

EPB-MPF

EPROM Programmer Board

Operation Manual

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I. Introduction

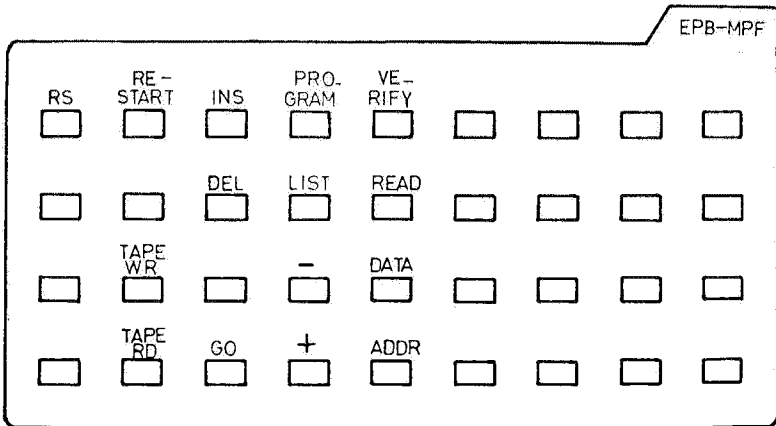
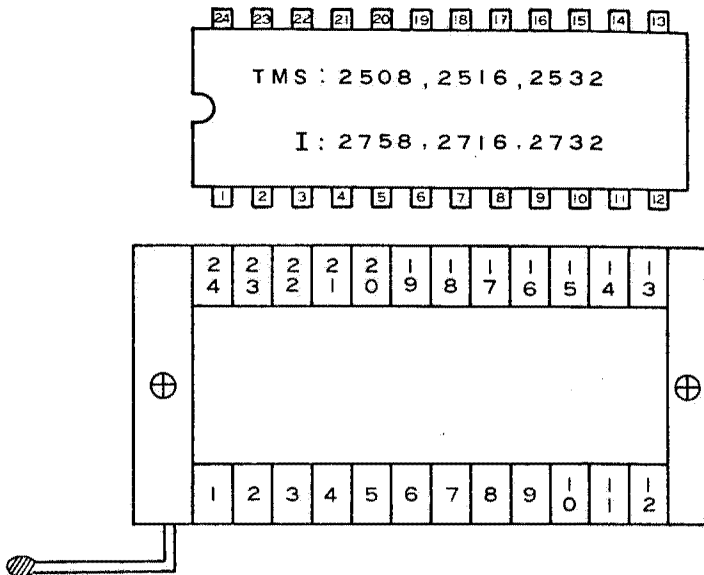
The EPB-MPF is an EPROM programmer board for the MICRO-PROFESSOR, provides the programming capability for the following EPROMS.

	1K x 8	2K x 8	4K x 8
TI	: TMS2508,	TMS2516,	TMS2532,
Intel	: I2758,	I2716,	I2732,
Option	: 2758S1865,		

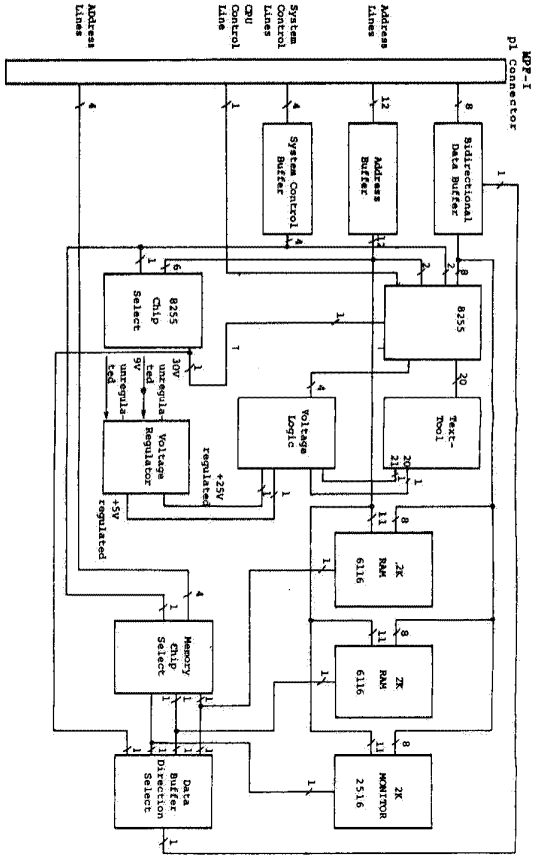
The EPB-MPF interfaces with the MPF-I by using a flat ribbon cable and utilizes the monitor for writing data to EPROM. Actually the EPB-MPF has two 40 pin male connectors - P1 and P2, P1 is to interface with the CPU BUS of MPF-I and P2 is for system expansion (for example, is to interface with SSB-MPF). Regarding the pin function of P1 and P2, please refer to 4-2. The MPF-I is usually covered by a name plate which has all kinds of keyfunctions, so it is quite convenient to operate the EPB-MPF.

Installation Procedure:

1. All power should be turned off.
2. Connect the CPU BUS of MPF-I with P1 on the EPB-MPF by flat cable.
3. Plug in the MPF-I power plug.
4. Plug in the EPB-MPF power plug.
5. Plug IC into textool, the indentation should face the left. (Please refer to next page)
6. As power adaptor output has no load, the voltage is 33V and 13.5V respectively; but the voltage is 30V and 10V when power adaptor output has load. Users can check whether the voltage of 723 pin 10 is 25.5V, if not, they can adjust VR 100K to 25.5V.
7. To cover the EPB Name Plate on the MPF-I original keyboard location, then users can start operating.



II. EPB-MPF Block Diagram



III. EPB-MPF Specifications

3.1 Hardware Specifications

1. Compatible with MPF-I. Use 40 pin flat ribbon cable and male connector to interface with MPF-I.
2. ROM: Single +5V EPROM 2516 x 1, total 2k bytes.
Monitor EPROM Address: 9000 - 97FF.
3. RAM: Static RAM - 6116 x 2, total 4K bytes.
Basic RAM Address: 8000 - 8FFF.
4. I/O Port: Programmable I/O port 8255x 1, total
24 parallel I/O lines.
I/O address: CC - CF.
5. Display: MPF-I display.
6. Keyboard: MPF-I keyboard compatible . Use MPF-I
keyboard covered with a name plate to
replace MPF-I keyboard name plate during
EPROM programming operation.
7. Audio Tape Interface: MPF-I compatible interface.
8. System Power Consumption: +25V/30mA and +5V/350mA.
9. Main Power Input: +30V 75mA and +9V 400mA adaptor is
provided, power adaptor input 110/220V.
10. Texttool: 24 pin zero insertion force socket.
11. Interface Connector/Cable: 40 pin flat ribbon cable and
male connector used to
interface with MPF-I.
12. Extension Connector: 40 pin flat ribbon cable male
connector provides the bus for
CPU option.
13. Physical Characteristic:

Height : 1.60 cm
Width : 11.15 cm
Depth : 13.4 cm

3.2 Software Specifications

EPB-MPF has a high performance 2K-byte monitor program with 15 function keys and is designed for easy operation. The following is a simple description of the key functions:

1.

READ

 : Read data from EPROM to RAM buffer.
2.

VERI FY

 : Verify EPROM with RAM buffer.
3.

DISP

 : Display or modify data on RAM buffer.
4.

RESTA RT

 : Restart to initial state of EPB-MPF.
5.

PROG

 : Write data from RAM buffer to EPROM.
6.

TAPE WR

 : Store data in RAM buffer onto the cassette tape.
7.

TAPE RD

 : Load data from the recorder.
8.

DEL

 : Delete 1 byte from data of the current display address of RAM buffer.
9.

INS

 : Insert 1 byte into data of the address following by the current display address by RAM buffers.
10.

+

 : Check contents of next memory address.
11.

-

 : Check contents of last memory address.
12.

GO

 : Execute the keyfunction of EPB-MPF.
13.

RR

 : System Reset. The display shows

UPF--1

 controlled by the monitor of MPF-I but not the monitor of EPB-MPF.
14.

ADDR

 : Set the address of RAM buffer.
15.

DATA

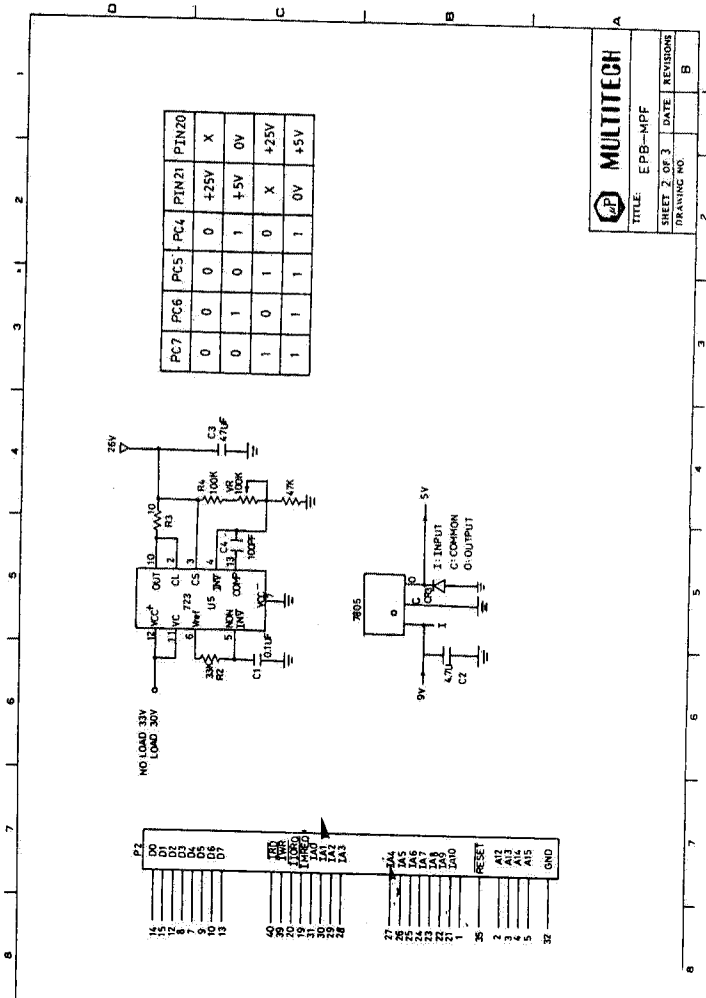
 : Input data to RAM buffer.
16.

NEW

 : Set new EPROM type.

IV. Theory of Hardware Circuit

4.1 EPB-MPF Hardware Circuit



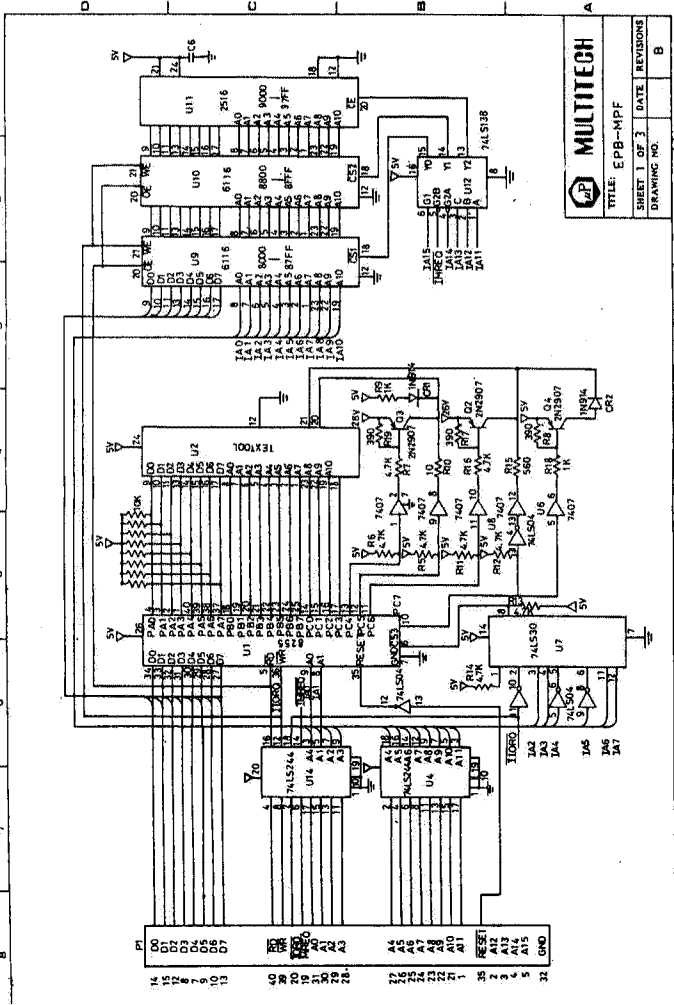
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TITLE: EPB-MPF

SHEET 2 OF 3

DATE: REVISION:

DRAWING NO: B



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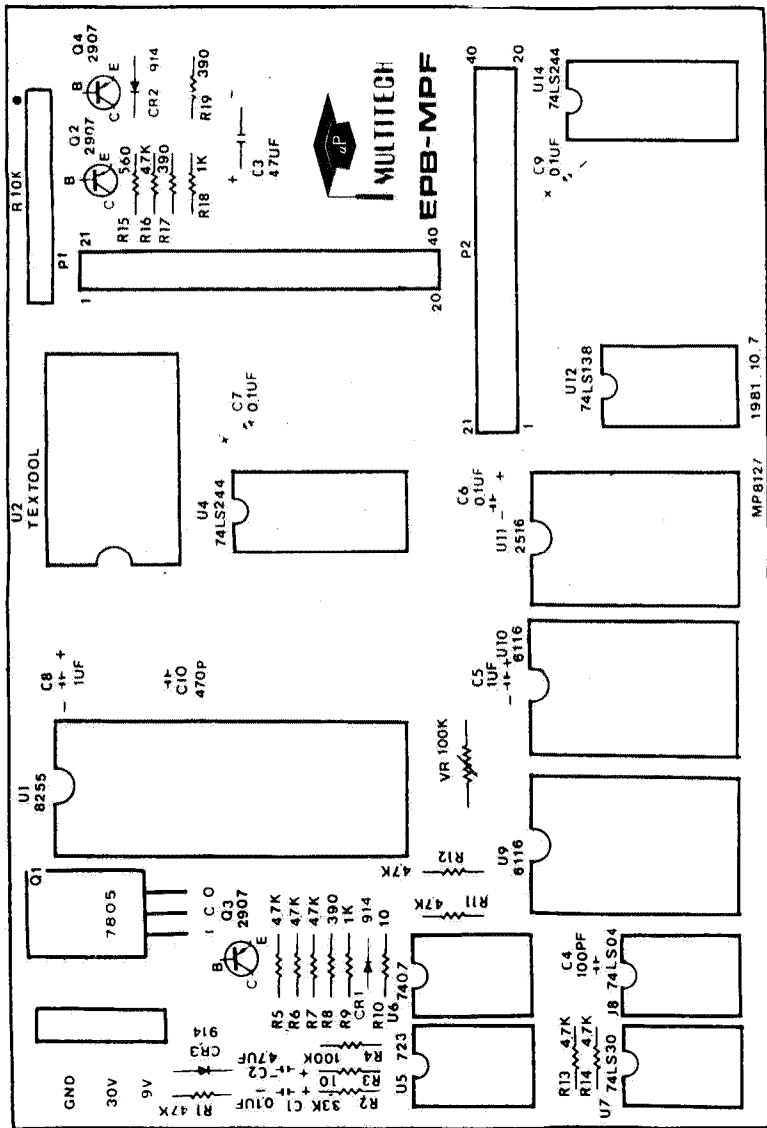
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SHEET 1 OF 3

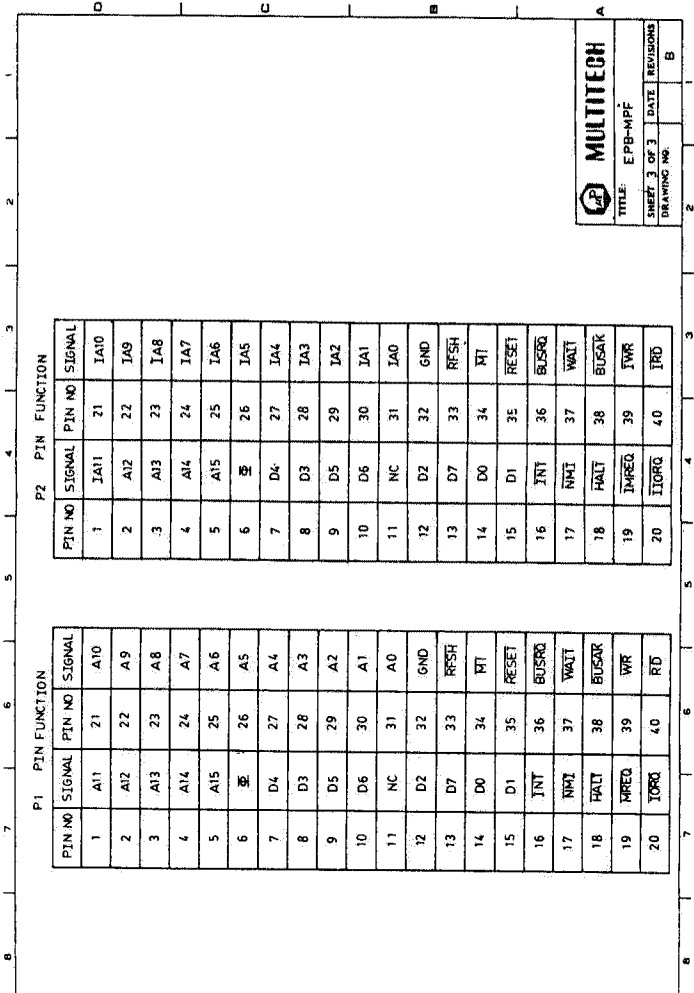
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4.2 EPB-MPF Pin Function P1 & P2



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TITLE: EPB-MPF

SHEET 3 OF 3

DRAWING NO. DATE REVISIONS

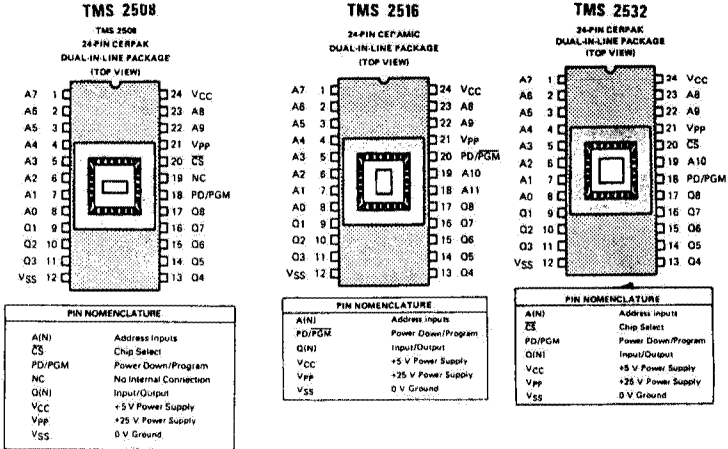
B

4.3 Theory of Operation

EPROM is the abbreviation for Erasable Read Only Memory which is a kind of Read Only Memory that can write data and rewrite new data into it. 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 three kinds of voltage 0V, +5V, +25V are needed for EPROM programming. So, the voltage logic of EPB-MPF must support different voltage to the same pin for different type of EPROM. By the hardware circuit users will observe that U1 (8255) has three ports: PA0-PA7 controls data bus, PB0-PB7 and PC0-PC3 control address bus, but PC4-PC7 controls the voltage logic to provide the different voltage for pin 21 and pin 20 with the different EPROM type.

For example, the process of writing data into a single 5V 2716 (or 2516), is adding an extra 25V source on its pin 21 (V_{pp}) and supplies both address and data, then a byte is written in. Continuing this process until all the bytes are programmed. Time is very critical during the process, if it is not properly controlled, it would cause the damage of 2716.

4.4 The Pin Function and Operation Voltage



TMS 2508 operation

FUNCTION	PIN	MODE					
		READ	OUTPUT DISABLE	POWER DOWN	START PROGRAMMING	INHIBIT PROGRAMMING	PROGRAM VERIFICATION
PD/PGM	18	V _{IL}	Don't Care	V _{IL}	Pushed V _{IL} to V _{IH}	V _{IL}	V _{IL}
CS	20	V _{IL}	V _{IH}	Don't Care	V _{IL}	V _{IH}	V _{IL}
Vpp	21	+5 V	+5 V	+5 V	+25 V	+25 V	+25 V (or +5 V)
VCC	24	+5 V	+5 V	+5 V	+5 V	+5 V	+5 V
Q	9-11, 13-17	0	HI-Z	HI-Z	D	HI-Z	0

TMS 2516 operation

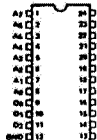
FUNCTION (PINS)	MODE						
	Read	Output Disable	Power Down	Start Programming	Inhibit Programming	Program Verification	
PD/PGM (18)	V _{IL}	Don't Care	V _{IH}	Pushed V _{IL} to V _{IH}	V _{IL}	V _{IL}	
CS (20)	V _{IL}	V _{IH}	Don't Care	V _{IH}	V _{IH}	V _{IL}	
Vpp (21)	+5 V	+5 V	+5 V	+25 V	+25 V	+25 V (or +5 V)	
VCC (24)	+5 V	+5 V	+5 V	+5 V	+5 V	+5 V	
Q (9 to 11, 13 to 17)	0	HI-Z	HI-Z	D	HI-Z	0	

TMS 2532 operation

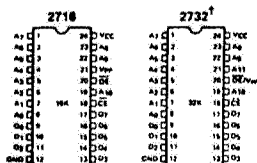
FUNCTION (PINS)	MODE					
	Read	Output Disable	Power Down	Start Programming	Inhibit Programming	
PD/PGM (18)	V _{IL}	V _{IH}	V _{IH}	Pushed V _{IL} to V _{IH}	V _{IH}	
Vpp (21)	+5 V	+5 V	+5 V	+25 V	+25 V	
VCC (24)	+5 V	+5 V	+5 V	+5 V	+5 V	
Q (9 to 11, 13 to 17)	0	HI-Z	HI-Z	D	HI-Z	

2758

PIN CONFIGURATION



PIN CONFIGURATION



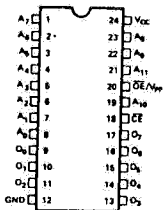
† Refer to 2732 data sheet for specifications

PIN NAMES

A ₇	A ₆	ADDRESSES
CE	OE	CHIP ENABLES (PROGRAM)
OE	O ₀ - O ₅	OUTPUTS

2732

PIN CONFIGURATION



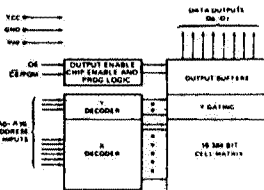
MODE SELECTION

MODE	PINS		V _{CC}		OUTPUTS (8-11, 13-17)
	CE (18)	A ₀ (19)	OE (20)	OE (24)	
Read	V _{IL}	V _{IL}	V _{IL}	+5	DOUT
Standby	V _{IH}	V _{IL}	Don't Care	+5	High Z
Program	Pulsed V _{IL} to V _{IH}	V _{IL}	V _{IL}	+25	D _{OUT}
Program Verify	V _{IL}	V _{IL}	V _{IL}	+25	DOUT
Program Inhibit	V _{IL}	V _{IL}	V _{IH}	+5	High Z

MODE SELECTION

MODE	PINS		V _{CC}		OUTPUTS (8-11, 13-17)
	OE (18)	OE (20)	OE (24)	OE (28)	
Read	V _{IL}	V _{IL}	+5	+5	DOUT
Standby	V _{IH}	Don't Care	+5	+5	High Z
Program	Pulsed V _{IL} to V _{IH}	V _{IH}	+25	+5	D _{OUT}
Program Verify	V _{IL}	V _{IL}	+25	+5	DOUT
Program Inhibit	V _{IL}	V _{IH}	+25	+5	High Z

BLOCK DIAGRAM

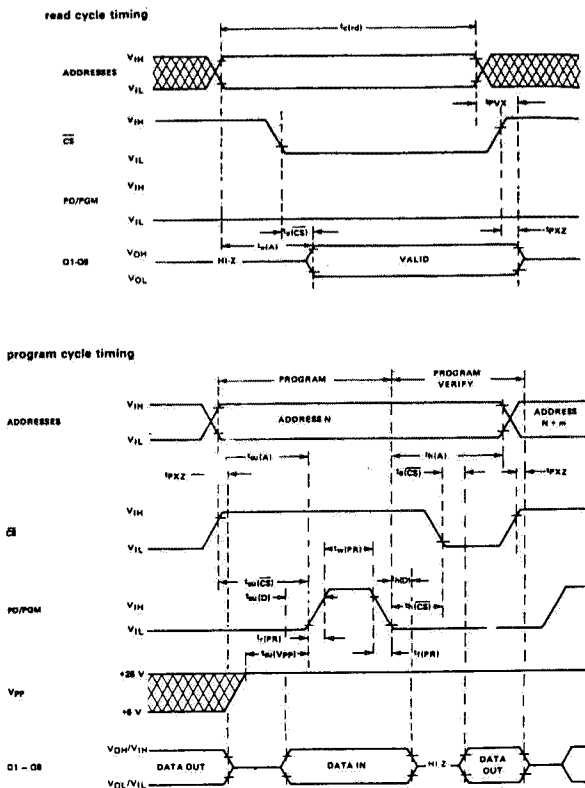


MODE SELECTION

MODE	PINS		V _{CC}		OUTPUTS (8-11, 13-17)
	CE (18)	OE/V _{pp} (20)	V _{CC} (24)	V _{CC} (28)	
Read	V _{IL}	V _{IL}	+5	DOUT	
Standby	V _{IH}	Don't Care	+5	High Z	
Program	V _{IL}	V _{pp}	+5	D _{OUT}	
Program Verify	V _{IL}	V _{IL}	+5	DOUT	
Program Inhibit	V _{IH}	V _{pp}	+5	High Z	

The following explanation serves the theory of writing data in I2716 which is the pin function compatible with TMS 2516. The method of writing I2716 is to put +25V on the Vpp (pin 21), convey the essential address or data, and transfer the 50ms cycle to the CE/PROG (pin 20). After handling these procedures, users first write 1 byte and then continue one by one.

The read cycle timing as well as the program cycle timing of I2516 are shown below:



In view of the circuit, U1 (8255) is divided into three ports: PA0-PA7, PB0-PB7, and PC0-PC3 to control the keyfunction of textool. Besides, PC4-PC7 can control the voltage logic to provide the different voltage for pin 21 and pin 20 with the different EPROM type.

Since these EPROMs operate from a single +5V (in the read mode), they are ideal for use in microprocessor system. One other (+25V) supply is needed for programming but all programming signals are TTL level, requiring a single 50ms pulse. Locations may be programmed singly, in blocks, or at random. Total programming time for all bits of I2716 or TMS 2516 is 100 seconds.

Note: Avoid taking off EPROM or pressing the MON key while EPB-MPF is at program cycle timing.

There are three parameters must be set before executing PROG command. Suppose they have any errors, press PROG key and then - E r r is shown.

1. S - Store the starting address of the data which will be written into EPROM
2. E - Store the ending address of the data which will be written into EPROM.
3. D - Store starting address of the EPROM where the data will enter.

There are four conditions as the value of parameter is wrong:

1. The ending address (E) is smaller than the starting address (S).
2. The data length ($E - S + 1$) is larger than 800H (for 2K) (400H for 1K, 1000H for 4K)
3. The starting address of EPROM (D) is equal or larger than 800H (for 2K). (400H for 1K, 1000H for 4K)
4. The ending address of EPROM ($D + E - S$) is equal or larger than 800H (for 2K). (400H for 1K, 1000H for 4k)

Once any errors occur, the display will show - E r r.

V. General Conception

5.1 Function of Monitor Program

Before executing the keyfunction of EPB-MPF, user should enter the EPB-MPF monitor program. As the address of the EPB-MPF monitor is 9000 - 97FF, the way to enter the EPB-MPF is to set the starting address on 9000 and then press key. When MPF-I display shows , it means the EPB-MPF monitor already starts and is ready to input the EPROM type. MPF-I keyfunction, which has lost its original use, has been replaced by the EPB-MPF keyfunction. Users just need to press if they want to return to the MPF-I monitor.

The monitor function is indicated as follows:

1. Read the data from EPROM to RAM buffer, users can store, modify, verify, duplicate, and display it.
2. Input the data of RAM buffer to recorder, or read the data from recorder to RAM buffer.

Example: Read the data of 2716 to RAM buffer and then verify it.
(Put EPROM on textool before reading data.)

Key	Display	Comments
<input type="button" value="RS"/>	<input type="text" value="UPF--1"/>	;System reset
<input type="button" value="ADDR"/> <input type="button" value="IY S"/> <input type="button" value="AF 0"/> <input type="button" value="AF 0"/> <input type="button" value="AP 0"/>	<input type="text" value="9.0.0.0.31"/>	;Set the starting address of EPB-MPF monitor program.
<input type="button" value="GO"/>	<input type="text" value="0.0.0.0.-E"/>	;Execute the EPB-MPF monitor.
<input type="button" value="DE 2"/> <input type="button" value="HL 7"/> <input type="button" value="BC 1"/> <input type="button" value="DE 6"/>	<input type="text" value="2.7.1.6.-E"/>	;Key in the EPROM type.
<input type="button" value="GO"/>	<input type="text" value="2716-E"/>	;The initial state of EPB-MPF.
<input type="button" value="READ"/>	<input type="text" value="rEAd"/>	;Key in the READ command
<input type="button" value="GO"/>	<input type="text" value=""/>	;Executing the read command, the display is blank.

VERIFY

PASS - r
0.0.0.0 - s

;The end of read command.

;The monitor sets the starting address on 0000 and the ending address on 07FF automatically. Users can verify the data of any region through setting both the starting address and the ending address.

GO

PASS - H

;Execute the verify command.

;All data are matched, showing PASS-H.

[Description]

1. Users should execute the keyfunction in the initial state of EPB-MPF, it stands for controlling by the EPB-MPF monitor. The display will show 2508-E, 2758-E, 2516-E, 2716-E, 2532-E, or 2732-E, as EPB-MPF is in the initial state, it expresses the EPROM type has been confirmed and users can start to execute the keyfunction at this moment.
2. Suppose users don't put EPROM on the texttool, the data reading from texttool all shows FF.
3. Press RESET key in case users intend to return to the initial state.
4. If users try to change the EPROM type, they must press RS key and reset the EPROM type.
5. Press the keyfunction directly if command has finished and users are ready to execute the new one.

5.2 RAM Addressing

Though the addresses of RAM buffer are 8000 - 8FFF, we make use of software technique to cause the display show 0000 - 0FFF instead of 8000 - 8FFF. All of these designs are for user's convenience. For example, it means the value of 8356 in RAM addressing is 38 when the display shows 03563.8. So the addresses of 8000 - 8FFF in MPF-I are the same as the addresses of 0000 - 0FFF in EPB-MPF. Now the following example could prove the both area's addresses are similar.

Example: Compare the addresses of 0068 in EPB-MPF with the addresses of 8068 in MPF-I.

Key	Display	Comments
RS	UPF -- 1	;System Reset.
ADDR IX 8 AF 0 DE 6 IX 8	8.0.6.8.××	;The content of address 8068 is XX.
ADDR IX 0 AF 0 AF 0	9.0.0.0. 31	;The starting address of EPB-MPF monitor.
GO	0.0.0.0.-E	;The EPB-MPF monitor is ready to accept the EPROM type.
DE 2 BC 5 AF 0 IX 8	2.5.0.8.-E	;Set the EPROM type on 2508.
GO	2508 - E	;The initial state of EPB-MPF.
LIST	LIST	;Key in the list command.
GO	0000×.×.	;The first address in RAM buffer.
ADDR	0.0.0.0.××	
AF 0 AF 0 DE 6 IX 8	0.0.6.8.××	;The six-eighth address in EPB-MPF monitor equals to the address of 8068 in MPF-I monitor.

VI. Operation Introduction

The EPB-MPF keyfunctions should be operated under the monitor's control. After executing the addresses of 9000 in EPB-MPF monitor, the display will show `0.0.0.0. -E` and users can key in the EPROM type. If any wrong types are shown, users press `-` key and the display becomes `0.0.0.0 -E`. But the display will show `xxxx -E` in case of no errors. As EPB-MPF is in the initial state, the display will show `2508-E`, `2758-E`, `2516-E`, `2716-E`, `2532-E`, `2732-E`, etc. Pressing `-` key will not affect the value of RAM. Users may Reset the EPROM type and re-execute the EPB-MPF monitor if they intend to change the EPROM type.

Once the EPB-MPF monitor starts to execute command, EPB-MPF monitor will examine U9, U10, and U11 whether they have any problems. The display shows `bAdU09` if U9 (the address of 8000 - 87FF in RAM) is out of order; moreover, `bAdU10` is expressed when U10 does not function very well. But `bAdU11` or RADOM DATA are shown if U11 has some troubles.

[Description]

1. Read data from EPROM to RAM buffer to store, modify, verify, duplicate, display etc.
2. Users can use LIST command to modify or display the data in RAM buffer.
3. We use VERIFY command to compare the data of EPROM in the socket with RAM buffer of the same address.
4. It also can use PROGRAM command to duplicate an EPROM.
5. When reading is completed, the display will show `PASS-r`. User can execute LIST command to check whether the data in RAM buffer is correct or not.

6.1 Read data from EPROM to RAM buffer-READ Key

The following procedures guide users how to implement the read command which can read the data from EPROM in the textool to RAM buffer.

1. Users should put EPROM in the textool before executing the read command, or the data reading from textool will be FF.
2. Before pressing READ key, users need to make sure whether the EPB-MPF is in the initial state that means xxxx-E is shown.
3. When the display is in the initial state, the other step is shown as follows:

Key	Display	Comments
READ	┌ EAd	;It get ready to read.
GO	 	;Begin to read.
	PASS -┐	;The contents of EPROM read into RAM buffer.

Example: The EPROM type on textool is 2532, reading its contents into RAM.

Key	Display	Comments
ADDR IV 9 AF 0 AF 0 AF 0	9.0.0.0.31	;Set the starting address of EPB-MPF monitor program.
GO	0.0.0.0.-E	;Wait to key in the EPROM type.
DE 2 BC 5 HL 3 DE 2	2.5.3.2.-E	;The EPROM type is 2532.
GO	2 5 3 2 -E	;The initial state of EPB-MPF.
READ	┌ EAd	;Set READ mode.
GO	 	;Execute the READ command.
	PASS -┐	;The READ command is finished.

[Description]

1. In case the EPROM type is 2508 or 2758, it means to load in the 1K bytes data. The situation is similar in 2516, 2716(2K) and 2532, 2732(4K).
2. After completing the READ command, users can utilize LIST command to display or modify the data in RAM buffer.
3. Check whether EPROM is blank or not. At first, don't put EPROM onto textool and the loading value will be FF. Now put EPROM onto textool, press and .

6.2 Display and modify the data in RAM buffer - Key

Six keyfunction are used with the LIST key to display or modify the data in RAM buffer.

1. Substitute memory - ADDR and DATA key.
2. Data deletion - DEL key.
3. Data insertion - INS key.
4. Check the next memory address - + key.
5. Check the last memory address - - key.

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

1. The EPB-MPF must be in initial state before pressing the LIST key.
2. If it is in initial state, do the steps as follows.

Key	Display	Comments
<input type="checkbox"/> LIST	LEST	;Set LIST mode
<input type="checkbox"/> 00	0000x.x.	;It always displays the first byte of data in RAM buffer.

Example: Display the contents of memory locations.
 Start the address at 0586 and end the
 address in 0588. Change the contents of 0587
 into 56.

Key	Display	Comments
RS	UPF - - 1	
ADDR	9.0.0.0.31	;Set the starting address of EPB-MPP monitor program.
GO	0.0.0.0.-E	
DE 2	2.5.1.6.-E	;The EPROM type is 2516.
GO	2516 - E	;The initial state of EPROM monitor.
LIST	LIST	;Set LIST mode.
GO	0000×.×.	;The first byte of data in RAM buffer.
ADDR	0.0.0.0.××	;The four index points notify user to input address.
AF 0	0.5.8.6.××	;The contents of address 0586 is XX.
BC 5		
IN 8		
DE 6		
+	0587×.×.	;The contents of address 0587 is XX.
+	0588×.×.	
-	0587×.×.	;The contents of address 0588 is XX.
BC 5	05875.6.	;Change the contents of 0587 into 56.
DE 6		

[Description]:

1. ADDR, DATA, INS, and DEL are only used in LIST MODE.
2. Press GO key, and then the value of address 0000 will be shown.

6.3 Substitute memory- ADDR and DATA Key

The ADDR or DATA commands must be used in LIST mode.

ADDR <address>[DATA [<data>]] + [data] +

Example: Check the contents in 0000 - 0003.

Key	Display	Comments										
	xxxx-E	;It is in the initial state of EPB-MPF.										
LIST	LIST	;Set LIST mode.										
GO	0000x.x.	;The content of ADDR 0 is xx. Note:Display format for ADDR.										
		<table border="0" style="margin-left: 40px;"> <tr> <td style="text-align: right;">ADDR</td> <td style="text-align: left;">DATA</td> </tr> <tr> <td style="text-align: right;">0 . 0 . 0 . 0 .</td> <td></td> </tr> <tr> <td style="border-left: 1px solid black; border-bottom: 1px solid black; width: 100px;"></td> <td style="text-align: center;">0 0</td> </tr> <tr> <td style="border-left: 1px solid black; border-bottom: 1px solid black;"></td> <td style="text-align: center;">[Data Bytes]</td> </tr> <tr> <td style="border-left: 1px solid black; border-bottom: 1px solid black;"></td> <td style="text-align: center;">[Address Bytes]</td> </tr> </table>	ADDR	DATA	0 . 0 . 0 . 0 .			0 0		[Data Bytes]		[Address Bytes]
ADDR	DATA											
0 . 0 . 0 . 0 .												
	0 0											
	[Data Bytes]											
	[Address Bytes]											
+	0001x.x.	;Note that the + key increments the ADDR counter by ONE.										
+	0002x.x.											
+	0003x.x.	;Contents of ADDR 0003 is xx.										

Example: Continue the above example. Change the contents of 0300 into AF, 0301 into CD.

Key	Display	Comments
	 {ADDR field}	;4 index points in ADDRESS field notify USER to input ADDRESS.
		;Enter 0300 by pressing the appropriate KEYS.
	 [DATA field]	;By pressing the Data function KEY indicates to the USER to input DATA into the DATA Field.
		;Enter 3A into the DATA FILED.
		;Enter B into the DATA filed. If DATA is more than two Digits the last two will be used.
		;AD Field increases by one. The 2 index points in the DATA Field notify user to input Data.
		;Enter Data by pressing the C and D Keys.

[Description]:

Addr means address. After pressing this key the display is in the standard format, i.e. the left four digits stand for the address and the right two digits stand for the data. The address field is indexed by four points and required 4 digits. If more than 4 digits are keyed in, only the last 4 are accepted. If less than 4 digits is entered, the address being displayed is assumed.

When is pressed, the index points will be shifted to the rightmost two digits notifying the user to enter data. The content of RAM will be replaced by the entered data. Pressing or will increase or decrease the address field. If the index points are already in the data field then it is unnecessary to press . After pressing , the user may press or directly.

If the user attempts to change the contents of ROM, the display will blank out. After releasing the key, the display will return.

6.4 Data insertion- INS Key

The INS command must be used in LIST mode.

INS <data>


When the display is of the Addr-Data form, the input data will be inserted after the displayed address.

Example: Assume the contents of RAM are as follows:

	ADDRESS	OLD DATA	DATA AFTER INSERTION
	0200	00	00
	0201	11	11
	0202	22	22
insert 33 here->	0203	44	33
	0204	55	44
	0205	66	55

Key	display	Comments
	xxxx - E	;The initial state of EPB-MPF.
LIST	LIST	;Set LIST mode.
00	0000 x.x.	
ADDR AF 0 DE 2 AF 0 DE 2	0.2.0.2.22	;To change the display to Addr-Data form and enter the address of the insertion.
INS	02030.0.	;Insert one byte after 0202, address field becomes 0203. Key in data 33.
HL 3 HL 3	02033.3.	
ADDR AF 0 DE 2 AF 0 AF 0	0.2.0.0.00	Check
+	02011.1.	
+	02022.2.	
+	02033.3.	
+	02044.4.	
+	02055.5.	

[Description]:

The valid region for this key is the same as . After insertion, the last byte of the inserted block is lost.

The inserted address is one byte after the displayed address. Pressing this key causes all the data after the displayed address to be shifted down one position. Then the address field is incremented by one and the user may enter the data he wants to insert.

6.5 Data deletion - DEL Key

The DEL command must be used in LIST mode.

This key is valid when the display is of the Addr-Data form. Pressing this key causes the data of the displayed address to be deleted. All the data below this address is shifted up one position.

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

	ADDRESS	OLD DATA	DATA AFTER DELETING
	0200	00	00
	0201	11	11
delete address ->	0202	11	22
	0203	22	33
	0204	33	44
	0205	44	XX

Key	Display	Comments
	×××× - E	;The initial state of EPB-MPF.
LIST	LIST	;Set LIST mode.
GO	0000×.×.	
ADDR AF 0 DE 2 AF 0 DC 2	0.2.0.2.11	;To change the display to the Addr-Data form and enter the address to be deleted.
DEL	0202.2.	The old contents of 0202 have been deleted and data below it has been shifted up. The new contents of 0202 is 22, which was the original contents of 0203.

ADDR	AF 0	DE 2	AF 0	AF 0	0.2.0.0.00
+					02011.1.
+					02022.2.
+					02033.3.
+					02044.4.

Check

[Description]:

Data in ROM can not be deleted. The valid regions for this key are 0000 - 0FFF. When the deleted address is between 0000 - 0FFF, all the data after this address shift up one position. The last one 0FFF is filled with 0.

6.6 System reset- Key

Pressing the reset button will display and get back to MPF-I monitor program.

There are two possible results. When the MPF-I monitor is reset.

1. Power on

- a. Disable interrupt (IFF set to 0);
- b. I register set to 0;
- c. Interrupt mode set to 0;
- d. user's PC is set to 1800.
- e. User's SP is set to 1F9F;
- f. Break point is disabled.
- g. Set the content of 1FEE to 56 and set the content of 1FEF to 00. When 0038 is executed the CPU will jump to 0066. This is equivalent to pressing .
- h. MPF-I is displayed one character at one time from right to left.

2. Press

- (a) - (e) are the same as (1). The contents of 1FEE & 1FEF and break point are unaffected. 'UPF--I' is displayed (all digits) simultaneously.

6.7 Verify the data of EPROM with the data of RAM buffer- VER FY Key

VER
FY <address> + <address> GO

Verify command can compare the data in EPROM with the data in RAM buffer. If the starting address or the ending address has no change, the EPB-MPF monitor will automatically set and verify the data of EPROM. For example, the EPROM type is 2716 and then the EPB-MPF monitor will set the starting address on 0000, the ending address on 07FF.




Example: Compare the data of 0150 ~ 0250 in RAM buffer with the same address of EPROM in the socket.

Key	Display	Comments
	xxxx-E	;The initial state of EPB-MPF.
VER FY	0.0.0.0.-S	;S is the mnemonic of starting address in RAM buffer.
AF 0 BC 1 BC 5 AF 0	0.1.5.0.-S	;Set the starting address on 0150.
+	x.x.x.x.-E	;E is the mnemonic of ending address.
AF 0 BC 2 BC 5 AF 0	0.2.5.0.-E	;Set the ending address on 0250.
GO		;Execute the VERIFY command.
	PASS-H	;VERIFY finished.

[Description]:


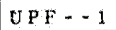





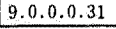

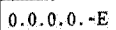




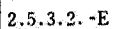

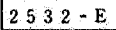

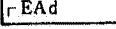




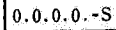


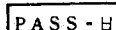

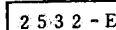
1. Write the data of RAM address 0100 - 0250 into EPROM, so the starting address of EPROM where the data will enter is 0000.
2. The command may compare the data of EPROM in the socket with the same address of RAM buffer. If the result does not match, the display will first show the address in RAM buffer which does not match and then the display is blank for a while, showing . It means the left three LED is the data of EPROM and the right three LED is the data of RAM buffer. Press key and continue this process. The display will show if all the data matches. The rest data can be deduced accordingly.
3. Set the starting address, the ending address beforehand and key in the data, if users want to compare data in blocks.
4. Suppose the command loads in the wrong parameter that is to say E<S, the display appears .

6.8 Return to the initial state of EPB-MPF- Key

Press  key at any time, the display will show  which means EPB-MPF is in the initial state. If the command is accomplished and is to do another one, users can press  key directly.

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

Put 2532 into textool before pressing  key.

Key	Display	Comments
		
    		;The starting address of EPB-MPF monitor.
		;The EPB-MPF monitor is ready to accept the EPROM type.
   		;The EPROM type is 2532.
		;The initial state of EPB-MPF monitor.
		;Set the READ command.
		;Execute the READ command.
		;The READ command is finished.
		;Set the VERIFY command.
		;Execute the VERIFY command.
		;The VERIFY command is finished.
		;The initial state of EPB-MPF monitor.

[Description]:

1. Read the data of 2532 in EPROM to RAM buffer and verify, so the result must be same and then appears.
2. Once users take off EPROM and press the data will show FF.
3. If users want to modify the data of 0532 in RAM buffer and then find it out in the EPB-MPF monitor, please use the LIST command.
4. As is shown, pressing key can return to the initial state of EPB-MPF monitor.

6.9 Write the data in RAM buffer to EPROM-PROGM Key

The primary function of PROGM key is to write data in RAM buffer at one time. The procedure is as below:

PROGM <address> + <address> + <address> GO

Key	Display	Comments
	x x x x - E	;The initial sta of EPB-MPF monitor.
PROGM	x . x . x . x . - S	;Notify users the starting address to write in RAM buffer.
+	x . x . x . x . - E	;Notify users the ending address (03FF for 1K, 07FF for 2K, 0FFF for 4K) to write in RAM buffer.
+	x . x . x . x . - d	;Notify users the address which EPROM starts to write.

Example: Write the data 0200 - 0250 in RAM buffer to EPROM in its address 0000. Make sure the EPROM address must be blank (FF). In case the purpose is only for test, users don't need to put EPROM onto textool but make the value in RAM buffer be FF.

Key	Display	Comments
	xxxx - E	;The initial state of EPB-MPF monitor.
PROGH	x.x.x.x.-S	
AF 0 DE 2 AF 0 AF 0	0.2.0.0.-S	
+	x.x.x.x.-E	
AF 0 DC 2 BC 5 AF 0	0.2.5.0.-E	
+	x.x.x.x.-d	
AF 0 AF 0 AF 0 AF 0	0.0.0.0.-d	
GO	xxxxx.x.	;Start to write and display the data or address which is proceeding.
	0050x.x.	;The last data and address in writing procedure.

[Description]

1. The EPB-MPF monitor still execute the PROG command, though EPROM is not on the textool. Users can check whether the Vpp pin of textool has 25V voltage. Anyhow the different EPROM types have the different pin functions.
2. Attention: Don't put EPROM onto textool or take EPROM from it as the command is proceeding.
3. The display shows `-Err` if the loading parameter bring forth any mistakes (Please refer to 4-4). Press `RESET BY` key, the command will go back to the initial state of EPB-MPF monitor.
4. Before executing `PROGM` command, EPB-MPF will check whether the EPROM is blank or not. As long as data exists, `FULL` is shown. No matter what the value happens, you can press `↵` key if you intend to continue writing the data.
5. The EPB-MPF monitor in executing `PROGM` command is not only writing the data but checking the value. If EPROM is out of order, naturally the data could not write into it. At this moment, EPB-MPF sounds and then the display shows `xxxxHH`. "xxxx" stands the address in EPROM is out of order, but "HH" is to notify users that a bad address exists and they can press `↵` key if they continue writing data. Refer to 2732, the new monitor is to be examined after writing but not be checked one by one as writing the data. The data of origin monitor is located in 9000H - 9712H, but the data of new version is 9000H - 97B3H
6. If we want to write only one byte, then the values for S and E must be the same. 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)
7. Note: Suppose in the initial state of EPB-MPF users test the voltage of pin 20 or pin 21 on textool is 25V, it indicates there is something wrong at transistor Q2, Q3, or 7407. Users must stop operating the procedure but change transistor Q2, Q3, or 7407 to avoid damaging EPROM.

6.10 Storing data onto tape- TAP WR Key

EPB-MPF takes advantage of the audio tape interface in 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.

TAP
WR <file name> + <address> + <address> GO

Example: Store the data of 0000 - 0100 on tape, use 1234 as file name.

Key	Display	Comments				
	XXXX-E	;The initial state of EPB-MPF.				
TAP WR	X.X.X.X.-F	;F is the mnemonic of filename.				
<table border="1" style="border-collapse: collapse; text-align: center; width: 100px;"> <tr> <td style="padding: 2px;">BC 1</td> <td style="padding: 2px;">DE 2</td> <td style="padding: 2px;">HL 3</td> <td style="padding: 2px;">AF 4</td> </tr> </table>	BC 1	DE 2	HL 3	AF 4	1.2.3.4.-F	Filename = 1234
BC 1	DE 2	HL 3	AF 4			
+	X.X.X.X.-S	;S is the mnemonic of starting address.				
<table border="1" style="border-collapse: collapse; text-align: center; width: 100px;"> <tr> <td style="padding: 2px;">AF 0</td> <td style="padding: 2px;">AF 0</td> <td style="padding: 2px;">AF 0</td> <td style="padding: 2px;">AF 0</td> </tr> </table>	AF 0	AF 0	AF 0	AF 0	0.0.0.0.-S	;Stating address = 0000.
AF 0	AF 0	AF 0	AF 0			
+	X.X.X.X.-E	;E is the mnemonic of ending address.				
<table border="1" style="border-collapse: collapse; text-align: center; width: 100px;"> <tr> <td style="padding: 2px;">AF 0</td> <td style="padding: 2px;">BC 1</td> <td style="padding: 2px;">AF 0</td> <td style="padding: 2px;">AF 0</td> </tr> </table>	AF 0	BC 1	AF 0	AF 0	0.1.0.0.-E	;Ending address = 0100
AF 0	BC 1	AF 0	AF 0			
<table border="1" style="border-collapse: collapse; text-align: center; width: 100px;"> <tr> <td style="padding: 2px;">AF 0</td> <td style="padding: 2px;">AF 0</td> <td style="padding: 2px;">AF 0</td> <td style="padding: 2px;">AF 0</td> </tr> </table>	AF 0	AF 0	AF 0	AF 0		;Connect the microphone of the tape recorder to MPF-I MIC. Start recording by pressing PLAY and REC key of recorder. Begin to output data. During transfer the display is dark, but the TONE-OUT LED is on.
AF 0	AF 0	AF 0	AF 0			
(PLAY & REC)						
GO						
	XXXXXXXX.	;When transfer is completed, the ending address is displayed.				

[Description]:

1. Pressing , the display becomes .
F means file name. It is used to distinguish different data sets stored on a single cassette. It is also used to read back data. Press and the display becomes . S represents the starting address of the data to be written. Press again and the display becomes . E represents the ending address of the data to be written. Before pressing , 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 data is still sent out. This data will not be recorded on tape. During transfer the display is blank, the TONE-OUT LED is on and a tone sounds.
2. For the setting data of 0000 - 0FFF in EPB-MPF equals to the data of 8000 - 8FFF in MPF-I, transferring the data of 0000 - 0FFF to tape in the EPB-MPF monitor is similar in transferring the data of 8000 - 8FFF to tape in the MPF-I monitor.

6.11 Reading data from tape- TAP NO Key

TAP
NO <filename> GO

Example: Read data from recorder, filename is 1234, the tape is prepared by TAP
WR key.

Key	Display	Comments
	xxxx - E	;The initial state of EMP-MPF.
TAP NO	x.x.x.x.-F	;F is the mnemonic of filename.
BC 1 DE 2 HL 3 AF 4	1.2.3.4.-F	;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 is searching for the filename.
(PLAY)	;Press PLAY of recorder. The recorder output volume should be turned to maximum. EPB-MPF 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.
	1 2 3 4 - F	
	- - - - -	
	xxxxx.x.	

[Description]:

1. Before execution, the user must connect the recorder (using earphone jack) to the EAR jack in MPF-I. Turn the volume of the recorder to maximum. Then press , 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 file name. A check is also recorded on the tape which EPB-MPF will check when reading back. If not matched, the display will be . If matched, 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 . The tape data are echoed on the MPF-I 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, so you do not destroy data previously recorded.

2. The key in EPB-MPF monitor is to store the address of 8000 - 8FFF in RAM buffer onto tape through MPF-I. So, the data also read to the same address (8000 - 8FFF) in RAM when it is back from tape.
3. If the data of tape is 1800 - 1FFF in RAM address which users want to store it onto the RAM buffer of EPB-MPF, they should read data by the key in MPF-I monitor and then move this value to 8000 - 8FFF by using the command.
4. If the parameter has any errors in executing or key, the display will show . The above situation indicates the command returns to the MPF-I monitor, but the key has no any function under such situation. The command return to the MPF-I monitor just when shows under the execution of and , but the rest is still in the EPB-MPF monitor.

Example: EPROM blank test

Key	Display	Comments
	XXXX - E	;The initial state of EPB-MPF.
READ	READ	;Set READ command. There is no EPROM on textool.
GO		;Execute READ command.
	PASS - r	;READ finished. The data READ in are all FF.
VERIFY	0000 - S	;Put the EPROM which you want to check onto textool.
GO		;Execute VERIFY command.
	PASS - H	;If the EPROM is blank then the display is PASS-H , otherwise the display is XXXXXXXX and stops at the first address, which is not equal.



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