

PICmicro® Microcontroller Lite programmer datasheet



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1 About this document

This document concerns the Matrix USB Lite programmer code EB-010-00-1.

Trademarks and Copyright

PIC, PICmicro are registered trademarks of Arizona Microchip Inc. E-blocks is a trademark of Matrix Multimedia Limited. EB-010-00-1 and associates software and documentation are Copyright ©2004 Matrix Multimedia Limited.

Other sources of information

There are various other documents and sources that you may find useful:

Getting started with E-Blocks.pdf

This describes the E-blocks system and how it can be used to develop complete systems for learning electronics and for PICmicro programming.

PPP Help file

This describes the PPP software and its functionality. PPP software is used for transferring hex code to a PICmicro microcontroller.

Disclaimer

The information in this document is correct at the time of going to press. Matrix Multimedia reserves the right to change specifications from time to time.

Technical support

If you have any problems operating this product then please refer to the troubleshooting section of this document first. You will find the latest software updates, FAQs and other information on our web site: www.matrixmultimedia.co.uk. If you still have problems please email us at:

support@matrixmultimedia.co.uk. When emailing please state the operating system, the version of PPP you are using.

2 General information

Description

One of the latest PICmicro microcontrollers to come to market is the PIC16F88. This incredible device is one of the lowest cost PICmicro MCU devices and yet it has a combination of internal peripherals and features that also makes it one of the most powerful in the PIC16xxx series.

This new programmer connects to your PC via USB and can be used with Assembly, C or Flowcode programming utilities available from Matrix Multimedia. Flexible PICmicro MCU programming software – PPP – is provided.

This board has two uses: it is used where a second PICmicro communications device within a system is needed, and it is of such low cost that it can be designed into projects and left there. A PIC16F88 device is included.

Further information on E-blocks is available in a separate document entitled Introduction to E-blocks.doc.

Features

- Ultra low cost PICmicro programmer
- Full suite of programming software
- Ports A and B available
- Used as a programmer and as a development board
- No power supply required

Three courses and programming systems compatible with this product are available on CD ROM:







3 Board overview

- 1. USB connector
- 2. Reset switch
- 3. Port A I/O
- 4. Port B I/O
- 5. Screw Terminals (Power)
- 6. BJTAG connection
- 7. Expansion connector
- 8. PICmicro turned pin DIL socket
- 9. 'Ready to go' LED
- 10. Power selection mode
- 11. Programming selection mode



4 Getting Started

4.1 Installation instructions - Software

Installing PPP v3

To install run PPPv3.exe, which is located at <D>:\PPPv3\PPPv3.exe and follow the instructions provided. <D> refers to your CD drive. By default PPPv3 is installed into: C:\Program Files\Matrix Multimedia\Common\PPPv3\

There are four 'Features' that can be installed.

- * PPP v3 core files this is PPP v3 itself, and should be installed.
- * Update ASM4PICs This feature allows you to update ASM4PICs to use PPP v3.
- * Update C4PICs This feature allows you to update C4PICs to use PPP v3.
- * Update Flowcode This feature allows you to update Flowcode to use PPP v3.

The three updates will be automatically installed. Select the 'X' 'Do not install option' if you do not to update a feature.

If you need to update a product at a later date you can re-run the install and update that feature.

There is more help and information available on the CD provided at $\langle D \rangle$: \PPPv3\readme.txt $\langle D \rangle$ refers to your CD drive.

4.2 Installing in the Lite programmer

When you connect the Lite programmer to your computer, via the USB cable, the first time there will be installation routine for this 'new hardware'. This with most users will be a 'plug and play' routine where your computer will automatically recognize the hardware.

Running on Windows 2000 / ME / XP

These programs allow 'plug and play' for your new hardware. Therefore when you first connect the Lite programmer to your computer you will receive a pop-up screen that indicates that there is new hardware connected to the computer. The program itself will deal with any installation of any drivers that it requires internally. Therefore you can use your Lite programmer immediately.

Running on Windows 98 (you will need the Windows 98 CD at hand)

When you connect the Lite programmer to the computer your Windows 98 program will run a 'New Hardware Wizard'. This procedure is straightforward and easy to understand. Follow the on-screen instructions. Once this has been completed the Lite programmer will be ready to use.

There is more detailed information and help on the CD provided at <D>:\eblocks\Installation Guide.doc

4.3 Programming the PIC16F88

Testing the Lite programmer Board - 88_chase.HEX

The following instructions explain the steps to test and use your Lite programmer. The instructions assume that PPP is installed and functional. It also assumes that you are confident in sending a program to the PIC via the Lite programmer.

More information on the procedures of programming via PPPv3 are giving in the document located at <D>:\eblocks\Installation Guide.doc and in the PPPv3 help file.

Follow these instructions to test the Lite programmer board

- 1) Connect the Lite programmer to the PC via the USB cable and connector (J1)
- 2) Ensure that jumper on J4 is in "USB" mode. The jumper must connect the two header pins on J4 where the writing on the PCB reads "USB".
- 3) Ensure power is supplied to all the necessary boards via the USB connector. LED D1 will be illuminated if there is correct power to the board.
- 4) Insert an LED board (EB-004-00-1) into Port A of the Lite programmer
- 5) Insert an LED board (EB-004-00-1) into Port B of the Lite programmer
- 6) Program the a PIC16F88 with the test program 88_*chase.HEX* found in the directory <D>:\eblocks\Lite programmer\88_*chase.HEX*

Note the following:

D5 will not illuminate on Port A

D3 will not illuminate on Port B

7) Check the illumination of all LEDs

This should satisfy that the Lite programmer Board is fully functional!

Please note C4PICs V1 & V2 and FLOWCODE V1 will NOT program the PIC16F88.



5 Block schematic and description

The Lite programmer solution is made up of two parts: A circuit board that allows various slave PICmicro devices to be programmed, and the program to be executed 'seamlessly', and the Windows based programming utility 'PPP'.

Power Supply

The board can be powered via the USB socket (J1), although only 100mA of power will be available. But also by connecting +5V and Ground using the screw terminals (J5). When powering via the USB, you must ensure that the jumper link on J4 is connect to the "USB" side. When powering using the screw terminals the jumper link for J4 must be connected to the "+V" side

Programming (hardware)

The Lite programmer connects to a personal computer via the USB socket. Any USB socket on the PC can be used. The host PIC16C745 microcontroller is used to communicate between the USB bus and the Lite programmer circuitry.

Pins RB6, RB7 are used to program the slave PICmicro device. A third pin (PGM) is required to program the slave PICmicro. This pin depends on the actual device to be programmed, and is either RB3 or RB4. The jumper associated with J8 and J9 allows RB3 or RB4 to be selected. The PCB is designed to indicate the correct orientation jumper. The following table indicates which programming pin (either RB3 or RB4) is needed for different devices:

RB3 Programming Pin	RB4 Programming Pin
PIC16F87	PIC16F627
PIC16F88	PIC16F627A
PIC16F818	PIC16F628
PIC16F819	PIC16F628A
	PIC16F648

The 'ready to go' LED (D1) indicates that power is supplied to the Lite programmer board. If this LED is not on check the position of the jumper link J4. Then check your power supply.

I / O Ports

The slave PICmicro ports are fed out to 2 D-type sockets grouped in ports. These signals are also available on an 18-way header for expansion purposes. The ports are only partially complete. Port A has all I/O lines except A5. Port B has all I/O lines except b3 or b4 depending on which ship is being programmed (see table above for details). This reflects the pin outs of the various PICmicro devices themselves. Please refer to device datasheets for availability of port outputs on each device.

NOTE

RA4 on many PICmicro devices has an open collector output. This means that you will most likely need a pull up resistor to be able to detect a change in status. Please see the datasheet on the device you are using for further details.

Reset Push Button

PB1 provides a reset by pulling the MCLR pin low. Note that the PIC16C745 will reset the slave PICmicro as part of the send routine so that you do not need to press this switch each time you send your program to the board.

Other useful information

The Lite programmer does not have to be connected to the computer to use the board, although there must be a power supply for the board. But please be aware that it will need to be connected if you require programming a chip.

Appendix A – Circuit Diagram

