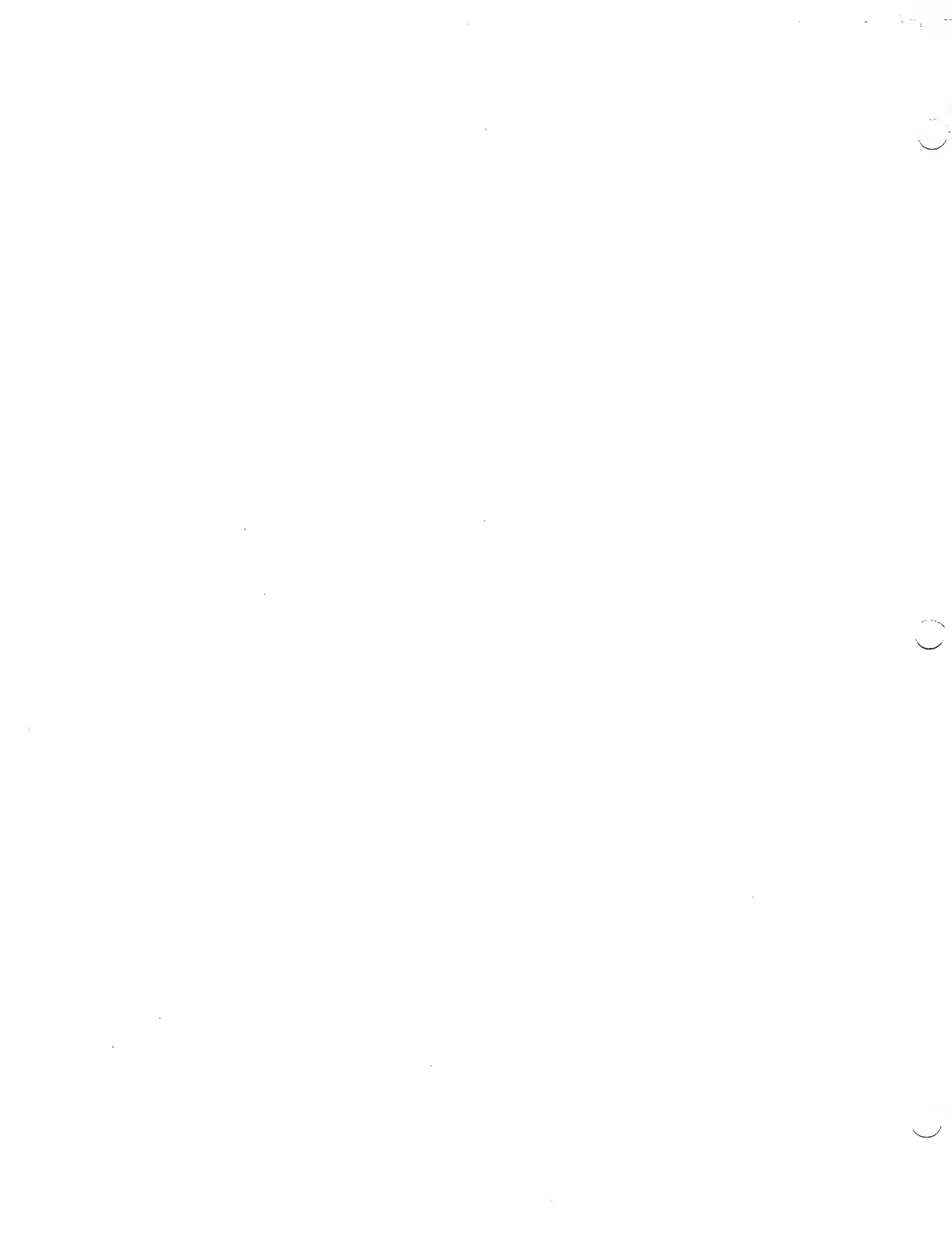


IDENTIFICATION

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-8i/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-8i/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.



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```

/PROGRAM TO VERIFY PDP-14 MEMORY
/COPYRIGHT 1969, DIGITAL EQUIPMENT CORP., MAYNARD, MASS.
*6000
VER14, CLA CLL
SCRFL /IS PDP-14 RUNNING?
JMP ,=1
TAD K0600
JMS INTER /PUT PDP-14 IN EXTERNAL MODE
LAS
AND K6000
OCA HIADD /STORE HIGH ORDER BITS OF ADDRESS
JMS CKIF
SEQUEN, TAD PMESS1
OCA HEADER /SET UP MESSAGE TYPEOUT
TAD M0100
OCA CNTR3
JMS CLEAR /CLEAR STORAGE AREA
TAD HIADD
JMS SETPC1 /LOAD PC1 WITH FIRST ADDRESS
TAD K2000
OCA PNTR2 /SET UP STORAGE ADDRESS
TAD K6000
OCA CNTR1 /SET UP STORAGE COUNTER
JMS RCD10
ROLUP1, TAD TRM
JMS INTER /EXECUTE A TRM
SOTF /OUTPUT FLAG SET?
HLT /NO, ERROR
ROTR /YES, READ OUTPUT REGISTER
OCA I PNTR2 /STORE AWAY
ISZ PNTR2 /
ISZ CNTR1 /DONE?
JMP ROLUP1 /NO
TAD KPNTR1
OCA PNTR1
TAD K2000
OCA PNTR2
TAD K6000
OCA CNTR1
DATCK1, CDF 00 /COMPARE
TAD I PNTR1 /BINARY
CIA
JMS RCD10
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      KPNT1
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
90      6122 7604          SLODP, LAS
91      6123 7012          RTR
92      6124 7620          SNL      CLA
93      6125 5662          JMP I    DATERR
94      6126 1770'        TAD      KPNT1
95      6127 7041          CIA
96      6130 1342          TAD      PNTR1
97      6131 1337          TAD      HIADD
98      6132 4761'        JMS      ACCESS
99      6133 5322          JMP      SLODP
100     6134 5062          JMP I    DATERR
101

```

/HALT ON ERROR?  
/YES

/LOOP ON ERROR?  
/NO

102				
103	6135	0000	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	6633			
126	6173	6604			
127	6174	6557			
128	6175	6641			
129	6176	6617			
130	6177	6600			
		6200			
131	6200	7300	*6200		
132	6201	1340	RANDOM, CLA CLL		
133	6202	3331	TAD M0100A		
134	6203	1777	DCA CNTR4		
135	6204	3330	TAD K6000		
136	6205	1776	DCA CNTR2		
137	6206	3325	TAD PMESS3		
138	6207	4342	DCA HEAD1		
139	6210	0334	JMS RAN	/GET A RANDOM NUMBER	
140	6211	3332	AND K1777A	/MASK	
141	6212	1332	DCA RANADD	/AND STORE	
142	6213	1333	TAD RANADD		
143	6214	3326	TAD K2000A	/FORM STORAGE ADDRESS	
144	6215	1332	DCA PNTR3		
145	6216	1736	TAD RANADD		
146	6217	3332	TAD PHIADD	/FORM MEMORY LOCATION ADDRESS	
147	6220	1332	DCA RANADD		
148	6221	4314	TAD RANADD		
149	6222	3726	JMS ACCESS	/GET CONTENTS OF 14 MEMORY	
150	6223	2330	DCA PNTR3	/AND STORE	
151	6224	5206	ISZ CNTR2	/MADE 1 PASS THROUGH MEMORY?	
152	6225	1333	JMP RANDOM*6	/NO	
153	6226	3327	TAD K2000A		
154	6227	1775	DCA PNTR4		
155	6230	3326	TAD KPNTR1		
156	6231	1335	DCA PNTR3		
157	6232	3330	TAD K6000A		
158	6233	6201	DCA CNTR2		
159	6234	1726	DATCK2, CDF 00	/CHECK DATA READ BACK	
160	6235	7041	TAD I PNTR3		
161	6236	4774	CIA		
162	6237	1727	JMS RCDF10		
163	6240	7640	TAD I PNTR4		
164	6241	4253	SZA CLA		
165	6242	2326	JMS RANERR	/DATA ERROR	
166	6243	2327	ISZ PNTR3		
167	6244	2330	ISZ PNTR4		
168	6245	5233	ISZ CNTR2	/DONE?	
			JMP DATCK2	/NO	

/PROGRAM TO VERIFY PDP-14 MEMORY

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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  7604      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 RANA00, 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

\*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

```

272  
273

/CR-LF SUBROUTINE

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

```

285  
286  
287

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

288		
289	6420	0000
290	6421	3257
291	6422	1697
292	6423	0260
293	6424	7450
294	6425	5620
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 6466 0000 PRINT, 0
332 6467 3310 DCA NUMBER
333 6470 1312 TAD M0004
334 6471 3311 DCA PCNTR
335 6472 1310 TAD NUMBER
336 6473 7104 RAL CLL
337 6474 7004 RAL
338 6475 7006 RTL
339 6476 3310 DCA NUMBER
340 6477 1310 TAD NUMBER
341 6500 0216 AND K0007
342 6501 1217 TAD K0260
343 6502 4200 JMS TYPE
344 6503 1310 TAD NUMBER
345 6504 2311 ISZ PCNTR
346 6505 5274 JMP ,=11
347 6506 7200 CLA
348 6507 5666 JMP I PRINT
349 6510 0000 NUMBER, 0
350 6511 0000 PCNTR, 0
351 6512 7774 M0004, -4
352
353 /WAIT ONLY SO LONG FOR INSTRUCTION DONE FLAG.
354
355 6513 0000 WAIT, 0
356 6514 4315 JMS ,*1
357 6515 0000 0
358 6516 6175 SCRF /14 RUNNING
359 6517 5334 JMP NDRUN /NO
360 6520 6161 SIOF /DONE?
361 6521 7410 SKP /NO
362 6522 5332 JMP EXIT1 /YES
363 6523 2315 ISZ WAIT*2 /TIME OUT?
364 6524 5316 JMP WAIT*3 /NO
365 6525 4206 TYMOUT, JMS CRLF /YES
366 6526 1337 TAD PHUNG
367 6527 4220 JMS MESSAGE
368 6530 4206 JMS CRLF
369 6531 7402 INSTYR, HLT
370 6532 7200 EXIT1, CLA
371 6533 5713 JMP I WAIT
372 6534 4206 NDRUN, JMS CRLF
373 6535 1346 TAD PNORUN
374 6536 5327 JMP TYMOUT*2
375
376 /POP-14 HUNG
377
378 6537 6540 PHUNG, ,*1
379 6540 2004 2004
380 6541 2055 2055
381 6542 6164 6164
382 6543 4010 4010

```

383	6544	2516	2516
384	6545	0700	0700

385

386

387

/POP-14 STOPPED

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 POP-14

398

6557 0000

CLEAR, 0

399

6560 1371

TAO K2000B

400

6561 3311

DCA PCNTR

401

6562 1372

TAO 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          LDEX
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 CL,A
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 5017          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 POP-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 POP-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 POP-8 AC
481      /
482      /
483      /DEFINITION OF EXTENDED MEMORY IOT'S.
484      /
485      6224      RIF=6224      /READ INSTRUCTION FIELO.
486      6201      COF=6201     /CHANGE OATA 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
COF	6201	MESSAGE	6420
COFSUB	6634	MPNTR	6457
CHAR	6461	NHEAD	6266
CIOF	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
OATCK1	6044	PNTR1	6142
OATCK2	6233	PNTR2	6143
DATERR	6062	PNTR3	6326
EXIT1	6532	PNTR4	6327
HEAO1	6325	PRINT	6466
HEADER	6140	RAN	6342
HIADO	6137	RANADO	6332
ILEX	6165	RANOOM	6200
INSTER	6531	RANERR	6253
INTER	6600	RCDF10	6633
K0007	6416	ROLUP1	6025
K0077	6465	RIF	6224
K0100B	6463	RNA	6355
K0200B	6464	RNB	6356
K0207	6341	ROTR	6176
K0212	6415	SCRFF	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	6371	TRM	6324
K4224	6616	TYMOUT	6525
K6000	6136	TYPE	6400
K6000A	6335	VER14	6000
K6000B	6572	WAIT	6513
K7700	6460		
KCDF00	6637		
KCOF10	6636		
KPNTR1	6640		
LDEX	6164		
LDIN	6162		
M0004	6512		
M0040	6462		
M0100	6147		

/PROGRAM TO VERIFY PDP-14 MEMORY

PAL10

V111

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21109

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ERRORS DETECTED: 0

LINKS GENERATED: 53

RUN-TIME: 5 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
.L6372	173	258#		257#
.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	492#