,#177777 ;SOURCE LESS THAN DESTINATION
291 000304 001001 BNE .+4 ;SHOULD NOT BE EQUAL
292 000306 000000 HLT ;SHOULD NOT BE EQUAL
293 000310 002401 BLT .+4 ;100000 IS LESS THAN 177777
294 000312 000000 HLT ;100000 IS LESS THAN 177777
295 000314 003401 BLE .+4 ;100000 IS LESS THAN 177777
296 000316 000000 HLT ;100000 IS LESS THAN 177777
297 000320 000240 SCOPE
298 000322 022727 077777 000000 CMP #077777,#000000 ;SOURCE GREATER THAN DESTINATION
299 000330 001001 BNE .+4 ;SHOULD NOT BE EQUAL
300 000332 000000 HLT ;SHOULD NOT BE EQUAL
301 000334 003001 BGT .+4 ;BGTA FAILED
302 000336 000000 HLT ;BGTA FAILED
303 000340 002001 BGE .+4 ;BGEA FAILED
304 000342 000000 HLT ;BGEA FAILED
305 000344 000240 SCOPE
306 000346 022727 000000 077777 CMP #000000,#077777 ;SOURCE LESS THAN DESTINATION
307 000354 001001 BNE .+4

```


J02

MAIN. MACY11 27(732) 01-OCT-75 10:12 PAGE 23
DOGA.P11

1036
1037

000000

N=0

