

1. ABSTRACT

The Memory Address Test checks for proper memory address selection on the PDP-8.

2. REQUIREMENTS

2.1 Equipment

Standard PDP-8 Computer.

2.2 Storage

The low version occupies locations 0000-0222. The high version occupies locations 7400-7575, 0-3. The binary loader must be stored in the last memory page.

2.3 Preliminary Programs

It is assumed that the only malfunction is in the memory addressing circuits.

3. LOADING PROCEDURE

The program is supplied in RIM format.

4. STARTING PROCEDURE

4.1 Control Switch Settings

SR0 Halt after error printout.

4.2 Starting Addresses

0004 Low Storage Restart 0000

7400 High Storage

4.3 Operator Action

- a. Load the starting address into the program counter.
- b. Set the SWITCH REGISTER to 4000, if halt on error is desired.
- c. Push START.

5. OPERATING PROCEDURE

Same as section 4.

6. ERRORS

6.1 Error Printouts

Axxxx Cyyyy (Error printout format)

Axxxx. (Address). xxxx = Address containing the wrong data

Cyyyy. (Contents). yyyy = Contents of location xxxx.

The address should always equal the contents.

6.2 Error Recovery

Analysis of several error printouts should establish a meaningful pattern that will single out a particular address selector card.

If it is necessary to scope the problem, the following two instruction loop may be entered into memory by the operator.

TAD [Bad Location]

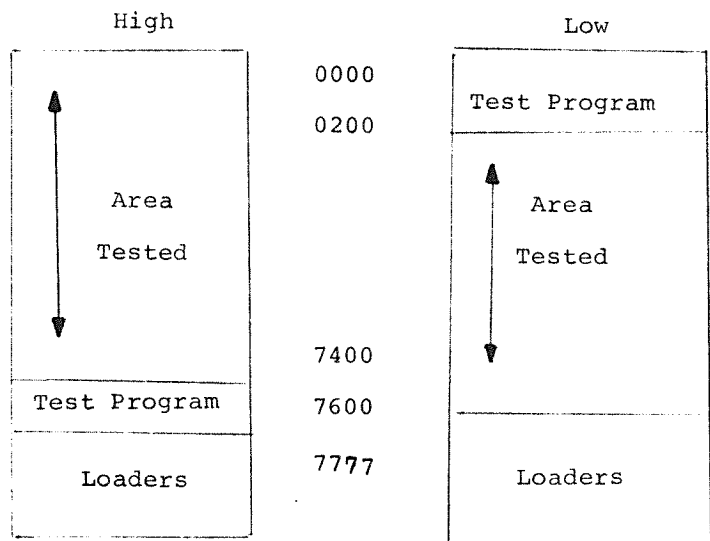
JMP .-1

7. MISCELLANEOUS

7.1 Execution Time

An ll is printed after every 96 complete program loops (every 28 seconds).

7.2 Memory Maps



/POP=8 MEMORY ADDRESS TEST (LOW, PAGE 4)
*2

/LOAD MEMORY FORWARD DIRECTION

0000	TAD LIMH	LOADUP, 0	
0001	DCA ADRES	JMP 1	/SET TEST AREA STARTING ADDRESS
0002	TAD M7410	2	
0003	DCA CTR	3	
0004	TAD ADRES	JMP I, +1	
0005	DCA I ADRES	PATCH	/DEPOSIT ADDRESS IN CONTENTS
0006		ISZ ADRES	
0007		ISZ CTR	
0010		JMP LOADUP*4	
0011		TAD LIMLO	
0012		DCA ADRES	
0013		TAD M7410	
0014		DCA CTR	

/GET CONTENTS FORWARD DIRECTION

0015	MEMLUP, TAD I ADRES	
0016	CJA	/GET ADDRESS
0017	TAD ADRES	/SKIP IF EQUAL
0020	SZA ERROR	/CONTENTS NOT SAME AS ADDRESS
0021	JMS ERROR	/SELECT NEXT ADDRESS
0022	ISZ ADRES	
0023	ISZ CTR	/SKIP IF END TEST AREA
0024	JMP MEMLUP	

/LOAD MEMORY REVERSE DIRECTION

0025	LOADWN, TAD LIMH	
0026	DCA ADRES	/SET TEST AREA ENDING ADDRESS
0027	TAD M7410	
0030	DCA CTR	
0031	TAD ADRES	
0032	DCA I ADRES	/DEPOSIT ADDRESS IN CONTENTS
0033	CLA CMA	/AC=-1
0034	TAD ADRES	/AC=(ADRES)-1
0035	DCA ADRES	/DECREMENT ADDRESS
0036	ISZ CTR	
0037	JMP LOADWN*4	/SKIP WHEN LOWER LIMIT REACHED
0040	TAD M7410	
0041	DCA CTR	

```

0042 1074 /SEQUENTIAL LOCATION TEST (DOWN)
0043 3073 TAD LIMH
0044 1473 DCA ADRES /SET STARTING ADDRESS
0045 7041 TAD I ADRES /GET CONTENTS
0046 1073 CIA /GET ADDRESS
0047 7440 TAD ADRES /SKIP IF EQUAL
0050 4116 JMS ERROR /CONTENTS NOT SAME AS ADDRESS
0051 7240 CLA CMA /AC=-1
0052 1073 TAD ADRES /AC=(ADRES)-1
0053 3073 DCA ADRES /SELECT NEXT ADDRESS
0054 2103 ISZ CTR /SKIP IF END TEST AREA
0055 5044 JMP LOOP2+2
0056 2077 ISZ COUNT
0057 5000 JMP LOADUP
0060 1100 TAD RESTOR
0061 3077 DCA COUNT
0062 1111 TAD CK
0063 4144 JMS PRINT
0064 1112 TAD LF
0065 4144 JMS PRINT
0066 1101 TAD K261
0067 4144 JMS PRINT
0070 1101 TAD K261
0071 4144 JMS PRINT
0072 5000 JMP LOADUP

```

LOOP2,

/CONSTANTS AND VARIABLES

```

ADRES, 0
LIMH, 7610
LIMLO, 200
M7410, -7410

COUNT, -140
RESTOR, -140
K261, 261
M4, -4
CTR, 0
MSK7, 7
TW6, 260
STOR, 0
NUM, RAL
CUVT, 0
CR, 215
LF, 212
SPACE, 240
A, 301
C, 303

```

```

0073 0000
0074 7610
0075 0200
0076 0370

0077 7640
0100 7640
0101 0261
0102 7774
0103 0000
0104 0007
0105 0260
0106 0000
0107 7004
0110 0000
0111 0215
0112 0212
0113 0240
0114 0301
0115 0303

```

0116	0000	/ERROR ROUTINE	
0117	7041	Ø	
0120	1073	CIA ADRES	/RESTORE CONTENTS
0121	3110	DCA CONT	/OF FAILING ADDRESS
			/PUT RESULT IN CONT
0122	1111	/ERROR MESSAGE	
0123	4144	TAD CH	
0124	1112	JMS PRINT	
0125	4144	TAD LF	
0126	1114	JMS PRINT	
0127	4144	TAD A	
0130	1073	JMS PRINT	
0131	4152	TAD ADRES	
0132	1113	JMS TYPAC	
0133	4144	TAD SPACE	
0134	1115	JMS PRINT	
0135	4144	TAD C	
0136	1110	JMS PRINT	
0137	4152	TAD CONT	
0140	7604	JMS TYPAC	
0141	7710	LAS	
0142	7402	SPA CLA	
0143	5516	HLT ON ERROR (SRØ)	
		JMP I ERROR	
0144	0000	Ø	
0145	6046	TLS	
0146	6041	TSF	
0147	5146	JMP I=1	
0150	7200	CLA	
0151	5544	JMP I PRINT	

/TYPE (AC) IN OCTAL

0152	0000		
0153	3106	Ø	DCA STOR
0154	1162		TAD BACK+1
0155	3163		DCA BACK+2
0156	1102		TAD M4
0157	3123		DCA CTR
0160	7100		CLL
0161	1106	BACK,	TAD STOR
0162	7006		RIL
0163	7006		RIL
0164	3106		DCA STOR
0165	1106		TAD STOR
0166	0104		AND MSK/
0167	1105		TAD TW6
0170	4144		JMS PRINT
0171	1107		TAD NUM
0172	5163		DCA BACK+2
0173	2103		ISE CTR
0174	5161		JMP BACK
0175	5552		JMP I TYPAC
0200	1215	*0200	
0201	3000	PATCH,	TAD X0
0202	1216		DCA 0
0203	3001		TAD X1
0204	1217		DCA 1
0205	3002		TAD X2
0206	1220		DCA 2
0207	3003		TAD X3
0210	1221		DCA 3
0211	3004		TAD X4
0212	1222		DCA 4
0213	3005		TAD X5
0214	5000		DCA 5
			JMP 0
0215	1075		TAD LIMLO
0216	3073		DCA ADRES
0217	1076		TAD M/410
0220	3103		DCA CTR
0221	1073		TAD ADRES
0222	3473		DCA I ADRES

/RESTORE 1ST PAGE

3

THERE ARE NO ERRORS

SYMBOL TABLE

A	0114
AURES	0073
BACK	0161
C	0115
CUNT	0110
COUNT	0077
CR	0111
CTR	0103
ERROR	0116
K261	0101
L+	0112
LIMHI	0074
LIMLO	0075
LOADUP	0000
LOADWN	0025
LOOP2	0042
MEMLUP	0015
MSG	0122
MSK7	0104
M4	0102
M7410	0076
NUM	0107
PATCH	0200
PRINT	0144
RESTOR	0100
SPACE	0113
STOR	0106
TW6	0105
TYPAC	0152
X0	0215
X1	0216
X2	0217
X3	0220
X4	0221
X5	0222

SYMBOL TABLE

LOADUP	0000
MEMLUP	0015
LOADWN	0025
LOOP2	0042
AUREL	0073
LIMHI	0074
LIMLO	0075
M7410	0076
CUUNT	0077
RESTOR	0100
K261	0101
M4	0102
CTR	0103
MSK7	0104
TW6	0105
STOR	0106
NUM	0107
CUNT	0110
CK	0111
LF	0112
SPACE	0113
A	0114
C	0115
ERROR	0116
MSG	0122
PRINT	0144
TYPAC	0152
BACK	0161
PATCH	0200
X0	0215
X1	0216
X2	0217
X3	0220
X4	0221
X5	0222

/PDP-8 MEMORY ADDRESS TEST (HIGH, PAGE 30)
*7400

7400

/LOAD MEMORY FORWARD DIRECTION

7400	1275	LOADUP, TAD LIMLO	
7401	3273	DCA ADRES	/SET TEST AREA STARTING ADDRESS
7402	1276	TAD M7400	
7403	3303	DCA CTR	
7404	1273	TAD ADRES	
7405	3673	DCA I ADRES	/DEPOSIT ADDRESS IN CONTENTS
7406	2273	ISZ ADRES	
7407	2303	ISZ CTR	
7410	5204	JMP LOADUP*4	
7411	1275	TAD LIMLO	
7412	3273	DCA ADRES	
7413	1276	TAD M7400	
7414	3303	DCA CTR	

MEMLUP, TAD I ADRES	/GET CONTENTS FORWARD DIRECTION
CIA	
TAD ADRES	/GET ADDRESS
SEA	/SKIP IF EQUAL
JMS ERROR	/CONTENTS NOT SAME AS ADDRESS
ISZ ADRES	/SELECT NEXT ADDRESS
ISZ CTR	
JMP MEMLUP	/SKIP IF END TEST AREA

7415	1673	MEMLUP, TAD I ADRES	/GET CONTENTS FORWARD DIRECTION
7416	7041	CIA	
7417	1273	TAD ADRES	/GET ADDRESS
7420	7440	SEA	/SKIP IF EQUAL
7421	4316	JMS ERROR	/CONTENTS NOT SAME AS ADDRESS
7422	2273	ISZ ADRES	/SELECT NEXT ADDRESS
7423	2303	ISZ CTR	
7424	5215	JMP MEMLUP	/SKIP IF END TEST AREA
7425	1274	/LOAD MEMORY REVERSE DIRECTION	
7426	3273	LOADWN, TAD LIMHI	
7427	1276	DCA ADRES	/SET TEST AREA ENDING ADDRESS
7430	3303	TAD M7400	
7431	1273	DCA CTR	
7432	3673	TAD ADRES	
7433	7240	DCA I ADRES	/DEPOSIT ADDRESS IN CONTENTS
7434	1273	CLA CMA	/AC=-1
7435	3273	TAD ADRES	/AC=(ADRES)-1
7436	2303	DCA ADRES	/DECREMENT ADDRESS
7437	5231	ISZ CTR	
7440	1276	JMP LOADWN*4	/SKIP WHEN LOWER LIMIT REACHED
7441	3303	TAD M7400	
		DCA CTR	

```

7442 1274 /SEQUENTIAL LOCATION TEST (DOWN)
7443 3273 TAD LIMMI
7444 1673 DCA ADRES /SET STARTING ADDRESS
7445 7041 TAD I ADRES /GET CONTENTS
7446 1273 CIA /GET ADDRESS
7447 7442 TAD ADRES /SKIP IF EQUAL
7450 4316 SZA /CONTENTS NOT SAME AS ADDRESS
7451 7240 JMS ERROR /AC=#1
7452 1273 CLA CMA /AC=(ADRES)-1
7453 3273 TAD ADRES /SELECT NEXT ADDRESS
7454 2303 DCA ADRES /SKIP IF END TEST AREA
7455 5244 ISZ CTR
7456 2277 JMP LOOP2*2
7457 5200 ISZ COUNT
7460 1300 JMP LOADUP
7461 3277 TAD RESTOR
7462 1311 DCA COUNT
7463 4344 TAD CR
7464 1312 JMS PRINT
7465 4344 TAD LF
7466 1301 JMS PRINT
7467 4344 TAD K261
7470 1301 TAD K261
7471 4344 JMS PRINT
7472 5200 JMP LOADUP

```

/CONSTANTS AND VARIABLES

```

7473 0000 ADRES, 0
7474 7377 LIMMI, 7377
7475 0000 LIMLO, 0
7476 0400 M7400, -7400

7477 7640 COUNT, -140
7500 7640 RESTOR, -140
7501 0261 K261, 261
7502 7774 M4, -4
7503 0000 CTR, 0
7504 0007 MSK7, 7
7505 0260 TW6, 260
7506 0000 STOR, 0
7507 7004 NUM, RAL
7510 0000 COUNT, 0
7511 0215 CR, 215
7512 0212 LF, 212
7513 0240 SPACE, 240
7514 0301 A, 301
7515 0303 C, 303

```

7516	0000		
7517	7041		
7520	1273		
7521	5310		
7522	1311		
7523	4344		
7524	1312		
7525	4344		
7526	1314		
7527	4344		
7530	1273		
7531	4352		
7532	1313		
7533	4344		
7534	1315		
7535	4344		
7536	1310		
7537	4352		
7540	7604		
7541	7710		
7542	7402		
7543	5716		
7544	0000		
7545	6046		
7546	6041		
7547	5346		
7550	7200		
7551	5744		

ERROR: /ERROR ROUTINE

Ø CIA /RESTORE CONTENTS
TAD ADRES /OF FAILING ADDRESS
DCA CNT /PUT RESULT IN CNT

MSG: /ERROR MESSAGE

TAD CK
JMS PRINT
TAD LF
JMS PRINT
TAD A
JMS PRINT
TAD ADRES
JMS TYPAC
TAD SPACE
JMS PRINT
TAD C
JMS PRINT
TAD CNT
JMS TYPAC
LAS
SPA CLA
HLT
JMP I ERROR /HALT ON ERROR (SR0)

PRINT: Ø

TLS
TSF
JMP .-1
CLA
JMP I PRINT

/TYPE (AC) IN OCTAL

7552	0000
7553	3306
7554	1362
7555	3363
7556	1302
7557	3303
7560	7100
7561	1306
7562	7006
7563	7006
7564	3306
7565	1306
7566	0304
7567	1305
7570	4344
7571	1307
7572	3363
7573	2303
7574	5361
7575	5752
0000	0000
0001	5001
0002	0002
0003	0003

TYPAC, 0	DCA STOR
	TAD BACK*1
	DCA BACK*2
	TAD M4
	DCA CTR
	CLL
BACK,	TAD STOR
	RIL
	RIL
	DCA STOR
	TAD STOR
	AND MSK/
	TAD TW6
	JMS PRINT
	TAD NUM
	DCA BACK*2
	ISZ CTR
	JMP BACK
	JMP I TYPAC
*0000	0
	JMP 1
	2
	3

3.00

8

THERE ARE NO ERRORS

SYMBOL TABLE

A	7514
ADRES	7473
BACK	7561
C	7515
CUNT	7510
COUNT	7477
CH	7511
CTR	7503
ERROR	7516
K261	7501
LF	7512
LIMHI	7474
LIMLO	7475
LOADUP	7400
LOADWN	7425
LOOP2	7442
MEMLUP	7415
MESS	7522
MSK7	7504
M4	7502
M7400	7476
NUM	7507
PRINT	7544
RESTOR	7500
SPACE	7513
STOR	7506
TW6	7505
TYPAC	7552

SYMBOL TABLE

LOADUP	7400
MEMLUP	7415
LOADWN	7425
LOOP2	7442
ADRES	7473
LJMH1	7474
LJML0	7475
M/400	7476
CUUNT	7477
RESTOR	7500
K261	7501
M4	7502
CTR	7503
MSK7	7504
TW6	7505
STOR	7506
NUM	7507
CUNT	7510
CK	7511
LF	7512
SPACE	7513
A	7514
C	7515
EMROR	7516
MSG	7522
PRINT	7544
TYPAC	7552
BACK	7561