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Lawrence Livermore Laboratory

MCS-8 MICROCOMPUTER SYSTEM
DISPLAY OCTAL DEBUGGING TECHNIQUE
DODT FOR MCS-8 MICROCOMPUTER

H. Brand

October 15, 1974

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H. R. Brand	MCS-8 MICROCOMPUTER SYSTEM			DATE 10-15-74
<i>[Signature]</i>				PAGE 1 of 15

DISPLAY OCTAL DEBUGGING TECHNIQUE DDOT FOR MCS-8 MICROCOMPUTER

1.0 INTRODUCTION

DDOT (Display Octal Debugging Technique) is a program written for the MCS-8 that allows the user to modify a program via the solid state keyboard. The program occupies 766 octal words, and must be located in the lowest memory slot of the MCS-8 system, since the program uses the RESTART instruction.

Memory locations 370_8 to 375_8 of random access memory (RAM 10_8) are used by DDOT. All addresses of memory locations and contents of memory locations are referred to in octal numbers. A question mark (?) will be displayed for any illegal input.

Location 370 is reserved for a JMP instruction, locations 371 and 372 contain RUNMOD L and H respectively, and locations 373 and 374 contain DSPMOD L and H respectively. The user should not try to modify these locations with DDOT. Location 375 is used to store the INPUT device switch.

The minimum system requirements for using DDOT are as follows:

- a) MCS-8 computer set with TV display option and Solid State Keyboard option.
- b) DDOT programmable read only memories (PROM) at memory page 000 and 001.
- c) 256 word (RAM) at page 10.

2.0 DISPLAY ODT

COMMANDS

(/) -- Slash	Opens current address and displays contents.
(LF) -- Line Feed	Closes current address, opens next sequential address and displays contents
(CR) -- Car. Return	Closes current address.
(N ₈ S) -- Set	Sets H Register = N ₈ of current address

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3.0 COMMANDS

(N _g D) -- Device	Selects input device number N _g =0 TTY N _g = 1 HSR
(R) -- Read	Reads input from selected device in DEC binary format
(N _g P) -- PN Tape*	Reads input from selected device in Intel "PN" format. Starts loading at location equal to N _g
(N _g L) -- List	Lists Page N _g on CRT
(N _g G) -- GO*	Go command starts executing instructions at address = N _g
* (N _g G) Go and (N _g P) Command should be preceded by a set command	

4.0 UTILITY ROUTINES

005	RST DODT	Restarts DODT. Note: this will clear the CRT.
015	RST REC TTY	Reads ALPHA-NUMERIC character from TTY. No CRT echo.
025	RST DSPMOD	Saves H&L Reg = RUNMOD Set H&L Reg = DSPMOD Only Registers B and D are destroyed.
035	RST RUNMOD	Saves H&L Reg = DSPMOD Sets H&L RUNMOD Only Registers B and D are destroyed.
045	RST INCR	L ← L+1 if L overflows, H ← H+1
055	RST KILL	Clears ALPHA character on screen.
065	RST Read	Reads ALPHA NUMERIC character from Electronic KB and echos on CRT
075	RST Send	Sends ALPHA NUMERIC character to CRT to location given by DSPMOD H and L

5.0 CALLS

106	CALL HSR	Reads data from HSR
-----	----------	---------------------

5.0 CALLS (Continued)

202

1

106 CALL CLEAR Clears graphics

346

1

106 CALL OCTOUT Sends a NNN_8 number to the CRT

0

1

JMP

104 JMP BEGIN 0 Restarts DODT without clearing CRT

116

0

6.0 PROGRAM LISTING

The actual program is on pages 4 through 15.

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/DISPLAY ODT - PROM 0

PALR-V7

PAGE 2

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3          /DISPLAY ODT WITH BINARY AND NP LOADERS
4          /
5          /WRITTEN BY HAL BRAND FOR PROMS 0 AND 1 1/11/74
6          /
7          /PROM 0
8
9          0000  P0=0
10         0001  P1=1
11         0000  MEMNO=0
12         0310  KILPG=310
13         0057  LIST=57
14         0214  NPTAP=214
15         0103  INTAPE=103
16         0000  OCTALP=0
17         0047  FILL=47
18         0324  DEV=324
19         0340  CLEAR=340
20
21         0000          *0
22         00030 0055      RST+KILPG
23         00001 0006  ERROR, LAI; 277      /A ?
24         00002 0277
25         00003 0075      RST+SEND
26         00004 0104      JMP; B; MEMNO
27         00005 0113
28         00006 0000
29         00007 0000      0
30
31         00010 0107  RECTTY, INP 6      /GET FLAG OF TTY
32         00011 0032      RAR; RAR      /GET FLAG INTO CARRY
33         00012 0032
34         00013 0100      JFC; RECTTY; MEMNO
35         00014 0010
36         00015 0000
37         00016 0111      INP 10      /READ DATA
38         00017 0007      RET
39
40         00020 0315  DSPMOD, LBH      /ROUTINE TO SAVE RUN H&L AND GET DISPLAY H&L
41         00021 0056      LHI; 10
42         00022 0010
43         00023 0336      LDL
44         00024 0104      JMP; DMOD; P0
45         00025 0347
46         00026 0000
47         00027 0000      0
48
49         00030 0315  RUNMOD, LBH      /ROUTINE TO SAVE DISPLAY H&L AND GET RUN H&L
50         00031 0336      LDL
51         00032 0056      LHI; 10
52         00033 0010
53         00034 0104      JMP; RMOD; P0
54         00035 0362
55         00036 0000
56         00037 0000      0
57

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/DISPLAY ODT - PROM 0

PAL8-V7

PAGE 2-1

58	00040	0060	INCR,	INL	/ROUTINE TO INCREMENT THRU DISPLAY
59	00041	0013		RFZ	
60	00042	0050		INH	
61	00043	0013		RFZ	/DISPLAY IN PAGES 74 - 77
62	00044	0056		LHI; 374	/RESET TO START
63	00045	0374			
64	00046	0335		LDH	
65	00047	0007		RET	
66					
67	00050	0025	KILLPG,	RST+DSPMOD	/ROUTINE TO ERASE CHARACTERS
68	00051	0056		LHI; 374	
69	00052	0374			
70	00053	0066		LLI; 0	
71	00054	0000			
72	00055	0104		JMP; KILPG; P1	
73	00056	0310			
74	00057	0001			
75					
76	00060	0111	READ,	111	/READ SOLID STATE KEYBOARD
77	00061	0260		ORA	
78	00062	0120		JFS; READ; MEMNO	
79	00063	0060			
80	00064	0000			
81	00065	0240		NDA; NDA; NDA	/3 NOP'S
82	00066	0240			
83	00067	0240			
84					
85	00070	0025	SEND,	RST+DSPMOD	/GO TO DISPLAY MODE
86	00071	0074		CPI; 215	/A CR?
87	00072	0215			
88	00073	0150		JTZ; FILL; P1	
89	00074	0047			
90	00075	0001			
91	00076	0074		CPI; 212	/A LF?
92	00077	0212			
93	00100	0150		JTZ; BLINK; MEMNO	/IGNORE
94	00101	0105			
95	00102	0000			
96	00103	0370		LMA	/DISPLAY THE CHAR
97	00104	0045		RST+INCR	
98	00105	0036	BLINK,	LDI; 52	/BLINKING CURSOR
99	00106	0052			
100	00107	0373		LMD	/DISPLAY IT
101	00110	0035		RST+RUNMOD	
102	00111	0310		LBA	/SAVE CHAR IN B ALSO
103	00112	0007		RET	
104	00113	0006	B,	LAI; 215	/GET A CR
105	00114	0215			
106	00115	0075		RST+SEND	
107	00116	0250	BEGIN,	XRA	/CLEAR A
108	00117	0026	BEG,	LCI; 0	/SET INPUT=0
109	00120	0000			
110	00121	0046		LEI; 4	/SET COUNTER TO 4
111	00122	0004			
112	00123	0065	NEXTC,	RST+READ	/GET A CHAR

/DISPLAY ODT - PROM 0

PAL8-V7

PAGE 2-2

113	00124	0074	CPI; 270	/TEST FOR >270
114	00125	0270		
115	00126	0120	JFS; TERM1; MEMNO	/>270 MEANS TERMINATOR
116	00127	0177		
117	00130	0000		
118	00131	0024	SUI; 260	
119	00132	0260		
120	00133	0160	JTS; TERM; MEMNO	/TEST FOR DIGIT
121	00134	0157		
122	00135	0000		
123	00136	0310	LBA	/SAVE DIGIT
124	00137	0041	DCE	
125	00140	0150	JTZ; ERROR; MEMNO	/TEST FOR TOO MANY DIGITS
126	00141	0001		
127	00142	0000		
128	00143	0302	LAC	/GET OLD INPUT
129	00144	0002	RLC; RLC; RLC	/ROTATE 3 LEFT
130	00145	0002		
131	00146	0002		
132	00147	0140	JTC; ERROR; MEMNO	
133	00150	0001		
134	00151	0000		
135	00152	0201	ADB	/ADD IN NEW DIGIT
136	00153	0320	LCA	/SAVE IN C
137	00154	0104	JMP; NEXTC; MEMNO	
138	00155	0123		
139	00156	0000		
140	00157	0301	TERM, LAB	
141	00160	0074	CPI; 212	/A LF?
142	00161	0212		
143	00162	0150	JTZ; LF; MEMNO	
144	00163	0253		
145	00164	0000		
146	00165	0074	CPI; 215	/A CR?
147	00166	0215		
148	00167	0150	JTZ; CR; MEMNO	
149	00170	0314		
150	00171	0000		
151	00172	0074	CPI; 257	/A SLASH?
152	00173	0257		
153	00174	0150	JTZ; SLASH; MEMNO	
154	00175	0301		
155	00176	0000		
156	00177	0074	TERM1, CPI; 303	/A C FOR CLEAR GRAPHICS?
157	00200	0303		
158	00201	0150	JTZ; CLEAR; P1	
159	00202	0340		
160	00203	0001		
161	00204	0074	CPI; 304	/A D FOR DEVICE SELECT?
162	00205	0304		
163	00206	0150	JTZ; DEV; P1	/DEVICE SELECT 0 FOR TTY, 1 FOR HSR
164	00207	0324		
165	00210	0001		
166	00211	0074	CPI; 307	/A G?
167	00212	0307		

/DISPLAY ODT - PROM 0

PAL9-V7

PAGE 2-3

169	00213	0150		JTZ; GO; MEMNO	
169	00214	0326			
170	00215	0000			
171	00216	0074		CPI; 313	/A K?
172	00217	0313			
173	00220	0150		JTZ; KILL; MEMNO	
174	00221	0343			
175	00222	0000			
176	00223	0074		CPI; 314	/A L?
177	00224	0314			
178	00225	0150		JTZ; LIST; P1	
179	00226	0057			
180	00227	0001			
181	00230	0074		CPI; 320	/A P? FOR READ PN TAPE
182	00231	0320			
183	00232	0150		JTZ; NPTAP; P1	
184	00233	0214			
185	00234	0001			
186	00235	0074		CPI; 322	/A R?
187	00236	0322			
188	00237	0150		JTZ; INTAPE; P1	
189	03240	0103			
190	00241	0001			
191	00242	0074		CPI; 323	/A S?
192	00243	0323			
193	00244	0110		JFZ; ERROR; P0	
194	00245	0001			
195	00246	0000			
196	00247	0352	SET,	LHC	/SET HIGH ADD
197	00250	0104		JMP; SP; MEMNO	
198	00251	0306			
199	00252	0000			
200	00253	0304	LP,	LAE	/GET INPUT SENTINAL
201	00254	0074		CPI; 4	/ANY INPUT?
202	00255	0004			
203	00256	0150		JTZ; NOCHG; MEMNO	
204	00257	0262			
205	00260	0000			
206	00261	0372		LMC	/PUT NEW NUMBER IN MEM.
207	00262	0006	NOCHG,	LAI; 215	
208	00263	0215			
209	00264	0075		RST+SEND	/SEND A CRLF
210	00265	0060		INL	
211	00266	0305		LAH	/GET HIGH ADD.
212	00267	0106		CAL; OCTALP; P1	
213	00270	0000			
214	00271	0001			
215	00272	0306		LAL	/GET LOW ADD.
216	00273	0106		CAL; OCTALP; P1	
217	00274	0000			
218	00275	0001			
219	00276	0104		JMP; GETCON; MEMNO	
220	00277	0302			
221	00300	0000			
222	00301	0362	SLASH,	LLC	

/DISPLAY ODT - PROM 9

PALP-V7

PAGE 2-4

223	00302	0307	GETCON, LAM	/GET MEMORY INTO A
224	00303	0105	CAL; OCTALP; P1	
225	00304	0000		
226	00305	0001		
227	00306	0006	SP, LAI; 240	
228	00307	0240		
229	00310	0075	RST+SEND	/SEND A SPACE
230	00311	0104	JMP; BEGIN; MEMNO	
231	00312	0116		
232	00313	0000		
233	00314	0304	CR, LAE	
234	00315	0074	CPI; 4	/NEW INPUT?
235	00316	0004		
236	00317	0150	JTZ; BEGIN; MEMNO	
237	00320	0116		
238	00321	0000		
239	00322	0372	LMC	
240	00323	0104	JMP; BEGIN; MEMNO	
241	00324	0116		
242	00325	0000		
243	00326	0362	GO, LLC	/SET LOW ADD.
244	00327	0006	LAI; 215	/SEND A CRIP AND STORE H & L FOR JUMP
245	00330	0215		
246	00331	0075	RST+SEND	
247	00332	0066	LLI; 370	/SET FOR JUMP TO JUMP
248	00333	0370		
249	00334	0056	LHI; 10	
250	00335	0010		
251	00336	0076	LMI; JMP	
252	00337	0104		
253	00340	0104	JMP; 370; 10	/JUMP TO JUMP
254	00341	0370		
255	00342	0010		
256	00343	0055	KILL, RST+KILLPG	
257	00344	0104	JMP; BEGIN; MEMNO	
258	00345	0116		
259	00346	0000		
260	00347	0056	DMOD, LLI; 371	
261	00350	0371		
262	00351	0373	LMD	/SAVE L IN MEM
263	00352	0060	INL	
264	00353	0371	LMB	/SAVE H IN MEM
265	00354	0060	INL	
266	00355	0317	LBM	/GET DISPLAY H
267	00356	0060	INL	
268	00357	0367	LLM	/GET DISPLAY L
269	00360	0351	LHB	
270	00361	0007	RET	
271	00362	0066	RMOD, LLI; 374	
272	00363	0374		
273	00364	0373	LMD	/SAVE DISPLAY L
274	00365	0061	DCL	
275	00366	0371	LMB	/SAVE DISPLAY H
276	00367	0061	DCL	
277	00370	0317	LBM	/GET RUN H

/DISPLAY ODT - FROM 0

PAL8-V7

PAGE 2-5

278 00371 0061
279 00372 0367
280 00373 0351
281 00374 0007
282

DCL
LLM
LHB
RET
S

/GET RUN L

/DISPLAY ODT - PROM 1

PAL8-V7

PAGE 2

```

3      /DISPLAY ODT WITH BINARY AND NP LOADERS
4      /
5      /WRITTEN BY HAL BRAND FOR PROMS 0 AND 1  1/11/74
6      /
7      /PROM 1
8
9      0000 MEMNO=0
10     0001 N=1
11     0010 RECTTY=10
12     0020 DSPMOD=20
13     0030 RUNMOD=30
14     0040 INCR=40
15     0050 KILLPG=50
16     0060 READ=60
17     0070 SEND=70
18     0000 P0=0
19     0001 P1=1
20     0105 BLINK=105
21     0115 BEGIN=115
22     0113 B=113
23
24     0000 *0
25     00000 0025 OCTALP, RST+DSPMOD
26     00001 0016 LBI; 240 /DISPLAY A SPACE
27     00002 0240
28     00003 0371 LMB
29     00004 0045 RST+INCR
30     00005 0026 LCI; 3
31     00006 0003
32     00007 0002 RLC; RLC /ROTATE 2 LEFT
33     00010 0002
34     00011 0310 LBA /SAVE A
35     00012 0044 NDI; 3 /GET FIRST DIGIT
36     00013 0003
37     00014 0004 DECR, ADI; 260
38     00015 0260
39     00016 0370 LMA
40     00017 0045 RST+INCR
41     00020 0021 DCC /COUNT DOWN THE DIGITS
42     00021 0150 JTZ; RUNMOD; P0
43     00022 0030
44     00023 0000
45     00024 0301 LAB /GET A BACK
46     00025 0002 RLC; RLC; RLC /ROTATE 3 LEFT
47     00026 0002
48     00027 0002
49     00030 0310 LBA /SAVE A
50     00031 0044 NDI; 7
51     00032 0007
52     00033 0104 JMP; DECR; MEMNO+N
53     00034 0014
54     00035 0001
55     00036 0006 LP, LAL /TEST L FOR END OF LINE
56     00037 0044 NDI; 37 /FORMATER CONSTANT
57     00040 0037

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/DISPLAY ODT - FROM 1

PAL8-V7

PAGE 2-1

58	00041	0074		CPI; 0	/IF 0 THEN END OF LINE
59	00042	0000			
60	00043	0301		LAB	/RESTORE A
61	00044	0150		JTZ; BLINK; P0	
62	00045	0105			
63	00046	0000			
64	00047	0310	FILL,	LBA	/SAVE A
65	00050	0006		LAI; 240	/GET A SPACE
66	00051	0240			
67	00052	0370		LMA	/PUT IN DISPLAY
68	00053	0045		RST+INCR	
69	00054	0104		JMP; LP; MEMNO+N	
70	00055	0035			
71	00056	0001			
72					
73	00057	0352	LIST,	LHC	/MAKE H POINT TO MEM TO BE DUMPED
74	00060	0066		LLI; 0	
75	00061	0000			
76	00062	0025		RST+DSPMOD	
77	00063	0056		LHI; 374	
78	00064	0374			
79	00065	0066		LLI; 0	/RESET DISPLAY TO TOP 0 PAGE
80	00066	0000			
81	00067	0035		RST+RIINMOD	
82	00070	0307	DLIST,	LAM	/GET A MEM LOC.
83	00071	0106		CAL; OCTALP; MEMNO+N	
84	00072	0000			
85	00073	0001			
86	00074	0060		INL	
87	00075	0110		JFZ; DLIST; MEMNO+N	
88	00076	0070			
89	00077	0001			
90	00100	0104		JMP; BEGIN; P0	
91	00101	0116			
92	00102	0000			
93					
94	00103	0105	INTAPE,	CAL; REC; P1	
95	00104	0165			
96	00105	0001			
97	00106	0260		ORA	
98	00107	0160		JTS; INTAPE; MEMNO+N	
99	00110	0103			
100	00111	0001			
101	00112	0012	NBIN,	RPC; RRC	
102	00113	0012			
103	00114	0340		LEA	
104	00115	0044		NDI; 300	
105	00116	0300			
106	00117	0320		LCA	
107	00120	0106		CAL; REC; MEMNO+N	
108	00121	0165			
109	00122	0001			
110	00123	0044		NDI; 77	
111	00124	0077			
112	00125	0262		ORC	

/DISPLAY OUT - PROM 1

PAL9-V7

PAGE 2-2

113	00126	0320	LCA	/SAVE LOW ORDER
114	00127	0304	LAE	
115	00130	0344	NDI; 20	
116	00131	0020		
117	00132	0110	JFZ; ADR; MEMNO+N	
118	00133	0155		
119	00134	0001		
120	00135	0372	LMC	/LOAD DATA
121	00136	0060	INL	
122	00137	0100	JFC; CKTAPE; P1	
123	00140	0143		
124	00141	0001		
125	00142	0050	INH	
126	00143	0106	CKTAPE, CAL; REC; P1	
127	00144	0165		
128	00145	0001		
129	00146	0260	ORA	
130	00147	0160	JTS; 0; P0	/RETURN ON TRAILER TO ODT
131	00150	0000		
132	00151	0000		
133	00152	0104	JMP; NBIN; P1	
134	00153	0112		
135	00154	0001		
136	00155	0304	ADR, LAE	
137	00156	0044	NDI; 17	
138	00157	0017		
139	00160	0350	LHA	
140	00161	0362	LLC	
141	00162	0104	JMP; CKTAPE; P1	
142	00163	0143		
143	00164	0001		
144				
145			/ROUTINE TO FETCH A CHAR FROM THE PROPER INPUT DEVICE	
146	00165	0315	REC, LBH	/SAVE H
147	00166	0336	LDL	/SAVE L
148	00167	0056	LHI; 10	
149	00170	0010		
150	00171	0066	LLI; 375	/SET TO DEVICE
151	00172	0375		
152	00173	0307	LAM	
153	00174	0351	LHB	
154	00175	0363	LLD	/RESTORE H & L
155	00176	0260	ORA	/SET FLOPS
156	00177	0150	JTZ; RECTTY; P0	/INPUT FROM TTY
157	00200	0010		
158	00201	0000		
159	00202	0135	THSR, 135	/USER WANTS HRS SO POKE
160	00203	0107	107	/GET FLAGS
161	00204	0032	RAR; RAR; RAR	/FLAG TO CARRY
162	00205	0032		
163	00206	0032		
164	00207	0100	JFC; THSR; P1	
165	00210	0203		
166	00211	0001		
167	00212	0113	113	/GET DATA

/DISPLAY ODT - PROM 1

PALR-V7

PAGE 2-3

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168 00213 0007 RET /RETURN DATA IN A
169
170 /THIS ROUTINE INPUTS A NP TAPE INTO THE MEM SET BY THE SET COMMAND
171 /STARTING AT LOC 0
172 00214 0046 NPTAP, LEI; 0 /SET WORD=0
173 00215 0000
174 00216 0362 LLC /SET FIRST ADD = NUMBER PRECEEDING P COMMAND
175 00217 0026 LCI; 10 /SET BIT COUNTER TO 9 BITS
176 00220 0010
177 00221 0106 WAITL, CAL; REC; P1
178 00222 0165
179 00223 0001
180 00224 0074 CPI; 377 /SKIP OVER 377 CODE
181 00225 0377
182 00226 0150 JTZ; WAITL; P1
183 00227 0221
184 00230 0001
185 00231 0074 ISITN, CPI; 316 /A N?
186 00232 0316
187 00233 0150 JTZ; FOUNDN; P1
188 00234 0256
189 00235 0001
190 00236 0074 CPI; 320 /A P?
191 00237 0320
192 00240 0150 JTZ; TESTDN; P1
193 00241 0257
194 00242 0001
195 00243 0074 CPI; 377 /FINISHED?
196 00244 0377
197 00245 0150 JTZ; 0; 0 /IF YES GO TO ODT
198 00246 0000
199 00247 0000
200 00250 0106 INPUT, CAL; REC; P1
201 00251 0165
202 00252 0001
203 00253 0104 JMP; ISITN; P1
204 00254 0231
205 00255 0001
206 00256 0040 FOUNDN, INE /SET BIT IF CHAR IS A N
207 00257 0021 TESTDN, DCC /DONE WITH WORD?
208 00260 0150 JTZ; LODMEM; P1
209 00261 0271
210 00262 0001
211 00263 0304 LAE /NO. SO ROTATE TO ACCOMODATE NEXT BIT
212 00264 0002 RLC
213 00265 0340 LEA
214 00266 0104 JMP; INPUT; P1
215 00267 0250
216 00270 0001
217 00271 0374 LODMEM, LME /WORD ASSFMbled SO PUT IN MEM
218 00272 0060 INL /NEXT SEQUENTIAL LOC
219 00273 0046 LEI; 0 /RESET WORD
220 00274 0000
221 00275 0026 LCI; 10 /RESET BIT COUNTER
222 00276 0010

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/DISPLAY ODT - PROM 1

PALP-V7

PAGE 2-4

223	00277	0106	CAL; REC; P1	/TEST FOR END OF WORD
224	00300	0165		
225	00301	0001		
226	00302	0074	CPI; 306	/END OF WORD IS A F
227	00303	0306		
228	00304	0150	JTZ; INPUT; P1	
229	00305	0250		
230	00306	0001		
231	00307	0005	RST	/ERROR - SO RESTART ODT
232	00310	0336	KILPG, LDL	/SET D=0 TO TEST WHEN DONE
233	00311	0006	OVER, LAI; 240	/A SPACE TO CLEAR
234	00312	0240		
235	00313	0370	LMA	
236	00314	0045	RST+INCR	/NEXT LOC.
237	00315	0250	XRA	/CLEAR A
238	00316	0203	ADD	/GET D AND SET FLOPS
239	00317	0150	JTZ; OVER; P1	
240	00320	0311		
241	00321	0001		
242	00322	0035	RST+RUNMOD	
243	00323	0007	RET	
244	00324	0315	DEV, LBH	/IO DEVICE SELECT 0 FOR TTY, 1 FOR HSR
245	00325	0336	LDL	/SAVE H&L
246	00326	0056	LHI; 10	
247	00327	0010		
248	00330	0066	LLI; 375	
249	00331	0375		
250	00332	0372	LMC	/SAVE DIGIT
251	00333	0351	LHB	
252	00334	0363	LLD	/RESTORE H&L
253	00335	0104	JMP; B; P0	
254	00336	0113		
255	00337	0000		
256	00340	0106	CLEAR, CAL; ZERGR; P1	
257	00341	0346		
258	00342	0001		
259	00343	0104	JMP; B; P0	
260	00344	0113		
261	00345	0000		
262	00346	0056	ZERGR, LHI; 370	
263	00347	0370		
264	00350	0066	LLI; 0	
265	00351	0000		
266	00352	0306	LAL	/SET A=0, H&L = GRAPHICS
267	00353	0046	LEI; 4	/4 PAGES TO ZERO
268	00354	0004		
269	00355	0370	ZEROG, LMA	/ZERO ONE LOC
270	00356	0060	INL	/NEXT LOC.
271	00357	0110	JFZ; ZEROG; P1	
272	00360	0355		
273	00361	0001		
274	00362	0050	INH	/NEXT MEM
275	00363	0041	DCE	/DONE?
276	00364	0110	JFZ; ZEROG; P1	
277	00365	0355		

/DISPLAY ODT - PROM 1

PALS-V7

PAGE 2-5

278 00366 0001
279 00367 0007
280

RET
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