

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]

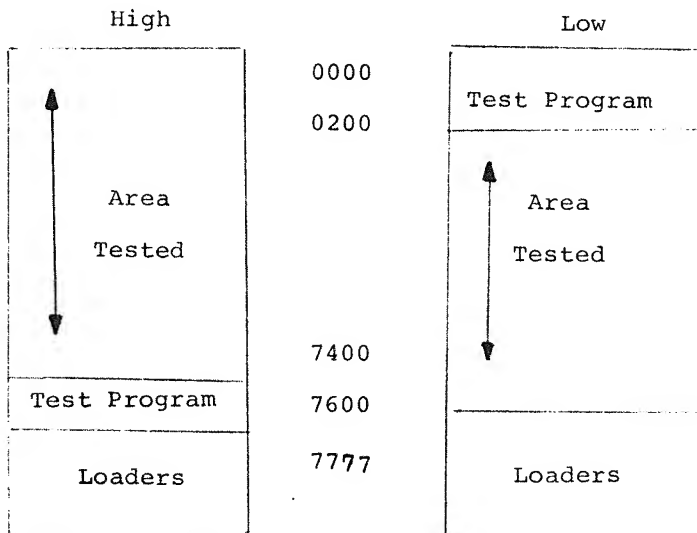
JMP .-1

7. MISCELLANEOUS

7.1 Execution Time

An 11 is printed after every 96 complete program loops (every 28 seconds).

7.2 Memory Maps



/POP=0 MEMORY ADDRESS TEST (LOW, PAGE 0)
*0

/LOAD MEMORY FORWARD DIRECTION

0000	LOADUP, 0		
0001	JMP 1	/SET TEST AREA STARTING ADDRESS	
0002	2		
0003	3		
0004	JMP I, +1	/DEPOSIT ADDRESS IN CONTENTS	
0005	PATCH		
0006	ISZ ADRES		
0007	ISZ CTR		
0010	JMP LOADUP*4		
0011	TAD LIMLO		
0012	DCA ADRES		
0013	TAD M/410		
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 LIMHI		
0026	DCA ADRES	/SET TEST AREA ENDING ADDRESS	
0027	TAD M/410		
0030	DCA CTR		
0031	TAD ADRES	/DEPOSIT ADDRESS IN CONTENTS	
0032	DCA I ADRES	/AC=-1	
0033	CLA CMA	/AC=(ADRES)-1	
0034	TAD ADRES	/DECREMENT ADDRESS	
0035	DCA ADRES	/SKIP WHEN LOWER LIMIT REACHED	
0036	ISZ CTR		
0037	JMP LOADWN*4		
0040	TAD M/410		
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

```

0073 0000 ADRES, 0
0074 7610 LIMH, 7610
0075 0200 LIMLO, 200
0076 0370 M7410, -7410

0077 7640 COUNT, -140
0100 7640 RESTOR, -140
0101 0261 K261, 261
0102 7774 M4, -4
0103 0000 CTR, 0
0104 0007 MSK7, 7
0105 0260 TW6, 260
0106 0000 STOR, 0
0107 7004 NUM, RAL
0110 0000 CUVT, 0
0111 0215 CR, 215
0112 0212 LF, 212
0113 0240 SPACE, 240
0114 0301 A, 301
0115 0303 C, 303

```

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	/HALT ON ERROR (SR0)
		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	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	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	4104	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	0200	
0201	3000	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
0215	1075	JMP 0
0216	3073	TAD LIMLO
0217	1076	DCA ADRES
0220	3103	TAD M/410
0221	1073	DCA CTR
0222	3473	TAD ADRES
		DCA I ADRES

/RESTORE 1ST PAGE

*0200

PATCH:

X0,
X1,
X2,
X3,
X4,
X5,

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
LIMH	0074
LIMLO	0075
LOADUP	0000
LOADRN	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
TM6	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	LOADDN, 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	/SKIP WHEN LOWER LIMIT REACHED
7440	1276	JMP LOADDN*4	
7441	3303	TAD M7400	
		DCA CTR	

```

/SEQUENTIAL LOCATION TEST (DOWN)
TAD LIMMI
DCA ADRES /SET STARTING ADDRESS
TAD I ADRES /GET CONTENTS
CIA
TAD ADRES /GET ADDRESS
SEA /SKIP IF EQUAL
JMS ERROR /CONTENTS NOT SAME AS ADDRESS
CLA CMA /AC==1
TAD ADRES /AC=(ADRES)-1
DCA ADRES /SELECT NEXT ADDRESS
ISZ CTR /SKIP IF END TEST AREA
JMP LOOP2*2
ISZ COUNT
JMP LOADUP
TAD RESTOR
DCA COUNT
TAD CR
JMS PRINT
TAD LF
JMS PRINT
TAD K261
JMS PRINT
TAD K261
JMS PRINT
JMP LOADUP

```

LOOP2,

7442 1274
7443 3273
7444 1673
7445 7041
7446 1273
7447 7442
7450 4316
7451 7240
7452 1273
7453 3273
7454 2303
7455 5244
7456 2277
7457 5200
7460 1300
7461 3277
7462 1311
7463 4344
7464 1312
7465 4344
7466 1301
7467 4344
7470 1301
7471 4344
7472 5200

/CONSTANTS AND VARIABLES

```

ADRES, 0
LIMMI, 7377
LIMLO, 0
M7400, -7400

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

```

7473 0000
7474 7377
7475 0000
7476 0400
7477 7640
7500 7640
7501 0261
7502 7774
7503 0000
7504 0007
7505 0260
7506 0000
7507 7004
7510 0000
7511 0215
7512 0212
7513 0240
7514 0301
7515 0303

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 CUNT /PUT RESULT IN CUNT

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 CUNT
 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

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
MSG	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
TM6	7505
STOR	7506
NUM	7507
CUNT	7510
CK	7511
LF	7512
SPACE	7513
A	7514
C	7515
ERROR	7516
MSG	7522
PRINT	7544
TYPAC	7552
BACK	7561