

# M792

ROM DIODE MATRIC  
MD-11-D8CA

EP-D8CA-DL

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MAY 1978

**digital**

MADE IN USA



IDENTIFICATION

PRODUCT CODE: MAINDC-11-D8CA  
PRODUCT NAME: M792 (ROM DIODE MATRIX)  
DATE CREATED: SEPT 19, 1978  
MAINTAINER: DIAGNOSTIC GROUP  
AUTHOR: JOHN ADAMS

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CORPORATION

1. ABSTRACT

THE M792 DIAGNOSTIC PROGRAMS ARE WRITTEN TO BE USED AS AN AID TO HARDWARE DEBUGGING AND MAINTENANCE OF THE M792 ROM DIODE MATRIX BOARD. THESE PROGRAMS MAY ALSO BE USED AS A DATA RELIABILITY TEST.

THE AVAILABLE TESTS ARE

- PRG0 - LOGIC TESTS
- PRG1 - ROM DATA DUMP
- PRG2 - SINGLE ROM ADDRESS READ DATA LOOP

2. REQUIREMENTS

2.1 EQUIPMENT

- A. PDP 11/20 SYSTEM
- B. M792

2 2 STORAGE

THIS PROGRAM USES CORE 0-4040(8)

3. LOADING PROCEDURE

THE ABSOLUTE LOADER IS USED TO LOAD THE PROGRAM

4. USE PROCEDURE

- A1 LOAD ADDRESS = 000200
- B1 SET SR = DESIRED STANDARD PDP-11 DIAGNOSTIC OPTIONS
- C1 DEPRESS START  
THE PROGRAM WILL TYPE OUT INSTRUCTIONS. ALL USER RESPONSES ARE VIA THE KEYBOARD (CARRIAGE RETURN TERMINATES THE RESPONSE)
- D1 TO RESTART THE SELECTED PROGRAM LA = 000204 AND DEPRESS START

5. PROGRAM DESCRIPTIONS

5.1 PRGM - LOGIC TESTS

THE LOGIC TESTS CONSIST OF 4 ROUTINES TO TEST THE M792 LOGIC

5.1.1 ROUTINE DESCRIPTIONS

ROUTINE	TESTS
T1	ADDRESSABILITY OF M792
T2	DATA RELIABILITY
T3	THAT M792 TIMES OUT WHEN REFERENCED BY A DATIP BUS CYCLE
T4	THAT DATA READ IS CORRECT

5.1.2 ERROR PRINTOUT

IF A ROUTINE FAILS AND THE INHIBIT PRINTOUT SWITCH IS NOT ENABLED (SR13) A PRINTOUT RESULTS, THE PC AT THE TIME OF FAILURE IS TYPED.

IF AN ERROR OCCURS IN T4 THE ROM DATA AND CORRECT DATA AND THE ADDRESS OF EACH IS TYPED OUT. (THIS TYPE OUT CANNOT BE DISABLED.) THE FORMAT IS

ROM ADDRESS/ROM DATA  
IMAGE ADDRESS\*CORRECT DATA

5.2 PRG1 - ROM DATA DUMP

THIS PROGRAM TYPES OUT THE 32 WORDS OF ROM DATA AND HALTS.

5.3 PRG2 - SINGLE ROM ADDRESS READ DATA LOOP

THIS PROGRAM CONTINUOUSLY READS DATA FROM A TYPED IN ROM ADDRESS. TO CHANGE THE ADDRESS TYPE IN A NEW ADDRESS.

IM792 (UNCUT DIODE MATRIX) DIAGNOSTIC  
 I COPYRIGHT 1970, DIGITAL EQUIPMENT CORP., MAYNARD, MASS. 01754  
 I LOAD ADDRESS=0200  
 I DEPRESS START  
 I RESTART ADDRESS=0210

	000000		.=0
	000020		.REPT 20
			.+2
			HALT
			.ENDR
			.+2
0	0000	000002	HALT
0	0002	000000	.+2
0	0004	000000	HALT
0	0006	000000	.+2
0	0010	000012	HALT
0	0012	000000	.+2
0	0014	000010	HALT
0	0016	000000	.+2
0	0020	000022	HALT
0	0022	000000	.+2
0	0024	000026	HALT
0	0026	000000	.+2
0	0030	000032	HALT
0	0032	000000	.+2
0	0034	000036	HALT
0	0036	000000	.+2
0	0040	000042	HALT
0	0042	000000	.+2
0	0044	000046	HALT
0	0046	000000	.+2
0	0050	000052	HALT
0	0052	000000	.+2
0	0054	000056	HALT
0	0056	000000	.+2
0	0060	000062	HALT
0	0062	000000	.+2
0	0064	000066	HALT
0	0066	000000	.+2
0	0070	000072	HALT
0	0072	000000	.+2
0	0074	000076	HALT
0	0076	000000	.+2
			.=30
0	0030	002224	ERROR
0	0032	000340	340
0	0034	002134	SCOPEC
0	0036	000000	0
	104000		HLT=ENT
	104400		SCOPE=TRAP
	177560		TKCSR=177560
	177562		TKOBR=177562
	177564		TPCSR=177564
	177566		TPOBR=177566

177776  
 177570  
 000060  
 000062  
 000200  
 0 0200 000167 0.0620  
 000210  
 0 0210 000167 000654  
 001000  
 0 1000 000040  
 0 1002 004000  
 0 1004 000000  
 0 1006 000000  
 0 1010 000000  
 0 1012 000000  
 0 1014 000000  
 0 1016 001102  
 0 1020 001530  
 0 1022 001664  
 0 1024 004567 000670  
 0 1030 002444  
 0 1032 004567 001000  
 0 1036 000000  
 0 1040 004567 000662  
 0 1044 002404  
 0 1046 042767 000100 176504  
 0 1054 004567 000764  
 0 1060 000000  
 0 1062 004567 000640  
 0 1066 002470  
 0 1070 016700 177742  
 0 1074 006300  
 0 1076 000170 001010  
 0 1102 012700 001000  
 0 1106 012767 001070 001074  
  
 0 1114 016700 177740  
 0 1120 016701 177694  
 0 1124 012767 001100 176092  
 0 1132 011003  
 0 1134 005720  
 0 1136 004067 177642  
 0 1142 021010  
 0 1144 132020  
 0 1146 000005  
 0 1150 104067 177630  
 0 1154 002700 000002  
 0 1160 005301  
 0 1162 001363  
 0 1164 000403  
 0 1166 022020  
 0 1170 104000  
 0 1172 000757  
 0 1174 104400

PSM=177776  
 SR=177570  
 TKINTA=60  
 TKINTP=62  
 ,=200  
 START1: JMP PRMTRS  
 ,=210  
 START3: JMP RESTART  
 ,=1000  
 WORDS: 32  
 IMAGE: 4000  
 DUMP: 0  
 LAST: 0  
 CHAR: 0  
 TERM: 0  
 SRT: 0  
 PRGTAB: PRG0  
 PRG1  
 PRG2  
 PRMTRS: JSR 5,TYPEH ;TYPE MESSAGE 'PRG0'  
 M6  
 JSR 5,RECD ;RECEIVE DATA AND PUT  
 ;IT HERE  
 PRGNUM: 0  
 JSR 5,TYPEH  
 M5  
 GTADD: BIC 0100,TKCSR ;CLEAR IE BIT  
 JSR 5,RECD  
 ROMADD: 0  
 JSR 5,TYPEH  
 M6  
 RESTART: MOV PRGNUM,X0 ;GET PROGRAM #  
 ASL X0 ;SHIFT PROGRAM #  
 JMP 0PRGTAB(0) ;GO TO PROGRAM  
 PRG0: MOV 01000,X0  
 MOV 0RESTART,RETURN  
 ;TEST: TEST ABILITY TO REFERENCE ROM WITHOUT TIMING OUT  
 T1: MOV ROMADD,X0 ;GET ROM ADDRESS  
 MOV WORDS,X1 ;GET ADDRESS COUNTER  
 MOV 0ERROR1,4 ;SET UP TIME OUT VECTOR  
 T1A: MOV (0),X3 ;REFERENCE  
 TST (0)+ ;FROM  
 ADD -(0),DUMP ;  
 CMP (0),(0) ;  
 BITB (0)+,(0)+ ;  
 RESET ;DELAY  
 SUB -(0),DUMP  
 ADD 02,X0 ;INCREMENT POINTER  
 DEC X1 ;DECREMENT ADDRESS COUNTER  
 BNE T1A ;BRANCH IF NOT FINISHED  
 BR T1B ;GO TO SCOPE LOOP  
 ERROR1: CMP (0)+,(0)+ ;REPOSITION STACK  
 HLT ;HERE IF ERROR  
 BR T1A ;LOOP ON ERROR  
 T1B: SCOPE ;SCOPE

ITEST2 TEST THAT ROM DATA CAN BE READ RELIABLY.

0 1176	016700	177650	T2I	MOV	ROMADD,X0	IGET ROM ADDRESS
0 1202	016701	177572		MOV	WORDS,X1	IGET ADDRESS COUNTER
0 1206	012767	020000		MOV	#6,4	INITIALIZE TIME OUT VECTOR
0 1214	005067	177564	T2AI	CLR	DUMP	INITIALIZE DUMP
0 1220	011003			MOV	(0),X3	IGET DATA
0 1222	002767	177550		ADD	(0)*,DUMP	ADD DATA TO DUMP
0 1226	106703	177552		SUB	DUMP,X3	SUBTRACT DATA FROM DATA
0 1232	001402			BEQ	T2B	BRANCH IF EQUAL
0 1234	104000		ERROR2I	HLT		DATA ERROR
0 1236	000766			BR	T2A	LOOP ON ERROR
0 1240	000005		T2BI	RESET		DELAY
0 1242	044067	177530		BIC	-(0),DUMP	CLEAR DUMP BITS
0 1246	001402			BEQ	T2C	BRANCH IF EQUAL TO 0
0 1250	104000			HLT		DATA ERROR
0 1252	000772			BR	T2B	LOOP ON ERROR
0 1254	021010		T2CI	CMP	(0),(0)	COMPARE DATA
0 1256	001402			BEQ	T2D	BRANCH IF EQUAL
0 1260	104000			HLT		DATA ERROR
0 1262	000774			BR	T2C	LOOP ON ERROR
0 1264	122040		T2DI	CMPS	(0)*,-(0)	COMPARE DATA (BYTE OPERATION)
0 1266	001402			BEQ	T2E	BRANCH IF EQUAL
0 1270	104000			HLT		DATA ERROR
0 1272	000774			BR	T2D	LOOP ON ERROR
0 1274	005720		T2EI	TST	(0)*	INCREMENT ADDRESS POINTER
0 1276	005301			DEC	X1	DECREMENT ADDRESS COUNTER
0 1300	001349			BNE	T2A	RETURN IF NOT DONE
0 1302	104400			SCOPE		

ITEST3 TEST THAT ROM TIMES OUT IF REFERENCED BY OTHER THAN DATA BUS CYCLE

0 1304	016700	177550	T3I	MOV	ROMADD,X0	IGET ROM ADDRESS
0 1310	016701	177464		MOV	WORDS,X1	IGET ADDRESS COUNTER
0 1314	012767	001330	T3AAI	MOV	#T3B,4	SET UP TIME OUT VECTOR
0 1322	010010		T3AI	MOV	X0,(0)	ATTEMPT TO ALTER DATA
0 1324	104000			HLT		HERE IF DID NOT TIME OUT
0 1326	000775			BR	T3A	LOOP ON ERROR
0 1330	012767	001340	T3BI	MOV	#T3D,4	SET UP TIME OUT VECTOR
0 1336	022620			CMP	(6)*,(6)*	REPOSITION STACK
0 1340	005210		T3CI	INC	(0)	ATTEMPT TO ALTER DATA
0 1342	104000			HLT		HERE IF DID NOT TIME OUT
0 1344	000775			BR	T3C	LOOP ON ERROR
0 1346	012767	001360	T3DI	MOV	#T3F,4	SET UP TIME OUT VECTOR
0 1354	022620			CMP	(6)*,(6)*	REPOSITION STACK
0 1356	005077	177470	T3EI	CLR	ROMADD	ATTEMPT TO ALTER DATA
0 1362	104000			HLT		HERE IF DID NOT TIME OUT
0 1364	000774			BR	T3E	LOOP ON ERROR
0 1366	005720		T3FI	TST	(0)*	INCREMENT ADDRESS POINTER
0 1370	022620			CMP	(6)*,(6)*	REPOSITION STACK
0 1372	005301			DEC	X1	DECREMENT ADDRESS COUNTER
0 1374	001347			BNE	T3AA	RETURN IF NOT DONE
0 1376	104400			SCOPE		SCOPE LOOP

!THIS TEST COMPARES ROM AND IMAGE DATA  
!AND TYPES OUT DIFFERENCES

0 1400 016701 177370  
 0 1404 016700 177450  
 0 1410 016703 177360  
 0 1414 021010  
 0 1416 001004  
 0 1420 005301  
 0 1422 001437  
 0 1424 022023  
 0 1426 000772  
 0 1430 010067 000632  
 0 1434 004767 000630  
 0 1440 004567 020262  
 0 1444 002554  
 0 1446 011067 020614  
 0 1452 004767 020612  
 0 1456 004567 000244  
 0 1462 002470  
 0 1464 010367 020576  
 0 1470 004767 000574  
 0 1474 004567 020220  
 0 1500 002562  
 0 1502 011367 020560  
 0 1506 004767 000550  
 0 1512 004567 000210  
 0 1516 002470  
 0 1520 000737  
 0 1522 104400  
 0 1524 004567 000170  
 0 1530 002562  
 0 1532 000167 177344

T4I MOV WORDS,X1 !GET # OF WORDS  
 MOV ROMADD,X0 !GET ROM ADDRESS  
 MOV IMAGE,X3 !GET IMAGE ADDRESS  
 T4BI CMP (0),(3) !COMPARE DATA  
 BNE T4D  
 T4CI DEC X1 !ALL DATA BEEN COMPARED  
 BEQ T4E  
 CMP (0)+,(3)+ !INCREMENT ADDRESS POINTERS  
 BR T4B  
 T4DI MOV X0,D2BTYP !TYPE  
 JSR 7,02A !ROM ADDRESS  
 JSR 5,TYPEM !TYPE  
 M10 !SEPARATOR  
 MOV (0),D2BTYP !TYPE  
 JSR 7,02A !ROM DATA  
 JSR 5,TYPEM !TYPE  
 M0 !CR/LF  
 MOV X3,D2BTYP !TYPE  
 JSR 7,02A !IMAGE ADDRESS  
 JSR 5,TYPEM !TYPE  
 M12 !SEPARATOR  
 MOV (3),D2BTYP !TYPE  
 JSR 7,02A !IMAGE DATA  
 JSR 5,TYPEM !TYPE  
 M0 !CR/LF  
 BR T4C !GO TO T4C

T4E1  
END1

!THIS PROGRAM TYPES OUT ROM DATA

0 1536 012700 001000  
 0 1542 004567 000100  
 0 1546 002454  
 0 1550 016701 177224  
 0 1554 016700 177300  
 0 1560 012702 000012  
 0 1564 105767 175774  
 0 1570 100375

PRG1I MOV 01000,X6 !INITIALIZE STACK  
 JSR 5,TYPEM !TYPE MESSAGE  
 M7 !'ROM DATA'  
 PRG1AI MOV WORDS,X1 !GET # OF WORDS  
 MOV ROMADD,X0 !GET STARTING ADDRESS  
 MOV 012,X2 !GET ADDRESS INDICATOR  
 TSTB TPCSR !WAIT FOR  
 SPL .-4 !TELEPRINTER FLAG



0 1572	010067	070470		PRG1B1	MOV	X0,02BTYP		I GET ADDRESS
0 1576	004767	030460			JSR	7,02A		I AND TYPE IT
0 1602	004567	0J0120			JSR	5,TYPEM		I TYPE
0 1606	002470				MB			ICR/LF
0 1610	012767	0J0452		PRG1C1	MOV	(0),02BTYP		I TYPE
0 1614	004767	000450			JSR	7,02A		I DATA
0 1620	105767	175740			TSTB	TPCSR		I WAIT FOR
0 1624	100375				BPL	.-4		I TELEPRINTER FLAG
0 1626	012767	030040	175732		MOV	01,TPD0R		I TYPE SPACE
0 1634	005301				DEC	X1		I ALL DATA TYPED
0 1636	001410				BEO	PRG1D		I GO TO FINISH
0 1640	005302				DEC	X2		
0 1642	001362				BNE	PRG1C		I RETURN TO PRG1B
0 1644	012702	000012			MOV	012,X2		I GET ADDRESS INDICATOR
0 1650	004567	070052			JSR	5,TYPEM		I TYPE
0 1654	002470				MB			ICR/LF
0 1656	000745				BR	PRG1B		I RETURN TO PRG1B
0 1660	000167	177204		PRG1D1	JMP	RESTART		I ALL DATA HAS BEEN TYPED
								I THIS PROGRAM CYCLES A SINGLE ADDRESS TO CHANGE
								I THE ADDRESS TYPE NEW ADDRESS ON THE TTY.
0 1664	012700	001000		PRG21	MOV	01000,X0		I INITIALIZE STACK POINTER
0 1670	005067	176102			CLR	PSW		I CLEAR PROCESSOR STATUS
0 1674	012767	001040	176156		MOV	00YADD,TKINTA		I LOAD KEYBOARD INTERRUPT VECTOR
0 1702	012767	000100	176152		MOV	0100,TKINTP		I LOAD KEYBOARD INTERRUPT PRIORITY
0 1710	012767	000100	175642		MOV	0100,TKCSR		I SET INTERRUPT ENABLE BIT
0 1716	016700	177130			MOV	ROMADD,X0		I GET ROM ADDRESS
0 1722	005710				TST	(0)		I READ ROM ADDRESS
0 1724	000776				BR	.-2		I LOOP
0 1726	010020			TYPEM1	MOV	X0,(0)		I SAVE REGISTER 0
0 1730	012500				MOV	(5),X0		I PLACE MESSAGE ADDRESS IN R0
0 1732	112067	177054			MOV0	(0),TERM		I GET TERMINATOR CHARACTER
0 1736	112067	177040		TYPEMA1	MOV0	(0),CHAR		I GET NEXT CHARACTER
0 1742	126767	177042	177042		CMPO	CHAR,TERM		I WAS NEXT CHARACTER THE TERM
0 1750	001005				BNE	TYPEM0		I CHARACTER
0 1752	014600				MOV	-(0),X0		I RESTORE R0
0 1754	105767	175604			TSTB	TPCSR		
0 1760	100375				BPL	.-4		
0 1762	000205				RTS	5		I AND EXIT
0 1764	126727	177020	000045	TYPEMB1	CMPO	CHAR,01X		I WAS CHARACTER X
0 1772	001015				BNE	TYPEMC		
0 1774	105767	175564			TSTB	TPCSR		I TEST TELEPRINTER FLAG
0 2000	100375				BPL	.-4		I AND WAIT FOR DONE
0 2002	012767	000215	175556		MOV	0215,TPD0R		I LOAD TELEPRINTER WITH CAR. RET
0 2010	105767	175550			TSTB	TPCSR		I TEST TELEPRINTER FLAG
0 2014	100375				BPL	.-4		I AND WAIT FOR DONE
0 2016	012767	000212	175542		MOV	0212,TPD0R		I LOAD TELEPRINTER WITH LINE FEED
0 2024	000744				BR	TYPEMA		I GET NEXT CHARACTER
0 2026	105767	175532		TYPEMC1	TSTB	TPCSR		I TEST TELEPRINTER FLAG
0 2032	100375				BPL	.-4		I AND WAIT FOR DONE
0 2034	016767	176750	175524		MOV	CHAR,TPD0R		I LOAD TELEPRINTER BUFFER
0 2042	000735				BR	TYPEMA		I AND GET NEXT CHARACTER

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0 2044 005015          RECDI  CLR      (5)          ;CLEAR OUT OLD DATA
0 2045 105767 175500  RECDAI  TSTB   TKCSR          ;TEST KEYBOARD FLAG
0 2052 100375          BPL     .-4           ;AND WAIT FOR CHARACTER
0 2054 116767 175502 176726  MOVB   TKDBR,CHAR    ;GET CHARACTER
0 2062 016767 176722 175476  MOV    CHAR,TPDBR   ;ECHO CHARACTER
0 2070 126727 176714 000215  CMBB   CHAR,0215    ;HAS CHARACTER CARRIAGE RETURN
0 2076 001005          BNE    RECD0        ;
0 2100 005725          TST    (5)0         ;INCREMENT RETURN ADDRESS
0 2102 105767 175456  TSTB   TPCSR        ;
0 2106 100375          BPL     .-4           ;
0 2110 000205          RTS     5            ;AND EXIT
0 2112 042767 177770 176670  RECD0I  BIC     0177770,CHAR ;STRIP AWAY ALL BUT 3 LSB
0 2120 006315          ASL    (5)          ;ROTATE
0 2122 006315          ASL    (5)          ;PREVIOUS
0 2124 006315          ASL    (5)          ;DATA
0 2126 056715 176656  BIS    CHAR,(5)     ;AND INSERT CHARACTER
0 2132 000745          BR     RECD0        ;GET NEXT CHARACTER
;SCOPE OR/AND ITERATION LOOP FOR EACH TEST 100,TIMES
0 2134 032767 040000 179426  SCOPECI BIT     040000,SR    ;TEST SR FOR SCOPE
0 2142 001023          BNE    SCOPE0       ;YES SCOPE
0 2144 032767 004000 175410  BIT     040000,SR    ;TEST FOR ITERATION
0 2152 001007          BNE    SCOPE0       ;INHIBIT ITERATION
0 2154 026767 000020 000022  CMB    SCOPE0,ICOUNT ;ITERATION COMPLETE
0 2162 001403          BEQ    SCOPE0       ;ITERATION COMPLETE GO TO SCOPE0
0 2164 005267 000010  INC    SCOPE0       ;INCREMENT ITERATION COUNT
0 2170 000410          BR     SCOPE0       ;GO TO SCOPE0
0 2172 005067 000010  SCOPECI CLR    SCOPE0    ;CLEAR ITERATION COUNT
0 2176 011667 000000  MOV    0X6,RETURN   ;GET ADDRESS OF NEXT TEST
0 2202 000002          RTI                    ;EXIT
0 2204 000144          ;COUNTI 100.
0 2206 000000          SCOPEFI 0
0 2210 001070          RETURNI  RESTART
0 2212 005726          SCOPE0I  TST(6)0    ;
0 2214 012667 175556  MOV    (6)0,PSW     ;POP PC
0 2220 000177 177764  JMP    0RETURN      ;RESTORE CONDITION CODES
0 2224 036727 175340 020000  ERRORI  BIT     SR,020000 ;INHIBIT PRINTOUT?
0 2232 001401          BEQ    .04          ;BRANCH IF ERROR PRINT OUT
0 2234 000002          RTI                    ;RETURN TO TEST
0 2236 004567 177464  JSR    X5,TYPEM     ;TYPE ERROR MESSAGE
0 2242 002374          ERRORM  ;PC=
0 2244 011667 000010  MOV    (6),D2BTYP   ;TYPE PROGRAM COUNTER
0 2250 004767 000014  JSR    7,02A        ;
0 2254 005767 175310  TST    SR           ;HALT ON ERROR?
0 2260 100001          BPL     .04          ;
0 2262 000000          HALT                    ;YES HALT
0 2264 000002          RTI                    ;RETURN TO TEST

```

0.2266 000000  
 0.2270 016746 175270  
 0.2274 010246  
 0.2276 010146  
 0.2300 010046  
 0.2302 016700 177760  
 0.2306 012701 000000  
 0.2312 005002  
 0.2314 006100  
 0.2316 006102  
 0.2320 002702 000260  
 0.2324 105767 175234  
 0.2330 100375  
 0.2332 010267 175230  
 0.2336 005002  
 0.2340 006100  
 0.2342 006102  
 0.2344 006100  
 0.2346 006102  
 0.2350 006100  
 0.2352 006102  
 0.2354 005301  
 0.2356 001360  
 0.2360 012600  
 0.2362 012601  
 0.2364 012602  
 0.2366 012667 175172  
 0.2372 000207

```

D2BTYP: 0
O2AI  MOV  TPCSR,=(6)
      MOV  X2,=(0)
      MOV  X1,=(0)
      MOV  X0,=(0)
      MOV  D2BTYP,X0
      MOV  #6,X1
      CLR  X2
      ROL  X0
      ROL  X2
O2AAI  ADD  #260,X2
      TST  TPCSR
      BPL  ,=4
      MOV  X2,TPCDBR
      CLR  X2
      ROL  X0
      ROL  X2
      ROL  X0
      ROL  X2
      ROL  X0
      ROL  X2
      DEC  X1
      ONE  O2AA
      MOV  (6),X0
      MOV  (6),X1
      MOV  (6),X2
      MOV  (6),TPCSR
      RTS  7
    
```

```

ISAVE TPCSR
ISAVE R2
ISAVE R1
ISAVE R0
IGET DATA TO BE TYPED
IGET COUNTER
ICLEAR WORKING REGISTER
IMOV FIRST BIT (MSB) INTO
IR2
IFORM ASCII CODE
ITEST TELEPRINTER
IFLAG AND WAIT UNTIL DONE
ILOAD TELEPRINTER BUFFER
ICLEAR WORKING REGISTER
IROTATE THE
INEXT
IOCTAL CHARACTER
IINTO
IREGISTER
ITWO
IDECREMENT COUNTER
IGO TO O2AA IF NOT 0
IFINISHED, RESTORE REGISTERS
I
IAND TPCSR
IAND EXIT
    
```

ASCII MESSAGES  
 ERROR: ASCII '0X PC' 0'

002374 100  
 002375 045  
 0.2376 040  
 0.2377 120  
 0.2400 103  
 0.2401 075  
 0.2402 040  
 0.2403 100  
 0.2404 100  
 0.2405 045  
 0.2406 124  
 0.2407 131  
 0.2410 120  
 0.2411 105  
 0.2412 040  
 0.2413 115  
 0.2414 101  
 0.2415 124  
 0.2416 122  
 0.2417 111  
 0.2420 130  
 0.2421 040  
 0.2422 123  
 0.2423 124

M51 .ASCII 'OXTYPE MATRIX STARTING ADDRESS 0'

R 2424 101  
 R 2425 122  
 R 2426 124  
 R 2427 111  
 R 2430 116  
 R 2431 107  
 R 2432 040  
 R 2433 101  
 R 2434 104  
 R 2435 104  
 R 2436 122  
 R 2437 105  
 R 2440 123  
 R 2441 123  
 R 2442 040  
 R 2443 100

S 2444 100  
 R 2445 045  
 R 2446 120  
 R 2447 122  
 R 2450 107  
 R 2451 043  
 R 2452 075  
 R 2453 100

M61 .ASCII '0XPRG000'

R 2454 100  
 R 2455 045  
 R 2456 122  
 R 2457 117  
 R 2460 115  
 R 2461 040  
 R 2462 104  
 R 2463 101  
 R 2464 124  
 R 2465 101  
 R 2466 045  
 R 2467 100

M71 .ASCII '0XROM DATA0'

R 2470 100  
 R 2471 045  
 R 2472 100

M81 .ASCII '0X0'

R 2473 100  
 R 2474 045  
 R 2475 122  
 R 2476 117  
 R 2477 115  
 R 2500 040  
 R 2501 101  
 R 2502 104  
 R 2503 104  
 R 2504 122  
 R 2505 105  
 R 2506 123

M91 .ASCII '0XROM ADDRESS/IMAGE ADDRESS ROM DATA+IMAGE DATA0'

0 2507 123  
 0 2510 057  
 0 2511 111  
 0 2512 119  
 0 2513 101  
 0 2514 107  
 0 2515 109  
 0 2516 040  
 0 2517 101  
 0 2520 104  
 0 2521 104  
 0 2522 122  
 0 2523 109  
 0 2524 123  
 0 2525 123  
 0 2526 040  
 0 2527 122  
 0 2530 117  
 0 2531 119  
 0 2532 040  
 0 2533 104  
 0 2534 101  
 0 2535 124  
 0 2536 101  
 0 2537 052  
 0 2540 111  
 0 2541 119  
 0 2542 101  
 0 2543 107  
 0 2544 109  
 0 2545 040  
 0 2546 104  
 0 2547 101  
 0 2550 124  
 0 2551 101  
 0 2552 049  
 0 2553 100  
  
 0 2554 100  
 0 2555 057  
 0 2556 100  
  
 0 2557 100  
 0 2560 040  
 0 2561 100  
  
 0 2562 100  
 0 2563 052  
 0 2564 100  
  
 003776  
 0 3776 000000  
 0 4000 177777  
 0 4002 177777  
 0 4004 177777

M101 .ASCII '0/0'

M111 .ASCII '0 0'

M121 .ASCII '000'

.03776  
 .WORD  
 177777,177777,177777,177777

PALX11

V003

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PAGE 0-3

0 4006 177777  
0 4010 177777  
0 4012 177777  
0 4014 177777  
0 4016 177777  
0 4020 177777  
0 4022 177777  
0 4024 177777  
0 4026 177777  
0 4030 177777  
0 4032 177777  
0 4034 177777  
0 4036 177777  
0 4040 177777  
0 4042 177777  
0 4044 177777  
0 4046 177777  
0 4050 177777  
0 4052 177777  
0 4054 177777  
0 4056 177777  
0 4060 177777  
0 4062 177777  
0 4064 177777  
0 4066 177777  
0 4070 177777  
0 4072 177777  
0 4074 177777  
0 4076 177777  
000001

177777,177777,177777,177777

177777,177777,177777,177777

177777,177777,177777,177777

177777,177777,177777,177777

177777,177777,177777,177777

177777,177777,177777,177777

177777,177777,177777,177777

.END

CHAR	001010	T2	001176
D2RTYP	002266	T2A	001214
DUMP	001004	T2B	001240
END	001524	T2C	001254
ERROR	002224	T2D	001264
ERROR1	001166	T2E	001274
ERROR2	001234	T3	001304
ERRORM	002374	T3A	001322
GTADD	001046	T3AA	001314
HLT	104000	T3B	001330
ICOUNT	002204	T3C	001340
IMAGE	001002	T3D	001346
LAST	001000	T3E	001356
M10	002554	T3F	001366
M11	002557	T4	001400
M12	002562	T4B	001414
M5	002404	T4C	001420
M6	002444	T4D	001430
M7	002454	T4E	001522
M8	002474	TERM	001012
M9	002473	TKCSR	177560
O2A	002270	TKDBR	177562
O2AA	002320	TKINTA	000060
PRG0	001102	TKINTP	000062
PRG1	001536	TPCSR	177564
PRG1A	001554	TPDBR	177566
PRG1B	001572	TYPEN	001726
PRG1C	001610	TYPENA	001736
PRG1D	001660	TYPENB	001764
PRG2	001664	TYPENC	002026
PRGNUM	001036	WORDS	001000
PRGTAB	001010		
PRMTRS	001724		
PSW	177776		
RECD	002044		
RECD A	002046		
RECD B	002112		
RESTAR	001070		
RETURN	002210		
ROMADD	001060		
SCOPE	104400		
SCOPEB	002212		
SCOPEC	002134		
SCOPEF	002200		
SCOPEG	002172		
SR	177570		
SRT	001014		
START1	000200		
START3	000210		
T1	001114		
T1A	001132		
T1B	001174		

ERRORS DETECTED: 0

RUN-TIME: 4 SECONDS

5K CORE USED

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