

IDENTIFICATION

PRODUCT CODE: MAINDEC-14-DLAB-D
PRODUCT NAME: VER-14
DATE CREATED: JUNE 18, 1970
MAINTAINER: DIAGNOSTIC GROUP
AUTHOR: EDWARD P. STEINBERGER



1. ABSTRACT

VER-14 is a program written to be run on a PDP-8I/L computer to verify the contents and operation of a PDP-14 Read-Only-Memory (ROM). It is loaded into and run on an 8I/L, connected to a PDP-14 which contains the ROM under test. The program provides error messages, error halts, and oscilloscope looping (sequential test only). The bell on the 8I/L teletype will be rung after each pass through the program.

2. REQUIREMENTS

2.1 EQUIPMENT

PDP-8I/L Computer
PDP-14 to PDP-8I/L Interface Module (M745)
PDP-14 INPUT and OUTPUT Register Modules (four M746's)
PDP-14 Computer
PDP-14 ROM under test
Binary representation or ROM

2.2 STORAGE

The program occupies approximate 3 PDP-8 memory pages starting at location 6000 and uses the first 2K of Memory (0000 to 3777) as data buffer areas.

2.3 PRELIMINARY PROGRAMS

The PDP-14 which contains the ROM should be capable of successfully running TEST-14. (TEST-14L if PDP-14L)

3. LOADING PROCEDURE

3.1 METHOD

The program is loaded using the "standard" PDP-8 Binary Loader Technique.

4. STARTING PROCEDURE

4.1 CONTROL SWITCH SETTINGS

The following is a table of switch register settings and their operation upon the program:

SR	SET AS	ACTION
0 } 1 }	00	Set to indicate memory slot to be tested (00-first, 01-second, 10-third, 11-fourth)
	01	
	10	
	11	
10	1	Loop on Data Error (Sequential Test Only)
	0	Don't loop on Data Error
11	1	Don't Halt on Data Error
	0	Halt on Data Error

4.2 STARTING ADDRESSES

Program's starting address is 6000.

4.3 PROGRAM AND/OR OPERATOR ACTION

- 4.3.1 Connect the PDP-14 which contains the ROM to be tested to the PDP-8I/L using the appropriate cables and revision of the M745 interface module. Install INPUT and OUTPUT Register Modules (M746's)
- 4.3.2 Power up the PDP-8I/L and the PDP14 computers, while depressing PDP-14 "STOP"
- 4.3.3 Load the binary program "VER-14" into the 8I/L using the PDP-8 Binary Loader
- 4.3.4 Load the binary program "LOAD-14" into the 8I/L using the PDP-8 Binary Loader (LOAD-14 is not normally destroyed by VER-14, it should only be necessary to load LOAD-14 once to test ROM's)
- 4.3.5 Use LOAD-14 to read the binary image of the ROM into PDP-8I/L memory from paper tape. If VER-14 is in field 1, LOAD-14 must be used with SR11 set to a 1. (Consult LOAD-14 Writeup for program operating procedure).

- 4.3.6 Set 8I/L Switch Register to 6000, Depress "LOAD ADDRESS"
- 4.3.7 Set Switch Register per 4.1 (above), SR0 and 1 should be set to indicate memory bank being tested.
- 4.3.8 Depress 8I/L "START"
- 4.3.9 Depress PDP-14 "START"
- 4.3.10 Program will now run and test the PDP14 ROM. Errors will cause error messages and halts. When the program has completed one complete pass through the tests, the teletype bell will be rung, after which another pass will be initiated.

5. OPERATING PROCEDURE

5.1 OPERATIONAL SWITCH SETTINGS

See 4.1 above

5.2 SUBROUTINE ABSTRACTS

None

5.3 PROGRAM AND/OR OPERATOR ACTION

See 4.3 above

6. ERRORS

6.1 ERROR HALTS AND DESCRIPTION

Most of the error halts in the program are preceded by error messages. However, if in doubt about the cause of the error halt, consult the program listing.

6.2 ERROR RECOVERY

To 'scope a data error condition, set SR10 to 1. If a data error occurs when in Sequential Address Test, the program will automatically put itself in a 'scope loop for signal tracing after checking the "HALT" switch (SR11). 'Scoping is not possible (or meaningful) in the Random Address Test as the program is checking for noise immunity of the memory, not correct data per se.

6.3 ERROR MESSAGES

SEQUENTIAL ADDRESS TEST

ADDR GOOD BAD

0470 7777 0000

0471 5777 0000

0472 7777 0000

0473 7777 0000

0474 7777 0000

0475 6777 0000

0476 7777 0000

0477 7777 0000

RANDOM ADDRESS TEST

ADDR GOOD BAD

0051 7777 5777

0071 7777 5777

0101 7777 5777

0111 7777 5777

0121 7777 5777

0131 7777 5777

0141 2525 0525

0171 6666 4666

0261 7777 5777

0271 7777 5777

0301 7777 5777

Shown above are the two data error messages printed by the program. The first shows an error in the Sequential Address Test. The column headings are self explanatory. The eight memory locations (0470 to 0477) were not being properly read, in fact their contents were coming back to the PDP-8/L as 0000. The second shows an error in the Random Address Test. In this example, bit 1 was lost from the memory locations being accessed.

7. RESTRICTIONS

7.1 STARTING RESTRICTIONS

The program in the PDP-8/L must be started before the PDP-14 is started, otherwise the program in the PDP-14 may cause strange results due to no I-, O-, and S- Boxes being attached to the PDP-14. Therefore, Power-up the PDP-14 while depressing "STOP" on the PDP-14 control panel so that the PDP-14 will not have the opportunity to execute the program in its memory.

7.2 OPERATING RESTRICTIONS

PDP-14 INPUT and OUTPUT Register must be installed.

8. MISCELLANEOUS

8.1 EXECUTION TIME

The time to complete one pass through the program (ring the bell on the teletype) is approximately 1 minute if no errors occur.

9. PROGRAM DESCRIPTION

9.1 Sequential Address Test (SA=6010)

In Sequential Address Test the program accesses PDP-14 memory sequentially (address 0000, 0001, 0002, etc. to 1777 of the memory bank), stores the information obtained in PDP-8 memory, then checks it against what it is supposed to be, and types out discrepancies. This test is repeated 64 times before the program goes on to the Random Address Test.

9.2 Random Address Test (SA= 6200)

In Random Address Test the program accesses PDP-14 memory randomly ~~1024~~ times (1 times through the 1K bank), stores the information obtained in PDP-8 memory, then checks it against what it is supposed to be, and types out discrepancies. This test is repeated 64 times before ringing the bell on the teleprinter and returning to the Sequential Address Test.


```

1
2
3
4
5
6 0000 6000
7 0001 6175
8 0002 5201
9 0003 1335
10 0004 4777'
11 0005 7604
12 0006 0336
13 0007 3337
14 0010 4776'
15 0011 1775'
16 0012 3340
17 0013 1347
18 0014 3345
19 0015 4774'
20 0016 1337
21 0017 4773'
22 0020 1341
23 0021 3343
24 0022 1336
25 0023 3344
26 0024 4772'
27 0025 1771'
28 0026 4777'
29 0027 6171
30 0030 7402
31 0031 6176
32 0032 3743
33 0033 2343
34 0034 2344
35 0035 5225
36 0036 1770'
37 0037 3342
38 0040 1341
39 0041 3343
40 0042 1336
41 0043 3344
42 0044 6201
43 0045 1742
44 0046 7041
45 0047 4772'
46 0050 1743
47 0051 7640
48 0052 4262
49 0053 2342
50 0054 2343
51 0055 2344
52 0056 5244
53 0057 2345
54 0060 5215
55 0061 5767'

/PROGRAM TO VERIFY PDP-14 MEMORY
/COPYRIGHT 1969, DIGITAL EQUIPMENT CORP., MAYNARD, MASS.
*6000
VER14, CLA CLL
SCRF
/IS PDP-14 RUNNING?
JMP I=-1
TAD K0000
JMS INTER
/PUT PDP-14 IN EXTERNAL MODE
LAS
AND K6000
DCA HIADD
/STORE HIGH ORDER BITS OF ADDRESS
JMS CKIF
SEQUEN, TAD PMESS1
DCA HEADER
/SET UP MESSAGE TYPEOUT
TAD M0100
DCA CNTR3
JMS CLEAR
/CLEAR STORAGE AREA
TAD HIADD
JMS SETPC1
/LOAD PC1 WITH FIRST ADDRESS
TAD K2000
DCA PNTR2
/SET UP STORAGE ADDRESS
TAD K6000
DCA CNTR1
/SET UP STORAGE COUNTER
JMS RCDF10
RDLUP1, TAD TRM
JMS INTER
/EXECUTE A TRM
SOTF
/OUTPUT FLAG SET?
HLT
/NO, ERROR
ROTR
/YES, READ OUTPUT REGISTER
DCA I PNTR2
/STORE AWAY
ISZ PNTR2
/
ISZ CNTR1
/DONE?
JMP RDLUP1
/NO
TAD KPNTR1
DCA PNTR1
TAD K2000
DCA PNTR2
TAD K6000
DCA CNTR1
DATCK1, CDF 00
/COMPARE
TAD I PNTR1
CIA
/BINARY
JMS RCDF10
TAD I PNTR2
/AGAINST
SEA CLA
/ PDP-14
JMS DATERR
/ MEMORY
ISZ PNTR1
ISZ PNTR2
ISZ CNTR1
/DONE?
JMP DATCK1
/NO
ISZ CNTR3
JMP SEQUEN*4
JMP RANDOM
/YES

```

```

55
56 /DATA ERROR SUBROUTINE
57
58 6062 0000 DATERR, 0
59 6063 1340 TAD HEADER
60 6064 7650 SNA CLA
61 6065 5275 JMP NOHEAD
62 6066 4766 JMS CRLF
63 6067 1340 TAD HEADER
64 6070 4765 JMS MESSAGE
65 6071 4766 JMS CRLF
66 6072 1764 TAD PMESS2
67 6073 4765 JMS MESSAGE
68 6074 3340 DCA HEADER
69 6075 4766 NOHEAD, JMS CRLF
70 6076 1770 TAD KPNTR1
71 6077 7041 CIA
72 6100 1342 TAD PNTR1
73 6101 1337 TAD HIADD
74 6102 4763 JMS PRINT
75 6103 1346 TAD K0240
76 6104 4762 JMS TYPE
77 6105 6201 CDF 00
78 6106 1742 TAD I PNTR1
79 6107 4772 JMS RCDF10
80 6110 4763 JMS PRINT
81 6111 1346 TAD K0240
82 6112 4762 JMS TYPE
83 6113 1743 TAD I PNTR2
84 6114 4763 JMS PRINT
85 6115 4766 JMS CRLF
86 6116 7604 STOP, LAS
87 6117 7010 RAR
88 6120 7620 SNL CLA
89 6121 7402 HLT /HALT ON ERROR?
90 6122 7604 SLOOP, LAS /YES
91 6123 7012 RTR
92 6124 7620 SNL CLA /LOOP ON ERROR?
93 6125 5662 JMP I DATERR /NO
94 6126 1770 TAD KPNTR1
95 6127 7041 CIA
96 6130 1342 TAD PNTR1
97 6131 1337 TAD HIADD
98 6132 4761 JMS ACCESS
99 6133 5322 JMP SLOOP
100 6134 5662 JMP I DATERR
101

```

102				
103	6135	0600	K0600:	600
104	6136	6000	K6000:	6000
105	6137	0000	HIADD:	0
106	6140	0000	HEADER:	0
107	6141	2000	K2000:	2000
108	6142	0000	PNTR1:	0
109	6143	0000	PNTR2:	0
110	6144	0000	CNTR1:	0
111	6145	0000	CNTR3:	0
112	6146	0240	K0240:	240
113	6147	7700	M0100:	-100
114				

115					
116	6161	6314			
117	6162	6400			
118	6163	6466			
119	6164	6556			
120	6165	6420			
121	6166	6406			
122	6167	6200			
123	6170	6640			
124	6171	6324			
125	6172	6533			
126	6173	6504			
127	6174	6557			
128	6175	6941			
129	6176	6817			
130	6177	6600			
		6200	*6200		
131	6200	7300	RANDOM, CLA CLL		
132	6201	1340	TAD	M0100A	
133	6202	3331	DCA	CNTR4	
134	6203	1777	TAD	K6000	
135	6204	3330	DCA	CNTR2	
136	6205	1776	TAD	PMESS3	
137	6206	3325	DCA	HEAD1	
138	6207	4342	JMS	RAN	/GET A RANDOM NUMBER
139	6210	0334	AND	K1777A	/MASK
140	6211	3332	DCA	RANADD	/AND STORE
141	6212	1332	TAD	RANADD	
142	6213	1333	TAD	K2000A	/FORM STORAGE ADDRESS
143	6214	3326	DCA	PNTR3	
144	6215	1332	TAD	RANADD	
145	6216	1736	TAD	PHIADD	/FORM MEMORY LOCATION ADDRESS
146	6217	3332	DCA	RANADD	
147	6220	1332	TAD	RANADD	
148	6221	4314	JMS	ACCESS	/GET CONTENTS OF 14 MEMORY
149	6222	3726	DCA	PNTR3	/AND STORE
150	6223	2330	ISZ	CNTR2	/MADE 1 PASS THROUGH MEMORY?
151	6224	5206	JMP	RANDOM*6	/NO
152	6225	1333	TAD	K2000A	
153	6226	3327	DCA	PNTR4	
154	6227	1775	TAD	KPNTR1	
155	6230	3326	DCA	PNTR3	
156	6231	1335	TAD	K6000A	
157	6232	3330	DCA	CNTR2	
158	6233	6201	DATCK2, CDF	00	/CHECK DATA READ BACK
159	6234	1726	TAD	PNTR3	
160	6235	7041	CIA		
161	6236	4774	JMS	RCDF10	
162	6237	1727	TAD	PNTR4	
163	6240	7640	SZA	CLA	
164	6241	4253	JMS	RANERR	/DATA ERROR
165	6242	2326	ISZ	PNTR3	
166	6243	2327	ISZ	PNTR4	
167	6244	2330	ISZ	CNTR2	/DONE?
168	6245	5233	JMP	DATCK2	/NO

/PROGRAM TO VERIFY PDP-14 MEMORY

PAL10 V141

18-JUN-78

21189

PAGE 4-1

169 6246 2331
170 6247 5203
171 6250 1341
172 6251 4773
173 6252 5772

ISE
JMP
TAD
JMS
JMP

CNTR4
RANDOM*3
K0207
TYPE
SEQUEN

/YES

```

174
175
176
177 6253 0000 RANERR, 0
178 6254 1325 TAD HEAD1
179 6255 7650 SNA CLA
180 6256 5266 JMP NHEAD
181 6257 4771 JMS CRLF
182 6260 1325 TAD HEAD1
183 6261 4770 JMS MESSAGE
184 6262 4771 JMS CRLF
185 6263 1767 TAD PMESS2
186 6264 4770 JMS MESSAGE
187 6265 3325 DCA HEAD1
188 6266 4771 NHEAD, JMS CRLF
189 6267 1775 TAD KPNTR1
190 6270 7041 CIA
191 6271 1326 TAD PNTR3
192 6272 1736 TAD I PHIADD
193 6273 4766 JMS PRINT
194 6274 1337 TAD K0240A
195 6275 4773 JMS TYPE
196 6276 6201 CDF 00
197 6277 1726 TAD I PNTR3
198 6300 4774 JMS RCDF10
199 6301 4766 JMS PRINT
200 6302 1337 TAD K0240A
201 6303 4773 JMS TYPE
202 6304 1727 TAD I PNTR4
203 6305 4766 JMS PRINT
204 6306 4771 JMS CRLF
205 6307 7004 LAS
206 6310 7010 RAR
207 6311 7620 SNL CLA
208 6312 7402 HLT
209 6313 5653 JMP I RANERR

```

```

210 /SUBROUTINE TO READ THE CONTENTS OF THE MEMORY
211 /LOCATION IN THE PDP-14 WHOSE ADDRESS IS IN THE
212 /AC OF THE PDP-8
213
214 6314 0000 ACCESS, 0
215 6315 4765 JMS SETPC1
216 6316 1324 TAD TRM
217 6317 4764 JMS INTER /EXECUTE TRM
218 6320 6171 SOTF /OUTPUT REGISTER FLAG SET?
219 6321 7402 HLT /NO
220 6322 6176 ROTR /YES, READ OUTPUT REGISTER
221 6323 5714 JMP I ACCESS /EXIT
222 6324 4226 TRM, 4226
223
224 6325 0000 HEAD1, 0
225 6326 0000 PNTR3, 0
226 6327 0000 PNTR4, 0
227 6330 0000 CNTR2, 0
228 6331 0000 CNTR4, 0
229 6332 0000 RANADD, 0
230 6333 2000 K2000A, 2000
231 6334 1777 K1777A, 1777
232 6335 6000 K6000A, 6000
233 6336 6137 PHIADD, HIADD
234 6337 0240 K0240A, 240
235 6340 7700 M0100A, -100
236 6341 0207 K0207, 207

```

```
237 /RANDOM NUMBER GENERATOR
238 RAN, 0
239 CLA CLL
240 TAD RNA
241 TAD RNB
242 DCA RNA
243 RAL
244 TAD RNA
245 TAD RNB
246 DCA RNB
247 TAD RNA
248 JMP I RAN
249 RNA, 7601
250 RNB, 3452
251
```


252 6364 6600
 253 6365 6604
 254 6366 6466
 255 6367 6656
 256 6370 6420
 257 6371 6406
 258 6372 6011
 259 6373 6400
 260 6374 6633
 261 6375 6640
 262 6376 6666
 263 6377 6136

*6400

/TYPE SUBROUTINE

264
 265
 266 6400 0000
 267 6401 6046
 268 6402 6041
 269 6403 5202
 270 6404 7200
 271 6405 5600

TYPE, 0
 TLS
 TSF
 JMP ,=1
 CLA
 JMP I TYPE

/CR-LF SUBROUTINE

272
 273
 274
 275 6406 0000
 276 6407 1214
 277 6410 4200
 278 6411 1215
 279 6412 4200
 280 6413 5606
 281 6414 0215
 282 6415 0212
 283 6416 0007
 284 6417 0260

CRLF, 0
 TAD K0215
 JMS TYPE
 TAD K0212
 JMS TYPE
 JMP I CRLF
 K0215, 215
 K0212, 212
 K0007, 7
 K0260, 260

/MESSAGE TYPEOUT SUBROUTINE
/ENTER WITH ADDRESS OF TEXT IN AC

285
 286
 287
 288
 289 6420 0000
 290 6421 3257
 291 6422 1657
 292 6423 0200
 293 6424 7450
 294 6425 5020
 295 6426 7112
 296 6427 7012
 297 6430 7012
 298 6431 3261
 299 6432 1261
 300 6433 1262
 301 6434 7710
 302 6435 1263
 303 6436 1264
 304 6437 1261
 305 6440 4200

MESSAGE, 0
 DCA MPNTR
 TAD I MPNTR
 AND K7700
 SNA
 JMP I MESSAGE
 RTR CLL
 RTR
 RTR
 DCA CHAR
 TAD CHAR
 TAD M0040
 SPA CLA
 TAD K0100B
 TAD K0200B
 TAD CHAR
 JMS TYPE

306	6441	1657	TAD I	MPNTR
307	6442	0265	AND	K0077
308	6443	7450	SNA	
309	6444	5620	JMP I	MESSAGE
310	6445	3261	DCA	CHAR
311	6446	1261	TAD	CHAR
312	6447	1262	TAD	M0040
313	6450	7710	SPA	CLA
314	6451	1263	TAD	K0100B
315	6452	1264	TAD	K0200B
316	6453	1261	TAD	CHAR
317	6454	4200	JMS	TYPE
318	6455	2257	ISZ	MPNTR
319	6456	5222	JMP	MESSAGE*2
320	6457	0000	MPNTR,	0
321	6460	7700	K7700,	7700
322	6461	0000	CHAR,	0
323	6462	7740	M0040,	-40
324	6463	0100	K0100B,	100
325	6464	0200	K0200B,	200
326	6465	0077	K0077,	77
327				

328
329
330
331
332
333
334
335
336
337
338
339
340
341
342
343
344
345
346
347
348
349
350
351
352
353
354
355
356
357
358
359
360
361
362
363
364
365
366
367
368
369
370
371
372
373
374
375
376
377
378
379
380
381
382

6466 0000
6467 3310
6470 1312
6471 3311
6472 1310
6473 7104
6474 7004
6475 7006
6476 3310
6477 1310
6500 0216
6501 1217
6502 4200
6503 1310
6504 2311
6505 5274
6506 7200
6507 5666
6510 0000
6511 0000
6512 7774

6513 0000
6514 4315
6515 0000
6516 6175
6517 5334
6520 6161
6521 7410
6522 5332
6523 2315
6524 5316
6525 4206
6526 1337
6527 4220
6530 4206
6531 7402
6532 7200
6533 5713
6534 4206
6535 1346
6536 5327

6537 6540
6540 2004
6541 2055
6542 6164
6543 4010

/TYPE OUT THE CONTENTS OF THE AC IN OCTAL

PRINT, 0
DCA NUMBER
TAD M0004
DCA PCNTR
TAD NUMBER
RAL CLL
RAL
RTL
DCA NUMBER
TAD NUMBER
AND K0007
TAD K0260
JMS TYPE
TAD NUMBER
ISZ PCNTR
JMP ,=11
CLA
JMP I PRINT
NUMBER, 0
PCNTR, 0
M0004, -4

/WAIT ONLY SO LONG FOR INSTRUCTION DONE FLAG.

WAIT, 0
JMS ,*1
0
SCRF /14 RUNNING
JMP NORUN /NO
SIDF /DONE?
SKP /NO
JMP EXIT1 /YES
ISZ WAIT+2 /TIME OUT?
JMP WAIT+3 /NO
TYMOUT, JMS CRLF /YES
TAD PHUNG
JMS MESSAGE
JMS CRLF
INSTER, HLT
EXIT1, CLA
JMP I WAIT
NORUN, JMS CRLF
TAD PNORUN
JMP TYMOUT+2

/PDP-14 HUNG

PHUNG, ,*1
2004
2055
6164
4010

```

383      6544 2516          2516
384      6545 0700          0700
385
386      /PDP-14 STOPPED
387
388      6546 6547  PNORUN, ,+1
389      6547 2004          2004
390      6550 2055          2055
391      6551 6164          6164
392      6552 4023          4023
393      6553 2417          2417
394      6554 2020          2020
395      6555 0504          0504
396      6556 0000          0
397      /SUBROUTINE TO CLEAR STORAGE AREA FOR INCOMING DATA FROM PDP-14
398      CLEAR, 0
399      6560 1371          TAD      K2000B
400      6561 3311          DCA     PCNTR
401      6562 1372          TAD     K6000B
402      6563 3310          DCA     NUMBER
403      6564 3711          DCA I  PCNTR
404      6565 2311          ISZ    PCNTR
405      6566 2310          ISZ    NUMBER
406      6567 5364          JMP     , -3
407      6570 5757          JMP I  CLEAR
408      6571 2000          K2000B, 2000
409      6572 6000          K6000B, 6000

```

```

410
411      6600      *6600
412
413      /EXECUTE THE INSTRUCTION IN THE AC IN INTERRUPT MODE.
414
415      6600 0000      INTER, 0
416      6601 6165      ILEX                                /INTERRUPT AND EXECUTE.
417      6602 4777      JMS      WAIT                    /WAIT FOR DONE FLAG.
418      6603 5600      JMP I      INTER
419
420      /SET PC1 TO NNNN USING JMP NNNN. ENTERED WITH NNNN IN AC.
421
422      6604 0000      SETPC1, 0
423      6605 3215      DCA      SETTEM                    /SAVE NNNN.
424      6606 1216      TAD      K4224                    /EXECUTE PDP14 JMP.
425      6607 6164      LOEX
426      6610 4777      JMS      WAIT                    /WAIT FOR DONE FLAG.
427      6611 1215      TAD      SETTEM                    /SET PC1 TO NNNN.
428      6612 6164      LOEX
429      6613 4777      JMS      WAIT                    /WAIT FOR DONE FLAG.
430      6614 5604      JMP I      SETPC1                /EXIT.
431      6615 0000      SETTEM, 0
432      6616 4224      K4224, 4224
433
434      /ROUTINE TO CHECK INSTRUCTION FIELD OF VER=14.
435
436      6617 0000      CKIF, 0
437      6620 6224      RIF                                /IS VER-14 IN FIELD1?
438      6621 7650      SNA      CLA
439      6622 5227      JMP      ,+5
440      6623 1236      TAD      KCDF10                    /YES, SUBSTITUTE CDF 10.
441      6624 3234      DCA      CDFSUB
442      6625 1776      TAD      HIADD                    /SET KPNTR1 TO HIADD BIAS.
443      6626 5231      JMP      ,+3
444      6627 1237      TAD      KCDF00                    /NO, SUBSTITUTE CDF 00.
445      6630 3234      DCA      CDFSUB
446      6631 3240      DCA      KPNTR1                    /SET KPNTR1 TO 0 BIAS.
447      6632 5617      JMP I      CKIF
448
449      /ROUTINE TO CHANGE DATA FIELD TO VER-14 INST. FIELD.
450
451      6633 0000      RCDF10, 0
452      6634 6201      CDFSUB, CDF                    /FILLED IN BY CKIF.
453      6635 5633      JMP I      RCDF10
454      6636 6211      KCDF10, CDF      10
455      6637 6201      KCDF00, CDF      00
456      6640 0000      KPNTR1, 0
457
458
459      6641 6642      PMESS1, ,*1
460      6642 2305      TEXT      "SEQUENTIAL ADDRESS TEST"
        6643 2125
        6644 0516
        6645 2411
        6646 0114
    
```

	6647	4001		
	6650	0404		
	6651	2205		
	6652	2323		
	6653	4024		
	6654	0523		
	6655	2400		
461				
462	6656	6657	PMESS2, +1	
463	6657	0104	TEXT	"ADDR GOOD BAD"
	6660	0422		
	6661	4007		
	6662	1717		
	6663	0440		
	6664	0201		
	6665	0400		
464				
465	6666	6667	PMESS3, +1	
466	6667	2201	TEXT	"RANDOM ADDRESS TEST"
	6670	1604		
	6671	1715		
	6672	4001		
	6673	0404		
	6674	2205		
	6675	2323		
	6676	4024		
	6677	0523		
	6700	2400		

```

467
468
469
470      6161      SIDF=6161      /SKIP ON INSTRUCTION DONE FLAG
471      6162      LDIN=6162     /LOAD THE PDP-14 INPUT REGISTER FROM PDP-8 AC
472      6164      LDEX=6164     /LOAD AND EXECUTE INSTRUCTION IN PDP-14
473      6165      ILEX=6165     /INTERRUPT THE PDP-14, LOAD AND EXECUTE INSTRUCTION
474      6167      CIDF=6167     /CLEAR INSTRUCTION DONE FLAG
475      6171      SOTF=6171     /SKIP IF PDP-14 OUTPUT REGISTER LOADED
476      6172      COTF=6172     /CLEAR OUTPUT FLAG
477      6173      STFF=6173     /SKIP IF PDP-14 TEST FLOP SET
478      6174      CTFF=6174     /CLEAR TEST FLOP
479      6175      SCRf=6175     /SKIP IF PDP-14 IS RUNNING
480      6176      ROTR=6176     /CLEAR AC, READ OUTPUT REGISTER INTO PDP-8 AC
481
482
483      /DEFINITION OF EXTENDED MEMORY IOT'S.
484
485      6224      RIF=6224      /READ INSTRUCTION FIELD.
486      6201      CDF=6201     /CHANGE DATA FIELD.
487
488      S
489      6776      6137
490      6777      6513

```

0000
0100

0200
0300

0400
0500

0600
0700

1000
1100

1200
1300

1400
1500

1600
1700

2000
2100

2200
2300

2400
2500

2600
2700

3000
3100

3200
3300

3400
3500

3600
3700

4000
4100

4200
4300

4400
4500

4600
4700

5000
5100

5200
5300

5400
5500

5600
5700

6000	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111
6100	11111111	11111111	11111111	11111111	11111111	00000000	01111111	11111111	11111111
6200	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111
6300	11111111	11111111	11111111	11111111	11111111	11111110	00001111	11111111	11111111
6400	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111
6500	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11100000
6600	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111
6700	10000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000011

7000
7100

7200
7300

7400
7500

7600
7700

ACCESS	6314	M0100A	6340
CDF	6201	MESSAGE	6420
CDFSUB	6634	MPNTR	6407
CHAR	6461	NHEAD	6266
CIDF	6167	NOHEAD	6075
CKIF	6617	NORUN	6534
CLEAR	6557	NUMBER	6510
CNTR1	6144	PCNTR	6511
CNTR2	6330	PHIADD	6336
CNTR3	6145	PHUNG	6537
CNTR4	6331	PMESS1	6641
COTF	6172	PMESS2	6656
CRLF	6406	PMESS3	6666
CTFF	6174	PNORUN	6546
DATCK1	6044	PNTR1	6142
DATCK2	6233	PNTR2	6143
DATERR	6062	PNTR3	6326
EXIT1	6532	PNTR4	6327
HEAD1	6325	PRINT	6466
HEADER	6140	RAN	6342
HIADD	6137	RANADD	6332
ILEX	6165	RANDOM	6200
INSTER	6531	RANERR	6253
INTER	6600	RCDF10	6633
K0007	6416	RDLUP1	6025
K0077	6465	RIF	6224
K0100B	6463	RNA	6355
K0200B	6464	RNB	6356
K0207	6341	ROTR	6176
K0212	6415	SCRF	6175
K0215	6414	SEQUEN	6011
K0240	6146	SETPC1	6604
K0240A	6337	SETTEM	6615
K0260	6417	SIOF	6161
K0600	6135	SLOOP	6122
K1777A	6334	SOTF	6171
K2000	6141	STFF	6173
K2000A	6333	STOP	6116
K2000B	6571	TRM	6324
K4224	6616	TYMOUT	6525
K6000	6136	TYPE	6400
K6000A	6335	VER14	6000
K6000B	6572	WAIT	6513
K7700	6460		
KCDF00	6637		
KCDF10	6636		
KPNTR1	6640		
LDEX	6164		
LDIN	6162		
M0004	6512		
M0040	6462		
M0100	6147		

/PROGRAM TO VERIFY PDP-14 MEMORY

PAL10

V141

18-JUN-70

21109

PAGE 11-4

ERRORS DETECTED: 0

LINKS GENERATED: 53

RUN-TIME: 3 SECONDS

2K CORE USED

.L6174	18	127#		
.L6175	14	128#		
.L6176	13	129#		
.L6177	9	27	130#	
.L6364	217	252#		
.L6365	215	253#		
.L6366	193	199	203	254#
.L6367	185	259#		
.L6370	183	186	256#	
.L6371	181	184	188	204 257#
.L6372	173	258#		
.L6373	172	195	201	259#
.L6374	161	198	260#	
.L6375	154	189	261#	
.L6376	136	262#		
.L6377	134	263#		
.L6776	442	489#		
.L6777	417	426	429	490#