

# **EPB-MPF-IBP**

**USER'S MANUAL**



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# **EPB-MPF-IBP**

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### **TABLE OF CONTENTS**

Chapter 1	Introduction.....	1
1.1	Installation Procedures.....	5
1.2	EPB-MPF-IBP Specifications.....	6
1.2.1	Hardware Specifications.....	6
1.2.2	Software Specifications.....	8
1.2.3	If you use EPB-MPF-IBP in conjunction with the MPF-IP.....	8
1.2.4	If you use EPB-MPF-IBP in conjunction with the MPF-I or MPF-IB.....	9
Chapter 2	General Concepts.....	13
2.1	Monitor Program.....	15
2.1.1	Entering the Monitor Program of EPB-MPF-IBP.....	15
2.1.2	Entering the Type of the EPROM to be Programmed.....	16
2.2	Major Monitor Functions.....	17
2.3	The RAM Buffer.....	21
Chapter 3	Operating Your EPB-MPF-IBP.....	25

PART A: When the EPROM Programmer board is connected to the MPF-IP.....	27
3.1 Read data from EPROM TO RAM Buffer - The R Key.....	28
3.2 Display and modify the data in RAM Buffer -The M Command.....	30
3.3 Data Fill - The F Command (Key) .....	31
3.4 Data Deletion - The D Command.....	32
3.5 Data Insertion - The I Command.....	33
3.6 Storing Data onto Tape - The W Command...	34
3.7 Reading Data from Tape - The L Command...	35
3.8 Verify the Data of EPROM with the Data of RAM Buffer - The V Command.....	36
3.9 Write the Data in RAM Buffer to EPROM - The P Command.....	37
3.10 Reset the EPROM Type - The N Command.....	39
3.11 Set the EPROM Programming Mode to "SHORT" - The S Command.....	39
3.12 Set the EPROM Written Type - The X Command.....	39
3.13 Display the EPROM Type being Programmed and the EPROM Programming Method - The H Command.....	40
3.14 Go back to Monitor Program - The Q Command.....	40
3.15 System Reset - RESET Key.....	40

PART B: When the EPROM programmer board is connected to the MPF-I.....	42
3.1 Read Data from EPROM to the RAM Buffer - The READ Key.....	43
3.2 Display or Modify the Data in the RAM Buffer - The LIST key.....	50
3.3 Examine and Alter the Contents in the RAM - ADDR and DATA Keys.....	53
3.4 Data Deletion - The DEL Key.....	56
3.5 Data Insertion - The INS Key.....	58
3.6 System Reset - The RS Key.....	60
3.7 Verify the data of EPROM with the data of RAM buffer - The VERIFY Key.....	61
3.8 Return to the initial state of EPB-MPF-IBP - The RESTART Key.....	64
3.9 Write the data in the RAM buffer to the EPROM - The PROGM Key.....	66
3.10 Storing Data onto Tape - The TAPE Key.... WR	70
3.11 Reading data from tape - The TAPE Key.... RD	72
Chapter 4 Hardware Circuit and Theory of Operation.....	75
4.1 Theory of Operation.....	77
4.2 Theory of Operation - Writing Data into 2716.....	77
4.3 Schematic.....	79
4.4 The pin Assignments of the EPROMs - 2508, 2758, 2516, 2716, 2532, 2732, 2564 2764.....	82





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# Chapter 1

## Introduction

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EPB-MPF-IBP is an EPROM programmer board which can be connected to either MPF-IB (MPF-I) or MPF-IP.

The heart of the EPB-MPF-IBP is a 4K monitor program which is stored in the 2732 chip on board location U8. The monitor program is stored in the memory range from 9000H to 9FFFH.

The first 2K of the monitor program (9000H to 97FFH) is used when the EPB-MPF-IBP is used together with the MPF-IP for EPROM programming. The EPB-MPF-IBP when used in conjunction with the MPF-IP allows the users to program EPROMs of up to 8K memory.

The remaining 2K of the monitor program (9800H to 9FFFH) is used when the EPB-MPF-IBP is used together with the MPF-I (MPF-IB) for EPROM programming. The EPB-MPF-IBP when used in conjunction with the MPF-I (MPF-IB) allows the users to program EPROMs of up to 8K memory. However, you have to perform an EPROM read or write operation twice when programming an 8K EPROM with MPF-IB or MPF-I.

The EPB-MPF-IBP is used for programming the following EPROMs.

1K x 8	2K x 8	4K x 8	8K x 8
TMS2508, I2758,	TMS2516, I2716,	TMS2532 I2732	2564 2764

\*\*\* Note

The MPF-I has a 2K monitor ROM, while the MPF-IB has a 4K monitor ROM. The 4K monitor ROM of the MPF-IP contains the 2K monitor program that is exactly the same as that of the 2K monitor program contained in the 2K monitor ROM of the MPF-I. The remaining 2K in the 4K monitor ROM is a 2K BASIC Interpreter. The same keyboard is used on either MPF-I or MPF-IB. Thus, the MPF-I or the MPF-IB is operated the same way. Hereafter in this manual, MPF-I is universally used to represent MPF-I and MPF-IB.

\*\*\*

The EPB-MPF-IBP interfaces with the MPF-IP, MPF-IB, or MPF-I by using a flat ribbon cable and utilizes the 4K monitor program for writing data to EPROM. Actually the EPB-MPF-IBP has two 40 pin male connectors - P1 and P2, P1 is used to interface with the CPU bus of MPF-IP (or MPF-I, MPF-IB), and P2 is for system expansion (for example, P2 may be used to interface with PRT-MPF-IP or PRT-MPF-I). For the detailed pin functions of P1 and P2, please refer to the schematic of this manual.

Logically, the EPB-MPF-IBP performs the same EPROM programming functions no matter which one of MPF-IP or MPF-I (MPF-IB) is connected to it. Moreover, the same installation procedure is applied when connecting the EPB-MPF-IBP to either the MPF-IP or MPF-I (MPF-IB).

The operations of the the EPB-MPF-IBP are controlled via the keyboard of the MPF-I (MPF-IB) or MPF-IP. Thus, you operate the EPB-MPF-IBP differently depending on whether it is connected to MPF-I or MPF-IP.

When the EPB-MPF-IBP is to be used in conjunction with the MPF-IP, the keyboard of MPF-IP is used to operate the EMP-MPF-IBP. Single one-key commands are provided so that you can operate the EPROM writer with ease.

However, if the EPROM writer is used in conjunction with the MPF-I (or MPF-IB), a nameplate (keyboard overlay) should be overlaid on the keyboard of MPF-I (MPF-IB).

## 1.1 Installation Procedures

The same installation procedure is applied when connecting the EPB-MPF-IBP to either the MPF-IP or MPF-IB (MPF-I).

1. All power should be turned off before making the connection.
2. Connect the CPU bus of MPF-IP or MPF-IB (MPF-I) with P1 on the EPB- MPF-IBP by 40-pin flat cable.
3. Plug in the MPF-IP or MPF-I (MPF-IB) power plug.
4. Plug in the EPB-MPF-IBP power plug.
5. Insert the EPROM to be programmed into the textool, the indentation should face toward the left, e.g., it should face toward the clamping lever of the textool.
6. The switch to the right of the textool should be always be off when programming EPROMs other than TMS2564. This switch should be on when programming TMS2564. (If the switch is on, then the voltage on Pin 1 is 25V. Otherwise, the voltage on this pin is 21.5V.)

## 1.2 EPB-MPF-IBP Specifications

### 1.2.1 Hardware Specifications

- 1) Bus compatible with MPF-I (MPF-IB) or MPF-IP. At Header P1, a 40-pin flat ribbon cable and male connector is used to interface with MPF-I (MPF-IB) or MPF-IP, and the other 40-pin of Header P2 can be connected with other optional boards for expansion purpose.
- 2) ROM: Single +5V EPROM 2732 x 1 at board location U8, total 4k bytes. The first 2K of the monitor program (9000H to 97FFH) is used when the EPB-MPF-IBP is used together with the MPF-IP for EPROM programming. The remaining 2K of the monitor program (9800H to 9FFFH) is used when the EPB-MPF-IBP is used together with the MPF-IB or MPF-I for EPROM programming.
- 3) RAM: Static RAM - 2016 x 3. The on-board RAM of the EPB-MPF-IBP totals 6K bytes starting from D800H to EFFFH.

Thus, when the EPB-MPF-IBP is used together with the MPF-I (MPF-IB), a total of 6K bytes of on-board RAM may be used.

However, if the EPB-MPF-IBP is used in conjunction with the MPF-IP. A total of 8K RAM space (from D800H to F7FFH) can be used by the users for EPROM programming. The RAM space from F000H to F7FFH is supplied by the RAM on the MPF-IP.

- 4) I/O Port: Programmable I/O port 8255 x 1, total 24 parallel I/O lines. I/O addresses from 70H to 7FH.
- 5) Display:

**MPF-IP display:** When the EPB-MPF-IBP is used in conjunction with the MPF-IP, then the MPF-IP display is used during EPROM programming.

**MPF-I (MPF-IB) display:** When the EPB-MPF-IBP is used in conjunction with the MPF-I or MPF-IB, then the MPF-I (MPF-IB) display is used during EPROM programming.

6) Keyboard:

When the EPB-MPF-IBP is connected to the MPF-I, the keyboard of MPF-I is used for EPROM programming. A keyboard overlay is used for EPROM programming.

When the EPB-MPF-IBP is connected to the MPF-IP, the keyboard of MPF-IP is used for EPROM programming.

7) Audio Tape Interface:

MPF-I or MPF-IP audio interface.

8) System Power Consumption: +5V and +25V, total 400 mA or so. The system power is supplied by an adapter, which is consisted of two power regulators--7805C and TL497. The regulated +5V is supplied by the 7805C, while the 25V, which is supplied to the pin of EPROM during programming, is supplied by TL497.

9) Main Power Input: power adaptor, input 110V or 220V, output 9V/600mA.

10) Textool: 28 pin zero insertion force socket.

11) Interface Connector/Cable: 40-pin flat ribbon cable and male connector used to interface with MPF-I or MPF-IP.

12) Extension Connector: 40-pin flat ribbon cable male connector provides the CPU bus signals for MPF-I or MPF-IP optional boards or other expansion boards.

13) Physical Characteristics:

Width : 11.15 cm

Length : 15.4 cm

### 1.2.2 Software Specifications

EPB-MPF-IBP has a high performance 4K-byte monitor program which provides 15 EPROM programming commands and is designed for easy operation. The following is a simple description of its key functions:

Each of the 15 EPROM programming commands can be activated by pressing one of the following 15 keys on your MPF-I or MPF-IP keyboard. Since the two models use different keyboards, discussion of the 15 commands is divided into two parts.

#### 1.2.3 If you use EPB-MPF-IBP in conjunction with the MPF-IP

Note if you use EPB-MPF-IBP together with MPF-I, ignore this section and proceed to the next section 1.2.4.

- 1) **RESET** : System reset.

When the RESET key is pressed, the system is under the control of the monitor program of MPF-IP but not the monitor of EPB-MPF-IBP. A warm reset is to be performed, when the RESET key is pressed.

- 2) **M** : (Memory display or memory modify). This command enables the user to examine or modify data in RAM buffer.
- 3) **D** : (Delete). Delete one byte of data from the RAM buffer.
- 4) **I** : (Insert). Insert one or more bytes of data into the RAM buffer.
- 5) **F** : (Fill data). Set the contents of a memory range to a specific value.
- 6) **L** : (Tape load). Load data from cassette tape to the RAM of MPF-IP.
- 7) **W** : (Tape write). Store data in RAM buffer onto the cassette tape.
- 8) **R** : (Read). Read data from EPROM to the RAM buffer.



- 9) **[P]** : (Program). Write data from the RAM buffer to EPROM.
- 10) **[V]** : (Verify). Verify the contents of EPROM with that in the RAM buffer.
- 11) **[N]** : (New type). Reset the type of EPROM to be programmed.
- 12) **[S]** : (Shortcut). Use a quicker technique to program EPROM, this method may reduce the programming time by two thirds.
- 13) **[X]** : Back to the "Long" type EPROM programming mode, e.g., reset the EPROM programming mode so that EPROM is programmed with normal speed.
- 14) **[Q]** : (Quit) Back to the MPF-IP monitor program.
- 15) **[H]** : (Help). Verify the EPROM type currently being programmed, and the programming mode currently being applied.
- 16) **[C]** : (Check Sum). Add up the contents of all the memory locations in a RAM. The length of the data to be added to form a check sum depends on the type of the EPROMs to be programmed.

#### 1.2.4 If you use EPB-MPF-IBP in conjunction with the MPF-I or MPF-IB

- 1) **[RS]** : System reset.

When the RS key is pressed, the system is under the control of the monitor program of MPF-I but not the monitor of EPB-MPF-IBP. A warm reset is to be performed, when the RS key is pressed. At this time, the display of the MPF-I shows

UPF - - I

- 2) **[ADDR]** :

This key must be pressed before entering an address.

3) **DATA** :

Input data into the RAM buffer.

4) **+** :

Check contents of the next memory location.

5) **-** :

Check contents of the last memory location.

6) **GO** :

Execute the EPROM programming command.

7) **INS** :

Insert one byte of data immediately after the memory location whose address is being shown currently.

8) **DEL** :

Delete one byte of data stored in the memory location whose address is currently displayed.

9) **TAPE  
WR** :

Store the data in the RAM buffer onto the cassette tape.

10) **TAPE  
RD** :

Load the data stored on cassette tape to the RAM buffer.

11) **READ** :

Read data from EPROM to the RAM buffer.

12) **VERI  
FY** :

Compare the data in the EPROM with that in the RAM buffer.

13) **LIST** :

Display or modify data in the RAM buffer.

14) **RESTA  
RT** :

(Restart) Restart to the initial state of the  
EPB-MPF-IBP.

15) **PROGM** :

Write data from RAM buffer to the EPROM.



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## Chapter 2

### General Concepts

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## 2.1 Monitor Program

### 2.1.1 Entering the Monitor Program of EPB-MPF-IBP

Before executing the key function of EPB-MPF-IBP, user should enter the EPB-MPF-IBP monitor program. There are two ways to enter the monitor program of the EPB-MPF-IBP because the keyboards of the MPF-I and MPF-IP are different.

To enter the monitor program of the EPB-MPF-IBP when using MPF-IP, follow the instructions below. If you intend to enter the monitor program of the EPB-MPF-IBP when using MPF-I, ignore the instructions below and proceed to the next section.

#### Entering the Monitor Program of EPB-MPF-IBP

-- When using MPF-IP

As we mentioned in Chapter 1, the first 2K of the EPB-MPF-IBP monitor program (9000H to 97FFH) is used when the EPB-MPF-IBP is connected with the MPF-IP. The way to enter the EPB-MPF-IBP is to press G 9 0 0 0 and <--'.

Upon entering into the monitor program of EPB-MPF-IBP, it will first check whether the four RAMs (whose addresses range from D800H to F7FFH.) have been inserted properly or damaged.

If the RAM on board location U6 (whose addresses start from D800H to F7FFH) haven't been inserted, or have been damaged, the screen will display

"RAM U6-EPB ERROR"

At this moment, the user may press <--' to proceed the next step, or the "Q" key to return control to the MPF-IP monitor program.

## Entering the Monitor Program of EPB-MPF-IBP

-- When using MPF-I (MPF-IB)

As we mentioned in Chapter 1, the upper 2K of the EPB-MPF-IBP monitor program (9800H to 9FFFH) is used when the EPB-MPF-IBP is connected with the MPF-I. The way to enter the EPB-MPF-IBP is to press **ADDR** **9** **8** **0** **0** and **GO**.

At this time, the MPF-I display will show **0.0.0.0.-E** signaling that you have entered the EPB-MPF-IBP monitor program and the EPB-MPF-IBP is waiting for you to enter the type of EPROM to be programmed. After you have entered the type of EPROM to be programmed, you may type in an EPROM programming command from the MPF-I keyboard. To return control to the MPF-I monitor program, you can simply type the **RS** key.

### 2.1.2 Entering the Type of the EPROM to be Programmed

After you have entered into the monitor program of the EPB-MPF-IBP, you are prompted to enter the type of the EPROM to be programmed.

If you use the EPB-MPF-IBP together with the MPF-IP

After checking the four RAMs, the screen will display "<TYPE>=", it means the EPB-MPF-IBP monitor is already initialized and is ready to accept user's input of the EPROM type to be programmed.

You may input any one of the eight EPROM types, followed by the **<-->**. Then the screen will display a pound sign "#", showing that the system is in the EPB MODE and ready to accept EPB-MPF-IBP monitor commands.

If you input a wrong EPROM type which isn't one of the eight EPROM types, you may use the BACKSPACE key **<-** to erase the wrong EPROM type, input the correct one, and then type the carriage return key **<-->**.



If you use the EPB-MPF-IBP together with the MPF-I

If you use the EPB-MPF-IBP together with the MPF-I, the key press sequence you should follow to enter the type of the EPROM to be programmed is as follows:

<u>Key to Press</u>	<u>Display</u>	<u>Description</u>
RS	UPF -- 1	;System reset
ADDR 9 8 0 0	9.8.0.0. 3 1	;Enter the starting address of the monitor program of the EPB-MPF-IBP.
GO	0.0.0.0. - E	;Enter the monitor program of the EMP-MPF-IBP.
2 7 1 6	2.7.1.6. - E	;Enter the type of the EPROM to be programmed.
GO	2 7 1 6 - E	;Enter the initial state of the EPB-MPF-IBP.

## 2.2 Major Monitor Functions

The major EPB-MPF-IBP monitor program functions are indicated as follows:

- 1) Read the data from EPROM to RAM buffer, users can store, modify, verify, duplicate, and display the data.
- 2) Store the data of RAM buffer on cassette tape, or read the data from cassette tape to the RAM buffer.

Two examples are provided showing how to read data from an EPROM to the RAM buffer and then compare the data contained in the EPROM and that in the RAM buffer.

**Example:**

When using MPF-IP together with the EPB-MPF-IBP

Read the data contained in 2732 to the RAM buffer and then verify it. (Put EPROM on textool before reading data.)

<u>Key to Press</u>	<u>Display</u>	<u>Comments</u>
G 9 0 0 0 <--'	<TYPE>=	;Enter the EPB-MPF-IBP monitor program from the MPF-IP monitor.
2 7 3 2 <--'	#	;Input the EPROM type.
R <--'		;Executing the read command, the display is blank.
	"R COMPLETE"	;Generate a beep sound and the EPROM read is completed.
	"#"	;One second after the EPROM read was completed.
V <--'		;Executing the verify function, the display is blank.
	"V COMPLETE"	;A beep sound is generated and the verification function is completed.
	"#"	;About one second after the completion of the verify command.

The user may enter other EPROM programming command after the "#" sign has been displayed.

Note:

- 1) You are prohibited to enter EPB-MPF-IBP monitor commands unless the "#" is displayed on the display panel.
- 2) If the texttool is not inserted with an EPROM, the data being read from the texttool will all be FF.
- 3) Press **RESET** in case users intend to return to the MPF-IP monitor program.
- 4) If users try to change the type of EPROM to be programmed, press the **N** key and **<--'** to reset the EPROM type. Otherwise the EPROM will be damaged during programming.

When using MPF-I together with the EPB-MPF-IBP

The following example shows how to read data from a 2716 into the RAM buffer and then compare the data contained in the EPROM with that in the RAM buffer.

<u>Key to Press</u>	<u>Display</u>	<u>Description</u>
<b>RS</b>	<b>UPF -- 1</b>	;System reset
<b>ADDR</b> <b>9</b> <b>8</b> <b>0</b> <b>0</b>	<b>9.8.0.0. 3 1</b>	;Enter the starting address of the monitor program of the EPB-MPF-IBP.
<b>GO</b>	<b>0.0.0.0. - E</b>	;Enter the monitor program of the EMP-MPF-IBP.
<b>2</b> <b>7</b> <b>1</b> <b>6</b>	<b>2.7.1.6. - E</b>	;Enter the type of the EPROM to be programmed.
<b>GO</b>	<b>2 7 1 6 - E</b>	;Enter the initial state of the EPB-MPF-IBP.

**READ**

0.0.0.0 - S

```
;Type in the READ command.
;Because the type of EPROM
;to be programmed is 2716,
;the monitor program of EPB-
;MPF-IBP automatically sets
;the starting address to
;0000 and ending address to
;07FFH.
```

GO

```
;When the EPROM read is
performed, the display is
blanked out.
```

P A S S - r

```
;The read operation has
completed.
```

VERI  
FY

0.0.0.0. - S

```
;Because the type of EPROM
to be programmed is 2716,
the monitor program of EPB-
MPF-IBP automatically sets
the starting address to
0000 and ending address to
07FFH.
```

**GO**

```
:Execute the VERIFY command.
```

P A S S - r

```
;This display represents
that the contents of the
EPROM are the same as that
contained in the RAM
buffer.
```

Note:

- 1) You can only execute an EPB-MPF-IBP command only when the EPB-MPF-IBP is in its initial state, e.g., when one of the following is displayed:  
  
2 5 0 8 - E, 2 7 5 8 - E, 2 5 1 6 - E, 2 7 1 6 - E  
  
2 5 3 2 - E, 2 7 3 2 - E, 2 7 6 4 - E, 2 5 6 4 - E
- 2) If the textool is not inserted with an EPROM, the data being read from the textool will all be FF.

- 3) Press RS in case users intend to return to the MPF-I monitor program.
- 4) If users intends to change the type of EPROM to be programmed, he/she must re-enter the EPB-MPF-IBP monitor program and change the type of the-EPROM to be programmed accordingly. Otherwise the EPROM will be damaged during programming.
- 5) You can press a command key to execute the desired EPROM programming function immediately after a previous function has completed.

## 2.3 The RAM Buffer

This section will discuss the sizes of the RAM buffers which can be used by the user during EPROM programming. The sizes of the RAM buffers which can be used by the user during EPROM programming are hardware-dependent. That means the sizes of the RAM buffers are different depending on the hardware used for EPROM programming.

The EPB-MPF-IBP itself has an on-board RAM space of 6K which consists of three 2K RAM chips (2016). (Please refer to the schematic of the EPB-MPF-IBP in the appendix of this manual.) This 6K RAM space has physical addresses ranging from D800H through EFFFH. When you use the EPROM writer together with the MPF-I, this 6K RAM space is all you have as the RAM buffer.

If you use the EPB-MPF-IBP together with MPF-IP, then you will have a RAM buffer of 8K. This is because a RAM chip on the MPF-IP contributes an additional 2K memory space from F000H through F7FFH to the RAM buffer. We will conclude that the two sizes of the RAM buffers are:

$$[\text{EPB-MPF-IBP}] + [\text{MPF-I}] = 6\text{K}$$

$$[\text{EPB-MPF-IBP}] + [\text{MPF-IP}] = 8\text{K}$$

But for the convenience during EPROM programming, the addresses of the RAM buffer are converted internally to 0000H through 1FFFFH (when using MPF-IP) or 0000H through 17FFFH (when using MPF-I), and so displayed.

To the monitor program of the EPB-MPF-IBP, the addresses in the range of D800H to F7FFH in the MPF-IP's RAM correspond to 0000H through 0FFFFH when the system is under the control of the EPB-MPF-IBP. The memory range from D800H through EFFFFH (when the machine is under the control of the MPF-I monitor program) is the same as the memory range 0000H through 17FFH (when the system is under the control of the EPB-MPF-IBP.).

For a detailed memory allocations of the MPF-IP and EPB-MPF-IBP, please refer to Chapter 8 System Hardware Configuration, MPF-IP User's Manual.

Now the following example proves that the memory range from D800H to F7FFH in MPF-IP's RAM correspond to the memory range from 0000H to 0FFFFH in EPB-MPF-IBP.

Example:

When using the EPB-MPF-IBP in conjunction with MPF-IP

Compare the contents of address 0050H in EPB-MPF-IBP with the contents of address D850H in MPF-IP.

Key	Display	Comment
<b>RESET</b>	*****MPF-I-PLUS*****	; The warm reset of MPF-IP
		; Enter the MPF-IP monitor.
<b>M</b> <b>D</b> <b>8</b> <b>5</b> <b>0</b> <b>&lt;-J</b>	<b>&lt;M&gt;=D850 XX XX XX XX</b>	; The contents of memory location D850.
<b>G</b> <b>9</b> <b>0</b> <b>0</b> <b>0</b> <b>&lt;-J</b>	<b>&lt;TYPE&gt;=</b>	; Enter EPB-MPF-IBP monitor program.
<b>2</b> <b>7</b> <b>3</b> <b>2</b> <b>&lt;-J</b>	<b>#</b>	; Enter EPROM type 2732
<b>M</b> <b>5</b> <b>0</b> <b>&lt;-J</b>	<b>#M 0050 XX XX XX XX</b>	; The contents of memory location 50H checked under the control of EPB-MPF-IBP monitor program.

You will find that the contents contained at address D850H in MPF-IP monitor is the same as the contents of address 50H in EPB-MPF-IBP monitor program.

When using the EPB-MPF-IBP in conjunction with MPF-I

Compare the contents of memory location 0068H (when operating under the monitor program of the EPB-MPF-IBP) and that of memory location D868H (when under the control of the MPF-I monitor program).

Key\_to\_Press

**RS** **u P F - - 1** ;System reset

**ADDR** **D 8 6 8** **D.8.6.8.x x** ;Check the contents of memory location D868H.

**ADDR** **9 8 0 0** **9.8.0.0.3 1** ;Enter the starting address of the monitor program of EPB-MPF-IBP.

**GO** **0.0.0.0.- E** ;Enter the monitor program of EPB-MPF-IBP.

**2 5 0 8** **2.5.0.8.- E** ;Enter the type of the EPROM to be programmed.

**GO** **2 5 0 8 - E** ;The EPB-MPF-IBP is in initial state.

**LIST** **L I S T** ;Enter the LIST command.

**GO** **0 0 0 0 x.x.** ;

**ADDR** **0.0.0.0.x x** ;

**0 0 6 8** **0.0.6.8.x x** ;The address of 0068H in EPB-MPF-IBP monitor equals to the address of D868H in MPF-I monitor.





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## **Chapter 3**

# **Operating Your EPB-MPF-IBP**

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This chapter will introduce to you how to operate the EPROM programmer board. To clearly explain the use of the various EPROM programming commands, each command is followed by an example.

Because the keyboards and the display of the MPF-I and MPF-IP are arranged differently, to make every example clear this chapter is divided into two parts. The first part -- Part A -- gives instructions on how to operate the EPROM programmer board when it is connected to the MPF-IP. The second part -- Part B -- tells how to use the EPROM writer when it is connected to the MPF-I.

## ***PART A: When the EPROM Programmer board is connected to the MPF-IP***

After key in  to enter the EPB-MPF-IBP monitor, the screen will display "<TYPE>=" and user can key in the EPROM type to start EPROM programming. The following is the explanation of EPB-MPF-IBP commands.

### 3.1 Read data from EPROM TO RAM Buffer – The R Key

The following procedures guide users to read the data from EPROM in the textool to RAM buffer.

- 1) Users should put EPROM in the textool before executing the read command, otherwise the data read from textool will be FF.
- 2) Before pressing the R key, users need to make sure that the EPB-MPF-IBP is in the initial state, e.g., "#" is displayed.
- 3) When the display is in the initial state, the following sequence are used to perform a READ function.

Key	Display	Comments
<span style="border: 1px solid black; padding: 2px;">R</span>	#R	; It gets ready to read.
<span style="border: 1px solid black; padding: 2px;">&lt;--'</span>		; Begin to read.
	R COMPLETE	; The contents of EPROM are read into RAM buffer
	#	; Back to the initial state.

The command format is:

R ] <Starting Address> ] <number of bytes> <--'

Example:

The EPROM type on textool is 2732, read its contents into RAM.

<u>Key</u>	<u>Display</u>	<u>Comment</u>
<span style="border: 1px solid black; padding: 2px;">G</span> <span style="border: 1px solid black; padding: 2px;">9</span> <span style="border: 1px solid black; padding: 2px;">0</span> <span style="border: 1px solid black; padding: 2px;">0</span> <span style="border: 1px solid black; padding: 2px;">0</span>	<G>=9000	; Enter into the EPB-MPF-IBP monitor program.

---

\* In the following text, the square bracket "]" is used to represent the space bar (the SPACE key) --   .

<input type="text" value="&lt;--'"/>	<TYPE>	; Wait for keying in EPROM type.
<input type="text" value="2"/> <input type="text" value="7"/> <input type="text" value="3"/> <input type="text" value="2"/>	<TYPE>=2732	; The EPROM type is 2732.
<input type="text" value="&lt;--'"/>	#	; The initial state of EPB-MPF-IBP.
<input type="text" value="R"/>	#R	; Enter the READ command.
<input type="text" value="&lt;--'"/>		; Execute the READ command
	R COMPLETE	; The READ command is finished.
	#	; Back to the initial state.

In a reading procedure, if press  and  only, all the data will be read from EPROM to RAM buffer, if press  ] and "starting address" , then only one byte of data will be read, if you want a specified amount of data to be read, then press  ] "starting address" ] "byte number" .

#### Example:

Read the contents from 0 to 03FF of EPROM 2732 to the RAM buffer.

- Use H command to check the EPROM type, if it is not 2732, use N command to modify it.
- Press  ]  ]  .

## 3.2 Display and modify the data in RAM Buffer—The M Command

Users should take the following steps to display or modify the data in the RAM buffer.

- 1) The EPB-MPF-IBP must be in initial state -- "#" before pressing the M key.
- 2) If it is in the initial state, do as follows:

**M** <starting address> <--'>

then the screen will display the contents of the four consecutive memory locations following the starting address specified.

<M>=0010 3E FF D3 92

The M command can work with some other commands to display or modify the contents of RAM.

- 1) Command M working with "↑" or "↓" can display contents of four previous addresses or of the next four addresses. For example, continue the example above, if press ↓, the screen will display:

<M>=0014 D3 80 D3 81

- 2) Command M works with **:** may change the contents of RAM, press

M <starting address> : <data1 ] data2 ] ...> <--'>

for example, press

**M****F****8****0****0** : 0 ] 1 ] 22 ] 33 <--'>

then the contents from F800 to F803 will become 00, 01, 22, 33

<M>=F800 00 01 22 33

- 3) Command M working with command ☐ may move a section of memory contents:

M <starting address> ☐ <ending address> ] <object address> ☐

Please refer to MPF-IP User's Manual 4.4.1

Note: Only the memory addresses 0000-1FFF of EPB mode can be used.

### 3.3 Data Fill—The F Command(Key)

You may press

☐ <starting address> ] <ending address> ] <data> ☐

to set the contents of a memory range to a specific value. Please refer to MPF-IP User's Manual 4.4.2

### 3.4 Data Deletion—The D Command

The D command will delete one byte of data, press

**D** <deleted address> ] <address of upper limit> **<--'**

Example:

Assume the present contents of RAM and the desired contents are as follows:

	ADDRESSES	OLD DATA	DATA AFTER DELETION
	0000	00	00
	0001	11	11
delete --->	0002	11	22
address	0003	22	33
	0004	33	44
	0005	44	XX

For example, delete the data of address 0078 and not to change the data of 0100 and the after, you may press

**D** ] **7** **8** ] **1** **0** **0** **<--'**

After executing the above command, the contents of 0079 was shifted down one position to 0078 where one byte of data has been deleted, and the contents of 007A was shifted down one position to 0079, and the contents of 00FF was shifted down one position to 00FE. The location 00FF was filled with 0. The contents of memory locations above 0100, including that of 0100, remain unchanged.



### 3.5 Data Insertion—The I Command

The process of data insertion is:

```
I <inserted address> ] <address of upper limit> ]  
<data 1> ] <data 2> ] ....<data N> <--'
```

For example, the original data:

ADDRESS	OLD DATA
0000	0
0001	1
0002	2
0003	3
0004	4
0005	5
0006	6
0007	7
0008	8
0009	9
000A	A

If you want to insert two bytes of data: 10, 20 between data 2 and 3, and without changing the contents of memory locations higher than 0008, you may press:

```
I ] 2 ] 7 ] 10 ] 20 <--'
```

The data after execution is :

ADDRESS	DATA AFTER INSERTION
0000	0
0001	1
0002	2
0003	10
0004	20
0005	3
0006	4
0007	5
0008	8
0009	9
000A	A

The valid region into which data may be inserted is the same as that from which data may be deleted, after insertion, the last byte of the inserted block is lost.

### 3.6 Storing Data onto Tape—The W Command

EPB-MPF-IBP was the audio tape interface in MPF-IP to store the data of RAM buffer onto tape. Cassette tape is a large capacity non-volatile storage medium, and the MPF-IP contains hardware and software drivers. The process of storing data onto tape is:

```
[W] <starting address> ] <ending address> ] <filename>  
[<--']
```

The filename must be composed of four alphanumeric characters. For example, use PACE as file name, store the data of 0000-0100 on the tape, the MPF-IP screen will display:

<W>=0 100 PACE , then press [<--']

Before pressing [<--'], you must connect the microphone of the recorder to MIC jack of MPF-IP and press PLAY and REC to start recording. If the recorder is not ready and you press [<--'], data is still sent out but will not be recorded on tape. When recording is completed and the display is blank, the TONE-OUT LED is on and a tone sounds.

### 3.7 Reading Data from Tape—The L Command

L <filename> <--'

For example, if filename is PACE, to read data from recorder, you must press

<L>=PACE <--'

Before exeuting L command, the user must connect the recorder earphone jack and the MPF-IP ear jack , turn the recorder volume to maximum, then press <--', finally press the recorder PLAY key. Initially the display is ..... , when the desired file is found, the display becomes \_\_\_\_\_ .

Starting and ending address have already been stored on the tape so there is no need to input them, users just need to input the filename. A checksum is also recorded on the tape and the EPB-MPF-IBP will check when reading back, if not matched, the display will be ERRORS.

If the data read from the tape are stored in the system stack, errors will occur, so you must take care when you execute L command. The data on the tape are echoed on the MPF-IP speaker, so it is very easy to determine whether the tape is empty or not, this allows you to check a tape before recording data on it, and you need not destroy the data previously recorded.

The W key in MPF-IP monitor is to store the addresses D800-F7FF which in RAM buffer onto tape through MPF-IP, so the data also be read to the same addresses (D800-F7FF) in RAM when it is read back from tape.

If the parameter has any errors in executing W or L command, the screen will display "ERRORS", the above situation indicates that the command returns to MPF-IP monitor, but the N key has no function under such situation. The command return to the MPF-IP monitor just when "ERRORS" occurs under the execution of N or L command, and the rest is still in the EPB-MPF-IP monitor.

### 3.8 Verify the Data of EPROM with the Data of RAM Buffer—The V Command

**[V]** **[<starting address>]** **[<# of bytes>]** **[<--']**

V command compares the data in EPROM with the data in the RAM buffer, if the starting address is omitted, the EPB-MPF-IBP monitor will automatically verify all the data of EPROM, for example, the EPROM type is 2732 and then the EPB-MPF-IBP monitor will set the starting address to 0000, the ending address to 0FFF.

Example: Compare the data of 0100-02FF in RAM buffer with the same address of EPROM in the socket, you may press :

**[V]** **[1]****[0]****[0]** **[2]****[0]****[0]** **[<--']**

If the data in a memory location in the RAM is different from that in the corresponding location in the EPROM, the display will show the address of the memory location, the contents of this location and that of the corresponding location in the EPROM.

If you want to continue verifying, press the carriage return key, and the EPB-MPF-IBP will continue comparing the data in the RAM and that in the EPROM from the next memory location. When the process has completed, the display will show "V COMPLETE", if you want to stop this process, press Q will go back to EPB MODE.

### 3.9 Write the Data in RAM Buffer to EPROM –The P Command

The primary function of the P key is to write data in the RAM buffer to EPROM all at once, the procedure is below:

**P** ] <starting address> ] <# of bytes> **<--'**

If the starting address and byte number are omitted, then the EPROM programmer board will write all the data in the RAM buffer to the EPROM. For example, if the EPROM type is 2764, the monitor will set 0000 as its starting address and 1FFF as its ending address, and write the data in RAM buffer to the EPROM.

**Example 1:** Write the data 0000-07FF in RAM buffer to EPROM from address 0000.

- 1) Use H command to check the EPROM type in monitor and the EPROM type on textool are matched.
- 2) If not matched, use N command to modify. if matched, then continue the process.
- 3) Press **P** ] **0** ] **8000** **<--'**
- 4) The screen will display "EPROM READY?(Y/N)=". If the EPROM is put on textool properly, press Y .
- 5) The monitor first check whether the EPROM is blank or not, if the contents are not FF, the screen will display "NOT EMPTY (C/Q)=". You can press Q to go back to EPB MODE or **<--'** to continue writing the data.
- 6) After completing this command MPF-IP beeps and the screen displays "P AND V COMPLETE" about one second, then go back to EPB MODE.

Example 2: Write the data 0000-1FFF in RAM buffer to EPROM 2764 from address 0000.

- 1) Use H command to check if the EPROM type in monitor program is 2764.
- 2) Put EPROM 2764 on textool properly.
- 3) Press P <--'
- 4) The screen displays:

"EPROM READY? (Y/N) ="

Press Y

- 5) After completing this command, the screen displays "P AND V COMPLETE" about one second, then go back to EPB MODE.
- 6) You can pause the writing procedure by pressing CONTROL and Q simultaneously, then the screen will display the last address which is just written, press <--' to continue and Q to go back to EPB MODE.

If EPROM is not on the textool, the EPB-MPF-IBP still execute the P command. The different EPROM types have the different pin functions, and users can check whether the Vpp pin of textool has proper voltage.

You must notice that don't put EPROM onto textool or take EPROM from it as the command is proceeding.

Before executing P command, EPB-MPF-IBP will check whether the EPROM is blank or not, as long as data exist, "NOT EMPTY (C/Q) =" is shown, you can press <--' anytime to continue writing the data.

When the EPB-MPF-IBP writes data into an EPROM, it follows the steps below:

- 1) Write the first byte of data from the RAM buffer into the first memory location of the blank EPROM.
- 2) Read the data from the first memory location of the EPROM immediately after a byte worth of data has been written to it.

- 3) Compare the data read back from the EPROM and the one byte of data in the RAM buffer. If the one byte worth of data read back from the EPROM matches the first byte of data in the RAM buffer, then write the second byte from the RAM buffer to the EPROM. Otherwise, the EPROM programmer board will display the address of the memory location where a data write is not successful.

At this moment, if you want to continue writing data from the RAM buffer to the EPROM, you can press the carriage return key. Otherwise, you may press the Q key to return to the EPB Mode. In which mode, you may enter other EPROM programming command.

### 3.10 Reset the EPROM Type—The N Command

You can press

**N** **<--'**

the screen will display

<TYPE>=

Now you can input the EPROM type you want.

### 3.11 Set the EPROM Programming Mode to "SHORT"—The S Command

Use the S command to set the EPROM programming mode to "short". In this programming mode, each byte takes 17 ms to write.

### 3.12 Set the EPROM Written Type—The X Command

Use the X command to set the EPROM to "long" written type, that is, the writing speed is 55ms per byte, the process is to press

**X** **<--'**

### 3.13 Display the EPROM Type being Programmed and the EPROM Programming Method— The H Command

You can press **H** **<--'** , the screen will display the EPROM type which the monitor program of the EPB-MPF-IBP remembers as being programmed, and the "long" or "short" EPROM programming method for about 1 sec, then go back to the EPROM MODE.

### 3.14 Go back to Monitor Program— The Q Command

Anytime you press control Q, the computer will go back to MPF-IP monitor program. When in the EPB-MPF-IBP programming process, Press **Q** **<--'** will first go back to EPB-MPF-IBP monitor (#), and the second **Q** **<--'** will go back to MPF-IP monitor program ( ).

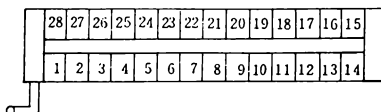
### 3.15 System Reset—RESET Key

Press the reset key will cause EPB-MPF-IBP and MPF-IP be reset and return the control to the monitor program of MPF-IP.



**Note:**

1. Don't put EPROM onto textool or take EPROM from it as the P command is proceeding.
2. If the user inputs error command, the screen will display "?#", then the user may continue to input the correct commands.
3. The correct position of various EPROM type in textool is as follows:



**EPROM TYPE**

- 2764 2564 : Just the same as textool.
- 2732 2532 : These EPROM's first pin is to plug into  
2716 2516 the third pin of the textool, and the  
2758 2508 EPROM's 24th pin to the textool's 26th pin.

## ***PART B: When the EPROM programmer is connected to the MPF-I***

All the operations of the EPB-MPF-IBP are controlled by the monitor program of the EPB-MPF-IBP. To operate the EPROM programmer board, you have to enter the monitor program of the EPB-MPF-IBP. After you have entered the monitor program of the EPROM programmer board, the display of the MPF-I will show

```
0.0.0.0.- E
```

This display prompts you to enter the type of the EPROM to be programmed. If a correct EPROM type is entered, the MPF-IP display will show

```
x x x x - E
```

Otherwise, the MPF-I display remains unchanged. If a 2716 is to be programmed, then after the type -- 2716 -- has been entered, the MPF-I display will become

```
2 7 1 6 - E
```

When this is shown on the MPF-I, the EPROM programmer board is in the initial state. All the EPROM programming commands do not work unless the display is in the initial state.

If you intend to change the type of the EPROM to be programmed after a valid EPROM type has been entered, you can press the **[RS]** key, then enter the EPB-MPF-IBP monitor program again before entering a valid EPROM type. Note that the contents contained in the RAM buffer are not affected after the **[RS]** key has been pressed.

Upon entering the monitor program of the EPB-MPF-IBP, the monitor program will first check whether three 2016 are inserted properly in the sockets at board location U5, U6, and U7. If no 2016 is inserted in U6, then the MPF-I display will show

```
b A d U 0 6
```

This tells two possibilities:

- 1) The 2016 inserted at U6 is a bad one.
- 2) No 2016 is inserted at U6.

After you have entered the monitor program, the correct EPROM type, the MPF-I display will become initial state. Now you can enter a EPROM programming command. The commands are explained as follows:

### **3.1 Read Data from EPROM to the RAM Buffer –The READ Key**

This command allows you to read the contents of the EPROM placed in the textool to the RAM buffer. You should follow the steps listed below:

- 1) Put the EPROM in the textool. If no EPROM is put in the textool, the data read into the RAM buffer will all be FF.
- 2) Before typing in the READ key, make sure that the MPF-I display is in the initial state.
- 3) When the MPF-I display is in the initial state, type in the following command line:

**READ** <starting address> **+** <ending address> **GO**

The key press sequence is:

<u>Key</u>	<u>Display</u>	<u>Description</u>
<u>READ</u>	<u>0.0.0.0.- S</u>	;Enter the READ command.
<u>0</u> <u>1</u> <u>5</u> <u>0</u>	<u>0 1 5 0 - S</u>	;Enter the starting address of the memory block to be read into the RAM buffer.
<u>+</u>	<u>X.X.X.X.- E</u>	;The EPROM programmer board prompts you to enter the ending address of the memory block to be read into the RAM buffer.
<u>0</u> <u>7</u> <u>2</u> <u>0</u>	<u>0 7 2 0 - E</u>	;Enter the ending address.
<u>GO</u>		;Execute the READ command. The MPF-I display becomes blank.
	<u>P A S S - r</u>	;The read operation has completed.

Note 1:

If no starting and ending addresses are specified in the command line, then all the contents of the EPROM (2532, 2732, 2716, 2516, 2758, 2508) are read into the RAM buffer.

Note 2:

After the READ command has been executed, you can use the LIST command to display or modify the data in the RAM buffer.

Note 3:

To examine if an EPROM is blank, follow the steps listed below:

- 1) You can perform an EPROM read without putting the EPROM in the textool. This will cause the RAM buffer to be filled with "FF".
- 2) Put the EPROM into the textool and then enter the VERIFY command. If the EPROM is blank, then the MPF-I display will show P A S S - r. Otherwise, the EPROM is not blank.

Note 4:

Because the RAM buffer is 6K. You can read all the data stored in any of the 2532, 2732, 2716, 2516, 2758, 2508 all at once (because they are 4K EPROMs). But you can not read all the data contained in either 2764 or 2564 all at once because they are 8K EPROMs. Thus, when reading a 2564 or 2764, two EPROM read operations should be performed. Each read operation allows you to read 4K of the 2564 or 2764 into the RAM buffer.

The following steps are taken when writing data into 8K EPROMs such as 2564 or 2764.

Assume that an 8K EPROM is inserted in the textool and the contents of that EPROM (For convenience, we will refer to this EPROM as the "source" EPROM or EPROM A.) are to be written into a blank EPROM. We will refer to the blank EPROM as the destination EPROM or EPROM B. and the

Key	Display	Description
READ	X.X.X.X.- S	;Enter the READ command.
GO		;Execute the READ command.
	P A S S - r	;The data from 0H to 0FFFH of the EPROM has been read into the RAM buffer.

Take the EPROM (source EPROM) from the textool and insert a blank EPROM into the textool.

PROGM	X.X.X.X.- S	;Enter the PROGM command. The display will prompt the user to enter the starting address of the memory range in the RAM buffer which will be used to store the lower 4K bytes contained in the EPROM.
0000	0000 - S	;Enter the starting address of the memory range in the RAM buffer to which the lower 4K bytes of the EPROM are to be stored.
+	X.X.X.X.- E	;The EPROM programmer board prompts the user to enter the ending address of the memory range in the RAM buffer which will be used to store the lower 4K bytes contained in the EPROM.
0FFF	0FFF - E	;Enter the ending address of the memory range in the RAM buffer which will be used to store the lower 4K bytes contained in the EPROM.

**+** **x.x.x.x.- D** ;The EPROM programmer board prompts the user to enter the destination address of the memory range in the EPROM which will be used to store the lower 4K bytes of data to be written from the RAM buffer.

**0 0 0 0** **0 0 0 0 - D** ;

**GO** ;Excute the PROGM command. Each time a byte is written into the blank EPROM, the address and the contents of this byte are displayed.

**0 F F F x x** ;The 4K bytes contained in the RAM buffer have been written into the blank EPROM. The MPF-I display stops blinking when the contents and the address of the last byte is shown.

Now, take the EPROM (into which data is being written) from the textool and insert the source EPROM into the textool. Then, you must perform a READ command again to read the upper 4K bytes of data (address ranging from 1000H to 1FFFH) from the source EPROM to the RAM buffer.

Note that the following read operation will read the upper 4K bytes of the source EPROM, which has starting address of 1000H and ending address of 1FFFH, to the RAM buffer. However, the 4K bytes of data are placed in the memory locations 0H through 0FFFH in the RAM buffer under the control of the EPB-MPF-IBP monitor program.

**READ** **x.x.x.x.- S** ;Enter the READ command. The MPF-I display prompts the user to enter the statring address of the memory block (the upper 4K in the source EPROM) to be read into the RAM buffer.

**1 0 0 0** **1 0 0 0 - S** ;The upper 4K in the EPROM starts from memory location 1000H.

[+]      [X.X.X.X.- E] ;The MPF-I display prompts the user to enter the ending address of the memory block (the upper 4K in the source EPROM) to be read into the RAM buffer.

[1][F][F][F] [1 F F F - E] ;The ending address of the memory block to be read into the RAM buffer is 1FFFH.

[GO]      [P A S S - r] ;Execute the READ command.

Take the EPROM A from the textool and insert EPROM B into the textool.

[PROGM]      [X.X.X.X.- E] ;Enter the PROGM command. The MPF-I display prompts the user to enter the statring address of the memory block in the RAM buffer from which data are to be written into the EPROM.

[0][0][0][0] [0 0 0 0 - S] ;Enter 0000H as the starting address of the memory block in the RAM buffer from which data is to be written into the destination EPROM.

[+]      [X.X.X.X.- E] ;The MPF-I display prompts the user to enter the ending address of the memory block in the RAM buffer from which data are to be written into the EPROM.

[0][F][F][F] [0 F F F - E] ;Enter 0FFFH as the ending address.

[+]      [X.X.X.X.- D] ;The EPROM programmer board prompts the user to enter the destination address of the memory range in the EPROM which will be used to store the upper 4K bytes of data to be written from the RAM buffer.



1 0 0 0 1 0 0 0 - D ;Because the 4K bytes data in the RAM are to be written to the upper 4K of the destination EPROM. 1000H should be entered as the destination address.

GO  ;Execute the PROGM command.

1 F F F x x ;The 4K bytes contained in the RAM buffer have been written into the blank EPROM. The MPF-I display stops blinking when the contents and address of the last byte are shown.

You have written the contents of an 8K EPROM into a new blank EPROM.

#### Note 1:

When the starting address of a memory block in an EPROM is entered by the user, the monitor program of EPB-MPF-IBP first tests whether that address is greater than 1000H. If it is, the monitor program of the EPB-MPF-IBP will subtract a constant (1000H) from that starting address and then load the memory block to the RAM buffer of the EPB-MPF-IBP starting from the address which is the result of the subtraction. If the starting address entered by the user is smaller than 1000H, then the monitor program of the EPB-MPF-IBP will load the memory block immediately to the RAM buffer starting from the address as specified by the user.

#### Note 2:

If the memory block whose starting address is smaller than 1000H and its ending address is higher than 17FFH, then the contents of the memory locations higher than 17FFH are shifted out of the RAM buffer of the EPB-MPF-IBP when reading the contents of an EPROM into the RAM buffer of the EPB-MPF-IBP. This is because only 2K bytes memory space is available in the RAM buffer area with addresses higher than 1000H.

## 3.2 Display or Modify the Data in the RAM Buffer—The LIST Key

Six EPROM programming commands can be used together with the LIST command to display or modify the data in the RAM buffer. These six commands are:

- 1) **ADDR** :  
This key should be pressed before entering an address.
- 2) **DATA** :  
Input data into a memory location.
- 3) **INS** :  
Insert one byte of data into the memory location which follows the memory location whose address is currently being displayed.
- 4) **DEL** :  
Delete one byte of data whose address is currently being shown.
- 5) **+** :  
Examine the contents of the memory location which is one byte lower than the current memory location.
- 6) **-** :  
Examine the contents of the memory location which is one byte higher than the current memory location.

Users should take the following steps to display or modify data in the RAM buffer.

<u>Key</u>	<u>Display</u>	<u>Description</u>
------------	----------------	--------------------

<b>LIST</b>	<b>L I S T</b>	;Enter the LIST command.
-------------	----------------	--------------------------

<b>GO</b>	<b>0 0 0 0 x.x.</b>	;Execute the LIST command. The display always displays the first byte of data in the RAM buffer.
-----------	---------------------	--

### Example:

Assume that the EPROM used is 2516. Display the contents of memory locations 0586H through 0588H, and then change the contents of 0587H to 56.

<u>Key to Press</u>	<u>Display</u>	<u>Description</u>
RS	u P F - - 1	;System reset
ADDR 9 0 0 0	9.8.0.0.3 1	;Enter the monitor program of the EPROM programmer board.
GO	0.0.0.0.- E	;
2 5 1 6	2.5.1.6.- E	;Enter the EPROM type to be programmed.
GO	2 5 1 6 - E	;Enter into the initial state.
LIST	L I S T	;Enter the LIST command.
GO	0 0 0 0 x.x.	;Execute the LIST command. The first byte of data in the RAM buffer is displayed.
ADDR	0.0.0.0.x x	;
0 5 8 6	0.5.8.6.x x	;The contents of 0586H is displayed.
+	0 5 8 7 x.x.	;Press the + key to examine the contents of the location 0587H.
+	0 5 8 8 x.x.	;Press the + key to examine the contents of the location 0588H.
-	0 5 8 7 x.x.	;Press the - key to access memory location 0587H.
5 6	0 5 8 7 5.6.	;Enter the data 56 into memory location 0587H.

Note 1:

The four keys -- ADDR , DATA , DEL , INS -- are only used together with the LIST command.

Note 2:

After GO is pressed, the contents of 0000H is displayed.

### 3.3 Examine and Alter the Contents in the RAM-ADDR and DATA Keys

The **DATA** and **ADDR** keys are used together with the **LIST** command.

After the **ADDR** key is pressed, you can enter either an address or the **DATA** key. The key press sequence is as follows:

**ADDR** [<address>] **DATA**

After the **DATA** key is pressed, you may enter either a data value or the + key to access the next high order memory location. The key press sequence is as follows:

**DATA** [<data>] [ + ]

#### Example 1:

Check the contents of memory locations 0000H through 0003H.

Key	Display	Description
-----	---------	-------------

	x x x x - E	;Initial state.
--	-------------	-----------------

<b>LIST</b>	L I S T	;Enter the LIST command.
-------------	---------	--------------------------

<b>GO</b>	0 0 0 0 x.x.	;Execute the LIST command. The contents of 0H is displayed.
-----------	--------------	---

<b>+</b>	0 0 0 1 x.x.	;The + increments the address by one.
----------	--------------	---------------------------------------

<b>+</b>	0 0 0 2 x.x.	;
----------	--------------	---

<b>+</b>	0 0 0 3 x.x.	;
----------	--------------	---

### Example 2:

Continue the above example. Change the contents of 0300H into AB, 0301H into CD.

Key	Display	Description
ADDR	x.x.x.x.x x	;The four decimal points in the Address field prompts the user to input the address to be accessed.
0 3 0 0	0.3.0.0.x x	;Input the address.
DATA	0 3 0 0 x.x.	;Press the DATA key to inform the EPROM programmer board that data is to be entered.
3A	0 3 0 0 3.A.	;Though AB is to be entered into memory location 0300H, 3A is pressed inadvertently.
B	0 3 0 0 A.B.	;Enter B into the DATA field. If data is more than two digits, the last two are accepted.
+	0 3 0 1 x.x.	;Press the + key to access the next higher order memory location.
CD	0 3 0 1 C.D.	;Enter the data value CD.

Note 1:

After the ADDR key is pressed, the display of MPF-I becomes the standard format, i.e., the left four digits of the display stand for the address, while the two digits on the right are the data (contents) of this memory location. We refer to the left four digits as the "address field", and the two rightmost digits as the "data field".

When the MPF-I display is in the standard display format (Addr-Data form), the four decimal points (indication points) in the address field prompts the user to enter the address to be accessed. If more than four digits are entered as an address, only the last four digits are accepted.

After the DATA key is pressed, the indication points will be shifted to the rightmost two digits of the MPF-I display. The indication points actually prompts the user to enter data. If more than two digits are entered as the contents of a memory location, only the last two digits are accepted.

The ☐+ and ☐- keys can be pressed to increment or decrement the address displayed in the address field.

### 3.4 Data Deletion-The DEL Key

The DEL command must be used together with the LIST command. This key is valid when the display of the MPF-I is in the Addr-Data form. Pressing this key causes the data of the memory location (whose address is currently being displayed) to be deleted, and all the data of higher order memory locations is shifted down one memory location.

#### Example:

Assume the present contents of the RAM buffer and the desired contents are as follows:

ADDRESS Old Data Data after Deletion

0200	00	00
0201	11	11
0202	11	22
0203	22	33
0204	33	44
0205	44	XX

(The contents of memory location 0202H are to be deleted.)

The key press sequence to delete the contents of 0202H is as follows:

Key	Display	Description
	<span style="border: 1px solid black; padding: 2px;">x x x x - E</span>	;The initial state of EPB-MPF-IBP.
<span style="border: 1px solid black; padding: 2px;">LIST</span>	<span style="border: 1px solid black; padding: 2px;">L I S T</span>	;Enter the LIST command.
<span style="border: 1px solid black; padding: 2px;">GO</span>	<span style="border: 1px solid black; padding: 2px;">0 0 0 0 x x</span>	;Execute the LIST command.
<span style="border: 1px solid black; padding: 2px;">ADDR</span> <span style="border: 1px solid black; padding: 2px;">0</span> <span style="border: 1px solid black; padding: 2px;">2</span> <span style="border: 1px solid black; padding: 2px;">0</span> <span style="border: 1px solid black; padding: 2px;">2</span>	<span style="border: 1px solid black; padding: 2px;">0.2.0.2.1 1</span>	;Change the display to the Addr-Data form and enter the address to be accessed.
<span style="border: 1px solid black; padding: 2px;">DEL</span>	<span style="border: 1px solid black; padding: 2px;">0 2 0 2 2.2.</span>	;The contents of 0202H has been deleted, and the contents previously in 0203H are shifted down one position.



To check if the data in the RAM buffer has been altered as desired, you can follow the steps below:

ADDR	0	2	0	0	0.2.0.0.0 0
+					0 2 0 1 1.1
+					0 2 0 2 2.2
+					0 2 0 3 3.3
+					0 2 0 4 4.4

**Note:**

Data in the ROM can not be deleted. This command can only be used to delete data in the memory range from 0000H through 17FFH. When the display of the MPF-I is in the Addr-Data form, pressing this key will cause the data contained in the memory location (whose address is being displayed) to be deleted and data in the higher order memory locations shifted down one location.

### 3.5 Data Insertion—The INS Key

The INS key must be used together with the LIST command. When the display is in the Addr-Data form the input data is inserted immediately to the memory location one location higher than the current accessed memory location, and the data in the higher memory locations are all shifted up one memory location.

#### Example:

Assume the contents of the RAM buffer are as follows and 33 is to be inserted to 0203H:

ADDRESS Old Data Data after Insertion

0200	00	00
0201	11	11
0202	22	22
0203	44	33
0204	55	44
0205	66	55

Key	Display	Description
	x x x x - E	;The initial state.
LIST	L I S T	;Enter the LIST command.
GO	0 0 0 0 x.x.	;Execute the LIST command.
ADDR 0 2 0 2	0.2.0.2.2 2	;Change the display to Addr-Data form and enter the address to be accessed.
INS	0 2 0 3 0.0.	;Insert one byte after 0202H. The address field becomes 0203.
33	0 2 0 3 3.3.	;Type in the data to be inserted.

ADDR 0 2 0 0 0.2.0.0.0 0 ;Check

+ 0 2 0 1 1.1.

+ 0 2 0 2 2.2.

+ 0 2 0 3 3.3.

+ 0 2 0 4 4.4.

+ 0 2 0 5 5.5.

Note:

After one byte of data has been inserted, the data previously contained in the last memory location is shifted out.

### 3.6 System Reset--The RS Key

Pressing the RS button will cause the MPF-I to display

U P F -- I
------------

and transfer the control to the MPF-I monitor program.

The CPU of MPF-I will perform a series of operations after the RS button is pressed. When the RS key is pressed immediately after power-on, a power-on reset is performed.

1. The following operations are performed when a power-on reset is initialized:

- a. Disable interrupt (IFF set to 0);
- b. I register set to 0;
- c. Interrupt mode set to 0;
- d. User's Program Counter is set to 1800.
- e. User's Stack Pointer is set to 1F9F;
- f. Break point is disabled.
- g. Set the content of 1FEE to 66 and set the content of 1FEF to 00. When the instruction code "FF" is executed the CPU will jump to 0066. This is equivalent to pressing MONI key.
- h. MPF-I is displayed one character at a time from right to left.

2. The following operations are performed when the RS key is pressed at other times:

(a) through (e) are performed the same ways as mentioned above. However, the contents of 1FEE & 1FEF and break point are unaffected. 'UPF--I' is displayed (all digits) simultaneously.

### 3.7 Verify the data of EPROM with the data of RAM buffer--The VERIFY Key

The VERIFY command is entered as follows:

**VERIFY** <address> **+** <address> **GO**

The VERIFY command can compare the data in the EPROM with the data in the RAM buffer. If the starting and the ending addresses are not specified, the EPB-MPF-IBP monitor program will automatically set and verify the all the data contained in the EPROM. For example, the EPROM type is 2716, then the EPB-MPF-IBP monitor program will set the starting address to 0000, the ending address to 07FF.

#### Example:

Compare the data of 0150 - 0250 in the RAM buffer with the contents in the EPROM in the socket.

<u>Key</u>	<u>Display</u>	<u>Comments</u>
	x x x x - E	;The initial state.
VERIFY	0.0.0.0.- S	;S is the mnemonic of starting address in RAM buffer.
0 1 5 0	0.1.5.0.- S	;Set the starting address to 0150.
+	x.x.x.x.- E	;E is the mnemonic of ending address.
0 2 5 0	0.2.5.0.- E	;Set the ending address to 0250.
GO		;Execute the VERIFY command.
	P A S S - H	;The VERIFY command has completed.

Note 1:

After the VERIFY key is pressed, the EPROM programmer board will set the starting address to 0000H. It will set the ending address according to the EPROM used. The ending address is 03FFH when 2508 or 2708 is used; 07FFH if 2516 or 2716 is used; 0FFFH if 2532 or 2732 is used. If all the data in the RAM buffer is to be compared with that in the EPROM, then you can press the GO key immediately after the VERIFY key is pressed.

Note 2:

If the contents in the RAM buffer and that in the EPROM match, the MPF-I display will show

P A S S - H

If the contents in the RAM buffer and that in the EPROM does not match, the display will first show the address in RAM buffer which does not match and then the display is blank for a while. Then the display will show

E.xxd.xx

The left three LEDs show the data of the byte in EPROM which does not match that stored in the same address in the RAM buffer and the right three LEDs show the data of RAM buffer. If you want to continue executing the VERIFY command, press the GO key.

The display will show **PASS - H** if the data contained in the remaining memory locations matches.

Note 3:

If users want to compare the data of a memory range contained in the EPROM with that contained in the RAM buffer, you can enter the starting and the ending addresses and then type the GO key.

Note 4:

If wrong parameters are entered in the VERIFY command line, e.g., the ending address is smaller than the starting address. Then the display will show:

-Err .
--------

Note 5:

If the contents of 2764 or 2564 are to be compared with that in the RAM buffer, the data has to be compared twice.

### 3.8 Return to the initial state of EPB-MPF-IBP-The RESTART Key

Any time you press the RESTART key, the display will show xxxx-E which means EPB-MPF-IBP is in the initial state. If a command is completed, and you intend to execute another EPROM program command, you can press the command key directly without returning to the initial state of the EPB-MPF-IBP.

#### Example:

Read and verify the data of 2532 in EPROM, and then return to the initial state of EPB-MPF-IBP monitor.

Put 2532 into textool before pressing the READ key.

<u>Key</u>	<u>Display</u>	<u>Comments</u>
RS	u P F - - 1	
ADDR 9 8 0 0	9 8 0 0 3 1	;The starting address of EPB-MPF-IBP monitor.
GO	0.0.0.0.3 1	;The EPB-MPF-IBP monitor is ready to accept the EPROM type.
2 5 3 2	2.5.3.2.- E	;The EPROM type is 2532.
GO	2 5 3 2 - E	;The initial state.
READ	0.0.0.0.- S	;Enter the READ command.
GO		;Execute the READ command.
	P A S S - r	;The READ command is finished.



VERIFY	0.0.0.0.- S	;Enter the VERIFY command.
GO		;Execute the VERIFY command.
	P A S S - H	;The VERIFY command is finished.
RESTART	2 5 3 2 - E	;The initial state.

Note 1:

Because the data of 2532 contained in the EPROM is read to the RAM buffer, so the data contained in the RAM buffer is actually the same as that contained in the EPROM. Thus, the VERIFY command cause the MPF-I display to show **P A S S - H**.

Note 2:

If you take the EPROM out of the textool and then enter the VERIFY command, you are actually comparing FF with the data contained in the RAM buffer. This is because the data read by the EPROM programmer board is FF if no EPROM is put into the textool.

Note 3:

The user may experiment with the LIST command by altering the data contained in 0532H in the RAM buffer and then use the VERIFY command to see if the EPB-MPF-IBP can find out this address.

Note 4:

As - E r r is shown, pressing the RESTART key can return to the initial state of EPB-MPF-IBP monitor.

### 3.9 Write the data in the RAM buffer to the EPROM—The PROG M Key

The primary function of the PROG M key is to write data from the RAM buffer to the EPROM at one time. The key press sequence is as below:

**PROG M** <address> **+** <address> **+** <address> **GO**

Key

Display

Comments

**x x x x - E** ;The initial state of EPB-MPF-IBP monitor.

**PROG M**      **x.x.x.x.- E** ;Prompts users to enter the starting address of the memory range in RAM buffer whose contents are to be written into the EPROM.

**+**      **x.x.x.x.- E** ;Prompts users to enter the ending address (03FF for 1K, 07FF for 2K, 0FFF for 4K) of the memory range in RAM buffer whose contents are to be written into the EPROM.

**+**      **x.x.x.x.- d** ;Prompts users to enter the destination address of the memory range of the EPROM to which the data in the RAM buffer is to be written.

### Example:

Write the data 0200H - 0250H in the RAM buffer to EPROM. Make sure that the memory range in the EPROM to which data is to be written must be blank (FF).

<u>Key</u>	<u>Display</u>	<u>Comments</u>
	x x x x - E	;The initial state of EPB-MPF-IBP.
PROGM	x.x.x.x.- S	;Enter the PROGM command.
0 2 0 0	0.2.0.0.-S	;Enter the starting address of the memory range in the RAM buffer whose data is to be written into the EPROM.
+	x.x.x.x.- E	;
0 2 5 0	0.2.5.0.- E	;Enter the ending address of the memory range in the RAM buffer whose data is to be written into the EPROM.
+	x.x.x.x.- D	;
GO		;Execute the PROGM command. Data is written into the EPROM one byte after another. During the data write process, the address and contents of the byte being written are displayed one by one.
	0 0 5 0 x.x.	;The data write process has completed.

Note 1:

The EPB-MPF-IBP monitor will still execute the PROG command, even though no EPROM is inserted in the textool. Users can check whether the 26V voltage is available on the Vpp pin of textool. However, for different EPROMs, the location of the Vpp pin is different.

Note 2:

Don't put EPROM onto textool or take EPROM from it during execution of this command.

Note 3:

The display will show - E r r if the wrong parameters are input in the PROG command. For details of the error messages, please refer to 4.3. In case error occurs, pressing the RESTART key enables you to return to the initial state of EPB-MPF-IBP.

Note 4:

Before executing the PROG command, EPB-MPF-IBP will check whether the EPROM is blank or not. As long as data exists, FULL is shown. If you still want to write data into the EPROM, you can press the GO key to continue.

Note 5:

While writing data to the EPROM, the EPB-MPF-IBP monitor will check whether the value is written into the EPROM successfully.

If an EPROM is damaged, naturally the data could not be written into it. At this moment, EPB-MPF-IBP sounds and then the display shows x x x x H H . "xxxx" is the address of the damaged memory location in the EPROM. "HH" is simply to notify users that a bad address exists. You can press the GO key to continue writing data.

Note 6:

If we want to write only one byte, then the same address has to be entered when prompted by the EPROM programmer board. Moreover, if we want to change one bit of this byte, all we have to do is to press key after the pattern "FULL" is shown on the display. (Notice that the bit can only be changed from 1 to 0)

### 3.10 Storing Data onto Tape—The TAPE Key WR

EPB-MPF-IBP uses the audio tape interface of MPF-I to store the data of RAM buffer onto tape.

Cassette tape is a large capacity non-volatile storage medium. MPF-I contains hardware and software drivers for the audio tape interface.

The command is entered as follows:

**TAPE** <file name> **+** <address> **+** <address> **GO**  
**WR**

#### Example:

Store the data from 0000H through 0100H in the RAM buffer onto tape, use 1234 as file name.

Key	Display	Comments
	<b>x x x x - E</b>	;The initial state of EPB-MPF-IBP.
<b>TAPE</b> <b>WR;</b>	<b>x.x.x.x.- F</b>	;F is the mnemonic of filename.
<b>1 2 3 4</b>	<b>1.2.3.4.- F</b>	;Filename = 1234
<b>+</b>	<b>x.x.x.x.- S</b>	;S is the mnemonic of starting address.
<b>0 0 0 0</b>	<b>0.0.0.0.- S</b>	;Stating address = 0000.
<b>+</b>	<b>x.x.x.x.- E</b>	;E is the mnemonic of ending address.
<b>0 1 0 0</b>	<b>0.1.0.0.- E</b>	;Ending address = 0100

Connect the microphone of the tape recorder to MPF-I MIC. Start recording by pressing PLAY and REC key of recorder.

GO

;Begin to output data. During transfer of data, the display gets dark, but the TONE-OUT LED is on.

x x x x x.x.

;When transfer is completed, the ending address is displayed.

Note 1:

Pressing **TAPEWR** key, the display becomes **x.x.x.x.-F** . F means filename. This display prompts the user to input a filename for the data to be written onto tape. It is used to distinguish different data sets stored on a single cassette. The presence of filenames on a cassette tape makes it easy to read back data.

Press **+** and the display becomes **x.x.x.x.-S** . S represents the starting address of the data to be written. Press **+** again and the display becomes **x.x.x.x.-E** . E represents the ending address of the data, to be written.

Before pressing GO , you must connect the microphone of the recorder to MIC jack of MPF-I and press PLAY and REC to start recording. If the recorder is not ready and you press GO , data is still sent out. This data will not be recorded on tape. During data transfer the display is blank, the TONE-OUT LED is on and a tone sounds.

Note 2:

Because the memory range 0000H - 0FFFH (when the EPB-MPF-IBP is under the control of EPB-MPF-IBP monitor program) equals to the memory range D800H - EFFFH (when operating under MPF-I monitor program), transferring the data of 0000H - 0FFFH to tape while operating under the EPB-MPF-IBP monitor program is similar to transferring the data of D800H - EFFFH to tape while operating under the MPF-I monitor program.

### 3.11 Reading data from tape—The TAPE Key RD

This command is entered as follows:

```
TAPE
RD   <filename> GO
```

Example:

Read a file from tape. The filename is 1234, and the file is stored on the cassette tape with the TAPE key.

```
WR
```

Key	Display	Comments
	<pre>x x x x - E</pre>	;The initial state of EMP-MPF-IBP.
GO	<pre>x.x.x.x.- F</pre>	;F is the mnemonic of filename.
1 2 3 4	<pre>1.2.3.4.- F</pre>	;Filename = 1234. Connect the recorder (using earphone jack) to the EAR jack in MPF-I.
GO		;Start execution. The display is blank while EPB-MPF-IBP is searching for the file.
(PLAY)	<pre>. . . . .</pre>	;Press PLAY of recorder. The recorder output volume should be turned to maximum. EPB-MPF-IBP echoes the signal read from tape on its own speaker (if the volume is too low, then there will be no sound). Every file name read by the monitor will be displayed for 1.5 seconds. When the desired file is found, '.' is changed into '-'. When finished, the last address read in is displayed.
	<pre>1 2 3 4 - F</pre>	
	<pre>- - - - -</pre>	
	<pre>x x x x x.x.</pre>	



Note 1:

Before execution, the user must connect the recorder (using earphone jack) to the EAR jack of MPF-I. Turn the volume of the recorder to maximum. Then press the GO key, and finally, start the recorder (PLAY). Initially, the display is . . . . .. When the desired file is found, the display becomes - - - - -.

Starting and ending addresses are already stored on the tape so there is no need to input them. The user just needs to input the filename. A checksum is recorded on the tape when the TAPEWR command was used to store data onto tape, and EPB-MPF-IBP will check this checksum when reading data back from the tape. When the EPB-MPF-IBP reads data back from tape, this tape read operation will generate a checksum. Then, the checksum thus generated is compared with the checksum recorded on the tape when data was stored onto tape with the TAPEWR command.

If the two checksums do not match, the display will be -Err. If match, the last input byte will be displayed.

If the data read from the tape are stored in a system stack, errors will occur. Care must be taken when you prepare tape data by TAPEWR. Make sure that the memory range read onto the tape is not overlapped with the system stack. The tape data are echoed on the MPF-I speaker, so it is very easy to determine whether a tape is empty or not. This allows you to check a tape before recording data on it, so you do not destroy data previously recorded.

Note 2:

The TAPEWR key is used to store the contents of the memory range 0000H through 17FFH in the RAM buffer onto tape through MPF-I under the control of the EPB-MPF-IBP monitor program. So, when data is read back from tape, it should be read back to the same address in the RAM.

Note 3:

Assume the data on tape was previously stored with the address ranging from 1800H to 1FFFFH when operating under the MPF-I monitor program. Now if you want to store the data on tape onto the RAM buffer of EPB-MPF-IBP, then you can read data from tape using the TAPERD key and then move the data thus read into the RAM buffer to D800H - EFFFFH by using the MOVE command.

Note 4:

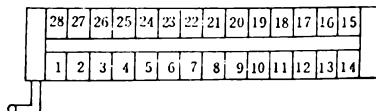
If wrong parameters were entered in the TAPEWR or TAPERD command, then the MPF-I display will display the error message such as **- E r r**. The above situation indicates the machine is under the control of the MPF-I monitor program. At this time, the RESTART key does not function. However, note that when errors occur on other occasions, pressing the RESTART key allows you to enter into the initial state of the EPB-MPF-IBP.

Note 5:

It is strictly prohibited to insert EPROM into the textool, take EPROM out from the textool, or press the RS key while data is being written into an EPROM from the RAM buffer.

Note 6:

Various EPROMs are inserted into different locations of the textool depending on the type of the EPROM used. They are inserted into the textool as follows:



EPROM TYPE

2764 2564 : The pin assignments of the two EPROMs are the same as that of the textool.

2732 2532 : These EPROMs' first pin is to be plugged into Pin 3 of the textool, and the EPROMs' 2716 2516 : Pin 24 to the textool's Pin 26.  
2758 2508 :

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# Chapter 4

## Hardware Circuit and Theory of Operation

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## 4.1 Theory of Operation

EPROM is the abbreviation of Erasable Programmable Read Only Memory which is a kind of Read Only Memory to which data can be written, cleared, and re-written.

The method of clearing the contents of EPROM is to put it under a ultraviolet ray source about 20 to 30 minutes. Each kind of EPROM has its own pin function, and there are 0V, +5V, +25V(21.5V) needed for EPROM programming, so the voltage logic of EPB-MPF-IBP must support different voltages to the same pin for different types of EPROMs. Users will observe that U2(8255) has three ports: PA0-PA7 control data bus line D0-D7, PB0-PB7 control address bus line A0-A7, the voltage logic will produce 25V(21.5V) or 5V or 0V to textool PIN1 or PIN22 or PIN23 when it works together with TL497 and 74LS273 (Q0-Q5) voltage control lines.

## 4.2 Theory of Operation-Writing Data into 2716

The method of writing data into 2716 is to apply +25V on the Vpp(pin 21), supplying both address and data, and apply a 50ms program pulse to the CE/PROG (pin 20). Then one byte of data has been written into the EPROM.

This process is repeated until all data in the RAM buffer is written into the EPROM. Time is very critical during the process, if it is not properly controlled, it would cause damage to the 2716.

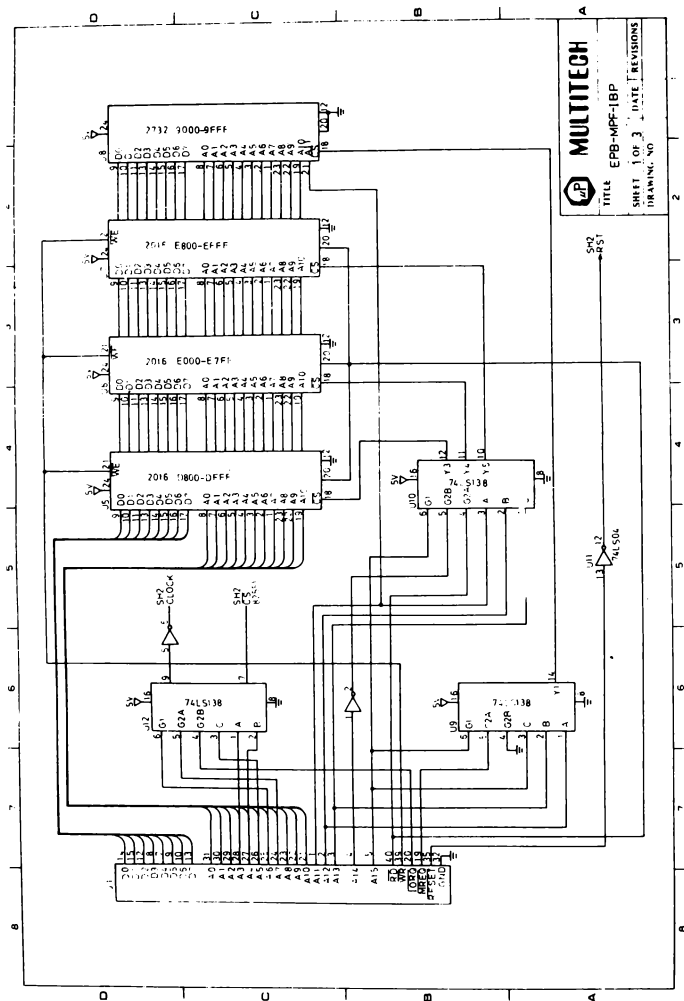
From the schematic, you will observe that the three ports of 8255 at board location U2 are used as address and data control lines for the textool, while the voltage control logic for the textool's Pin 1, Pin 22, and Pin 23 is made up of Q0 through Q5 of 74LS273.

The voltage control logic supplies three voltages 0V, 5V, and 25V -- to either of Pin 1, Pin 22, and Pin 23 when the switch of the textool is on. When the switch of the textool is in the off position, the voltage control logic supplies 0V, 5V, or 21.5V to Pin 1 of the textool. When a 2716 is to be programmed, the pin OE on 2716 must be high. When data is to be read to 2716 OE must be low.

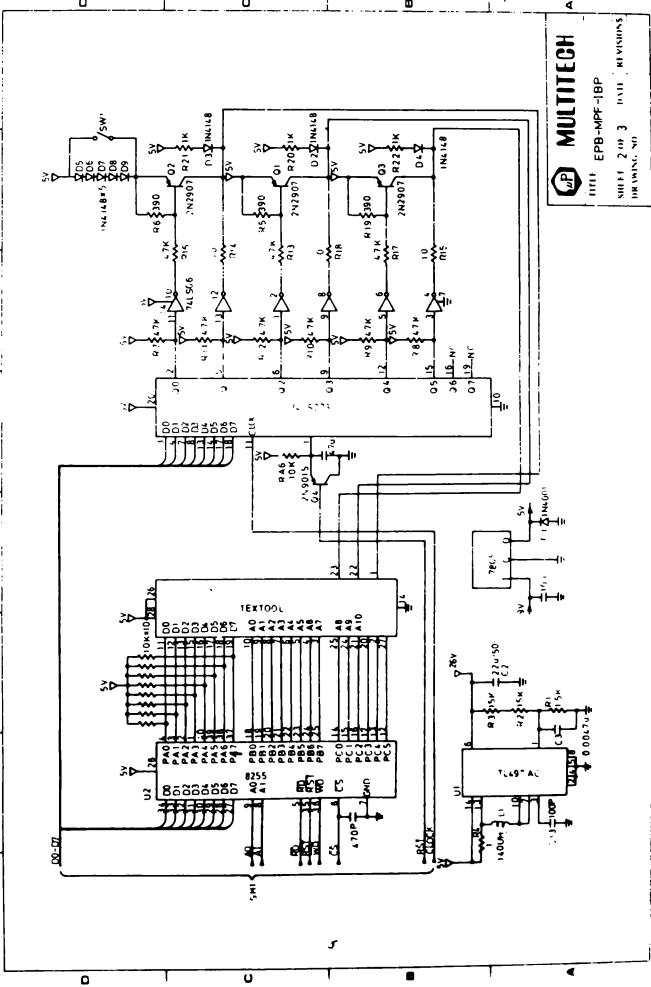
Port A (PA0 to PA7) is connected to the data bus, Port B (PB0 to PB7) is connected to A0 to A7 of the address bus, while A8 to A12 of the address bus, CE, OE, and Vpp are controlled by Port C (PC0 to PC7) of the 8255 and 74LS273.

Users may refer to the technical data on the mode selection for 2716 to realize the voltage requirements for Read Mode or Program Mode, and then use program to control the Port C of 8255 and 74LS273 in order to select the proper working voltages.

# 4.3 Schematic



2 3 4 5 6 7 8

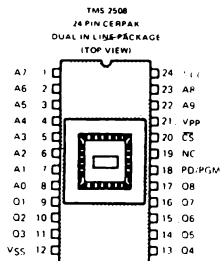


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 11111 EPB-MPF-1BP  
 SHEET 2 OF 3 DATE REVIEWS  
 DRAWING NO.

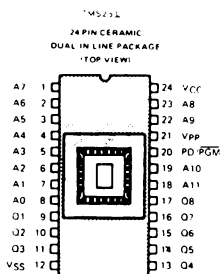
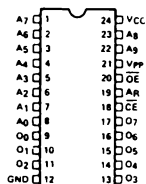




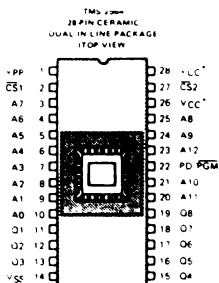
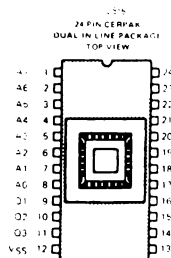
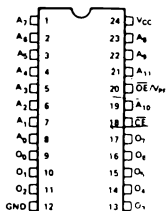
## 4.4 The Pin Assignments of the EPROMS— 2508, 2516, 2716, 2532, 2732, 2564 2764



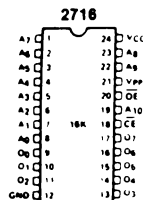
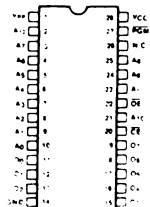
**2758**  
PIN CONFIGURATION



**2732**  
PIN CONFIGURATION



**2764**  
PIN CONFIGURATION



\*For total compatibility from 2732A provide a trace to pin 26

Errors may occur when executing the PROG M command. These errors are resulted from input of wrong parameters while entering the PROG M command. The errors may be caused by:

- (b) When the number of bytes to be written into an EPROM is greater than 800H for 2K, 400H for 1K and 1000H for 4K.
- (c) When the destination address of the EPROM into which data is to be written is no less than 800H for 2K, 400H for 1K and 1000H for 4K.
- (d) When the ending address of the memory range in the EPROM (to which data is to be written) is no less than 800H for 2K, 400H for 1K and 1000H for 4K.

To recover from the error, you can press the RESTART key to enter into the initial state of the EPB-MPF-IBP.



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