

altair™  
88-PROM PROGRAMMER  
USER'S MANUAL

© MITS, Inc. 1976  
First Printing, November 1976



mits .INC.

2450 Alamo S.E./Albuquerque, New Mexico 87106



ALTAIR 88-PROM Programmer  
User's Manual

TABLE OF CONTENTS

Section	Page
1. Introduction . . . . .	1
2. Required Equipment . . . . .	2
3. Board Addressing . . . . .	2
4. 88-PMC Socket Assignments. . . . .	3
5. General Programming Operation. . . . .	5
6. Detailed Programming Procedure . . . . .	7
Tables	
3-1. Board Addressing . . . . .	2
5-1. Sense Switch Starting Locations. . . . .	5
Illustrations	
3-A. PROM Programmer Interface Board Address Select Switch Settings . . . . .	3
4-A. 88-PMC Socket Assignments. . . . .	3

## 2. REQUIRED EQUIPMENT

The 88-PROM Programmer requires an Altair 8800a or 8800b computer with a PROM Memory Card (88-PMC). The 88-PMC is needed because the software driver for the Programmer is supplied on PROM. A Serial Input/Output Card (SIO or 2SIO) and some type of terminal device (TTY, CRT, or Comter II) is also necessary.

The 88-PROM Programmer unit includes the following:

- Programmer Cabinet
- Interface Board
- Interconnect Cable
- PROM Programmer Driver PROM (PPD)
- PROM Programmer Checker PROM (PPC)

## 3. BOARD ADDRESSING

Insure that all the boards are correctly addressed according to Table 3-1 (reference appropriate manuals).

Table 3-1. Board Addressing

Board	Starting Address or Channel (Octal)
88-PMC	174000
SIO (A, B, or C) or 2SIO	0,1 20,21
PROM Programmer Interface Board*	100,101

\* Before installing the Interface Board into the 8800, make sure the address select switches are set correctly as shown in Figure 3-A.

## 1. INTRODUCTION

The 88-PROM Programmer, designed to work with Altair™ 8800 systems, programs standard 1702A (256-byte) erasable PROMs in less than three minutes. The Altair 8800 controls all Programmer timing through its software driver. The PROM is programmed by doing a 256-byte block transfer from the 8800 memory (RAM or PROM) to the Programmer. Programmed PROMs are checked by doing a byte-for-byte compare using a standard 88-PROM Memory Card (a check routine is supplied on PROM), since the Programmer does not have provisions for reading out the data from a programmed PROM.

The Programmer functions as an addressable output port with two channels, even and odd. The even address channel outputs to a "control latch" in the Programmer. The odd address channel outputs to either an "address latch" or a "data latch" depending on the state of the fourth bit in the "control latch."

The unit consists of a separate chassis (10.6" x 4.2" x 11") with a 24-pin zero insertion force socket. It is connected to the Altair 8800 through its own interface card which plugs into the Altair bus. The Programmer has a self-contained power supply, and the interface card requires less than 500MA from the +8 volt bus in the Altair 8800.



C

C

C

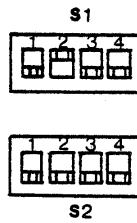


Figure 3-A. PROM Programmer Interface Board  
Address Select Switch Settings

4. 88-PMC SOCKET ASSIGNMENTS

Install the PROM Programmer Driver (PPD) and PROM Programmer Checker (PPC) in sockets B and C, respectively, on the 88-PMC as shown in Figure 4-A. Socket A is used for the PROM to be checked and socket D is used for the PROM to be copied. If a Disk is utilized, socket H is for the Disk Boot Loader PROM. Sockets E through G are not used at this time.

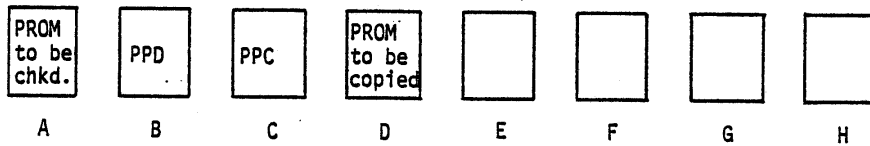


Figure 4-A. 88-PMC Socket Assignments

---

The operation of the PPC in checking the programmed PROM is similar to that of the PPD. If the first mode is selected by beginning execution at 175000 (octal), the checker will do a byte-for-byte compare between the PROM in the A socket and the PROM in the D socket of the 88-PMC. If the second mode is selected by beginning execution at 175006 (octal), the checker will do a byte-for-byte compare between the PROM in the A socket and the 256-byte block selected by the sense switches. In either mode, the PPC will output failing addresses in the PROM to the terminal device. If the data at all addresses is correct, the PPC will output "OK" to the terminal device.



## 5. GENERAL PROGRAMMING OPERATION

The PROM Programmer Driver (PPD) contains a short program that performs three tasks. It transfers a 256-byte block from the Altair computer to the Programmer, controls all Programmer timing, and keeps track of the number of passes made in programming the PROM.

The PPD has two modes of operation in accomplishing these tasks. The first mode transfers the 256-byte block contained in the 88-PMC (D socket) to the Programmer. This mode is useful for making a number of copies of a previously programmed PROM. To use the first mode, the PPD is executed from location 174400 (octal).

The second mode transfers the 256-byte block identified by the current setting of the sense switches to the Programmer. It is useful for copying one or more blocks of memory (RAM or PROM) into several PROMs. In utilizing the second mode, the PPD is executed from location 174405 (octal), and the sense switches are set to select which 256-byte block of memory is to be copied. The sense switches are used to form the upper 8 bits of the pointer address for the starting location of the block to be programmed. Thus, the starting locations that can be selected are restricted to integral 256-byte locations as shown in Table 5-1.

Table 5-1. Sense Switch Starting Locations

Sense Switch Setting								Starting Location
A15	A14	A13	A12	A11	A10	A9	A8	Octal
0	0	0	0	0	0	0	0	000000
0	0	0	0	0	0	0	1	000400
0	0	0	0	0	0	1	0	001000
0	0	0	0	0	0	1	1	001400
.	.	.	.	.	.	.	.	.....
.	.	.	.	.	.	.	.	.....
1	1	1	1	1	1	1	0	177000
1	1	1	1	1	1	1	1	177400

**WARNING**

The PROM must be installed with the #1 pin in the upper left hand corner of the socket. The notch on the PROM should be on top. Failure to correctly install the PROM may result in permanent damage to both the PROM and the PROM Programmer.

- 2) Examine location 174405 (octal).
  - 3) Set the sense switches A15-A8 for the 256-byte block to be programmed according to Table 5-1.
  - 4) Disregard the settings of the lower 8 address switches since they do not affect programming at this time.
  - 5) Actuate the RUN switch on the computer.
  - 6) The two LEDs labelled "Programming" will alternately blink on and off. When programming is finished, the "Programming Complete" LED will come on and remain on. The other LED will go off.
- d. To check the programmed PROM against the 256-byte block from which it was programmed:
- 1) Place the PROM to be checked in the A socket of the 88-PMC.
  - 2) Examine location 175006 (octal).
  - 3) Set the sense switches A15-A8 for the 256-byte block against which the PROM is to be checked according to Table 5-1.
  - 4) Actuate the RUN switch on the computer.
  - 5) If all bytes in the PROM check, the terminal device will print out "OK." If bytes are found that do not check, the PROM addresses of those bytes (octal 000 through 377) will be printed out followed by "OK."

## 6. DETAILED PROGRAMMING PROCEDURE

- a. To make copies of a previously programmed PROM:
- 1) Place the "Master" PROM to be copied in the D socket of the PROM Memory Card (88-PMC).
  - 2) Place the PROM to be programmed in the PROM Programmer.

### WARNING

The PROM must be installed with the #1 pin in the upper left hand corner of the socket. The notch on the PROM should be on top. Failure to correctly install the PROM may result in permanent damage to both the PROM and the PROM Programmer.

- 3) Examine location 174400 (octal).
  - 4) Actuate the RUN switch on the computer.
  - 5) The two LEDs labelled "Programming" will alternately blink on and off. When programming is finished, the "Programming Complete" LED will come on and remain on. The other LED will go off.
- b. To check the programmed PROM against the "Master" PROM in the D socket:
- 1) Place the PROM to be checked in the A socket of the 88-PMC. (The "Master PROM should be in the D socket.)
  - 2) Examine location 175000 (octal).
  - 3) Actuate the RUN switch on the computer.
  - 4) If all bytes in the PROM check, the terminal device will print out "OK." If bytes are found that do not check, the PROM addresses of those bytes (octal 000 through 377) will be printed out followed by "OK."
- c. To make copies of integral 256-byte blocks of memory (RAM or PROM) other than the PROM in the D socket on the the 88-PMC:
- 1) Place the blank PROM to be programmed in the Programmer.

**mits**

**2450 Alamo SE  
Albuquerque, NM 87106**

