Atmel AVR® multiprogrammer system EB194-00-2

Contents

1. <u>About this document</u>

This document concerns the E-blocks Atmel AVR Multiprogrammer System code EB194 version 2.

The order code for this product is EB194.

1. *Trademarks and copyright*

Atmel and AVR are registered trademarks of the Atmel Corporation.
E-blocks is a registered trademark of Matrix Multimedia Limited.

2. *Other sources of information*

You can find further information on this product and the E-blocks range on the Matrix web site:
www.matrixmultimedia.com.

Further information on the Atmel ISP and the AVR family of microcontrollers can be found at:
www.atmel.com.

3. *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. This product is for development purposes only and should not be used for any life-critical application.

4. *Technical support*

You will find the latest software updates, FAQs and other information on our web site:
www.matrixmultimedia.com.

If you still have problems please visit our forums at www.matrixmultimedia.com/mmforums

2. <u>General information</u>

1. *Description*

This new AVR® multiprogrammer system connects to your PC via an In-System Programmer (ISP) to provide you with one of the world's lowest cost and most flexible AVR microcontroller programmers. The board is fully compatible with the entire range of E-blocks allowing the investigation into many interesting and exciting projects.

The Atmel AVR multiprogrammer board allows serial programming of a large selection of 8, 20, 28 and 40 pin Atmel AVR devices. This board can be used with Atmel's AVR studio which is a free and comprehensive AVR programming utility. The board can be programmed using Assembly, C and Flowcode. It provides 'clean' access to all I/O lines on the relevant Atmel AVR devices.

In-circuit debug with Flowcode is available with the FlowKit device.

2. *Features*

- Includes an E-blocks compatible development board
- Includes the Atmel AVR ISP module (USB)
- Can be used as both a programmer and a development board
- Programs a wide range of 8, 20, 28 and 40 pin Atmel AVR devices
- Full suite of programming software included
- High speed crystal operation and internal RC operation
- No jumper settings required
- 4 full I/O E-blocks ports
- Flowcode compatible

3. <u>EB019 board layout</u>

The main component of the EB194 is the EB019 E-blocks AVR board. For details of the Atmel ISP system please see the Atmel web site.
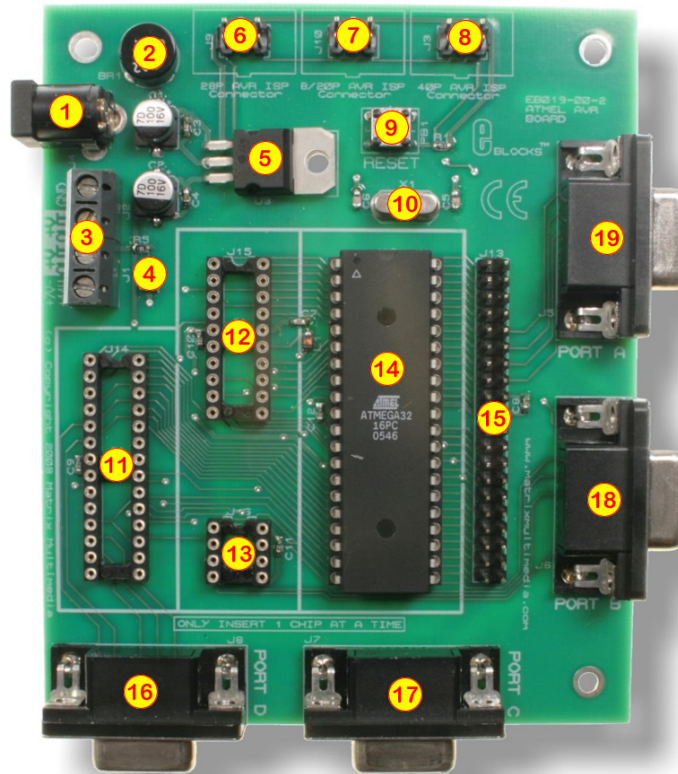
EB019-74-2.jpg

1. Power connector 2.1mm
2. Bridge rectifier to accept any polarity from power connector
3. Output voltage screw terminals
4. Power iIndicator LED
5. 5 volt voltage regulator
6. 28-pin AVRISP programming header
7. 8-pin / 20-pin AVRISP programming header
8. 40-pin AVRISP programming header
9. Microcontroller reset switch
10. Removable crystal to drive the microcontroller clock.
11. 28-pin AVR microcontroller socket
12. 20-pin AVR microcontroller socket
13. 8-pin AVR microcontroller socket
14. 40-pin AVR microcontroller socket
15. Expansion header containing the complete AVR microcontroller I/O
16. Port D I/O connector
17. Port C I/O connector
18. Port B I/O connector
19. Port A I/O connector

4. <u>Getting Started</u>

1. Installation instructions – software

   a. Insert the Atmel AVR CD into CD drive.
   b. Click Start in the pop up screen. The AVR web page will now be running from the CD.
   c. Click Software in the left hand toolbar.
   d. Next, Click AVR Studio 4, This will show all the features available when using the AVR Studio software.
   e. Scroll down to the CD marked "Install AVR Studio4.xx Build (Press "Open" when prompted). By clicking on this – then pressing "Open" when prompted, will allow you to install the software
   f. Follow the on-screen instructions.

For the most –up-to-date version of this software please visit the Atmel web page at: www.atmel.com

2. Installing AVR Studio 4 from Atmel's web page

   a. Click on the "Products" icon
   b. Using the left hand toolbar, click on "Microcontrollers", then "AVR 8-bit RISC"
   c. Again using the left hand toolbar click on "Tools & Software"
   d. Scroll down to the CD marked "AVR Studio4.xx Buildxx. By clicking on this – then pressing "Open" when prompted, will allow you to install the software.
   e. Follow the on-screen instructions.

For more help and guidance on installing AVR Studio visit the Atmel Website at: www.atmel.com

5. <u>Testing this product</u>

The following program will test the circuit.
The test file can be downloaded from www.matrixmultimedia.com.

The following instructions explain the steps to test and use your Atmel AVR Board. The instructions assume that AVR Studio is installed and functional. It also assumes that the test program *EB194Test.hex* has been downloaded. This test routine is a step-by-step guide to loading a program into the Atmel AVR Board.

Follow these instructions to test the Atmel AVR® Board

1) Ensure power is supplied to all the Atmel AVR® Board via the power connector J4.
2) Insert EB-004 LED board into Port B of the Atmel AVR® Board
3) Ensure that the Atmel AVR® is in correct configuration for programming
   - Ensure that a 20MHz crystal is inserted into X1 of the Atmel AVR® Board
   - Ensure that a 40 Pin ATMEGA324P is inserted into J12 of the Atmel AVR® Board
4) AVRISP connected to PC and J3 of AVR Board
   - Connect USB cable to PC and to AVRISP box (blue box)
   - Connect grey header socket (6-way) to J3 of AVR Board ensuring correct polarity
5) Open AVR studio Software
6) Cancel the pop-up window to open any project / files

7) Click on the AVR programming symbol ▦
8) Select ATMEGA324P device form "Device" pop-down window
9) Select the "…" button in the Flash section as shown below

10) Navigate to the program *EB194Test.hex*
11) Press the program button. This will program the ATMEGA324P with the test program
12) Check the illumination of all LEDs

This should satisfy that the Atmel AVR® Board is fully functional!

6. <u>Circuit description</u>
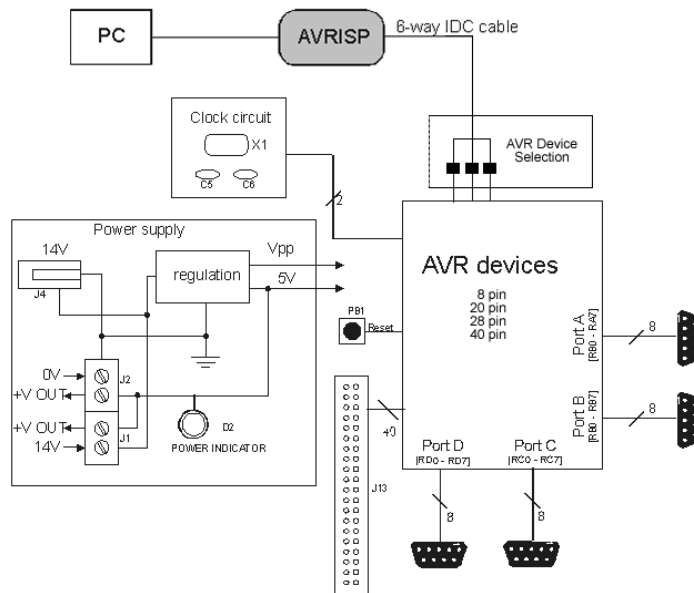
The AVR Multiprogrammer system is made up of several parts: the EB019 circuit board that allows various slave Atmel AVR® devices to be programmed, and the program to be executed 'seamlessly', and the Windows based programming utility AVR Studio.

1. Power Supply

The board can be powered from an unregulated 14V supply. The regulation circuitry will withstand unregulated 20V as a maximum input voltage and 7V as a minimum. If you are using a DC power supply then you should use a 14V setting. Power can be connected using the 2.1mm power jack or the screw terminal connectors J1, J2. The two "+V OUT" screw terminals are supplied for powering other E-blocks with approximately +5V. The regulator will supply up to 400mA via all outputs. LED D3 will indicate that power is connected to the board and that the voltage regulation circuitry is fully functional.

Please note connector J4 is directly connected to the J1 screw terminal pin 1 labelled '+14V', therefore any voltage input to J4 will also be available direct from pin 1 of J1. This means that '+14V' will not necessarily be +14V

Other E-blocks will have to receive +5V by placing a connecting wire from the "+V Out" screw terminal of the Multiprogrammer to the "+V" screw terminal of each E-Block that requires a voltage.

2. Programming Hardware

The AVR® Board connects to a personal computer via the AVRISP or compatible device. The AVRISP requires +5V and ground connection these are all provided on the board via one of the programming headers - J3, J9 or J10.

The following diagram shows the pin-out of the connector J3. The pin-out is the standard pin-out as used by AVRISP.
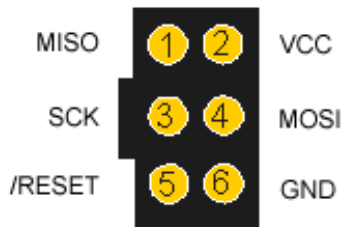
Figure showing Pin-Out of ISP header J3

By default the pins RB5, RB6, and RB7 are used to program the slave AVR® device. These are the pins that provide the programming functions MOSI, MISO and SCK respectively.

If problems occur in the programming sequence we recommend completely removing any E-blocks or circuitry connected to PortB. This allows MISO, MOSI and SCK to be completely clean whilst programming.

General Guide for positioning the AVR ISP programming header:

AVR ISP connected to:		
J9	J10	J3
28 Pin AVR	8 or 20 Pin AVR	40 Pin AVR

3. Programming Software

The CD ROM includes a range of development tools including an Integrated Development Environment for code writing in assembly and debugging, a professional C compiler, and the ISP programming software.

4. DIL Sockets and I / O Ports

The slave AVR® DIL sockets are wired in parallel (see circuit diagram below) and the ports are fed out to 4 D-type sockets grouped in ports. These signals are also available on a 40-way header for expansion purposes. Some of the ports will be inactive. This reflects the pin outs of the various AVR® devices themselves. For example, the ATMEGA8 only has Port B, Port C and Port D, therefore Port A is inactive. Please refer to device datasheets for availability of port outputs on each device.

NOTE – Only insert **ONE** Atmel AVR® device at a time!

5. Reset Push Button

PB1 provides a reset by pulling the /RESET pin low. PB1 is pulled normally high through a resistor so that the device will not be reset during normal operation. The programming software has control over the reset line during programming via the AVR ISP hardware.

6. Frequency Selection

By default the board is fitted with a 20 MHz crystal. The crystal fits into a small socket, which allows the crystal to be easily changed. This frequency was chosen to allow the ATMEGA324P to run at its maximum speed therefore increasing the processing power and productivity available from the board.
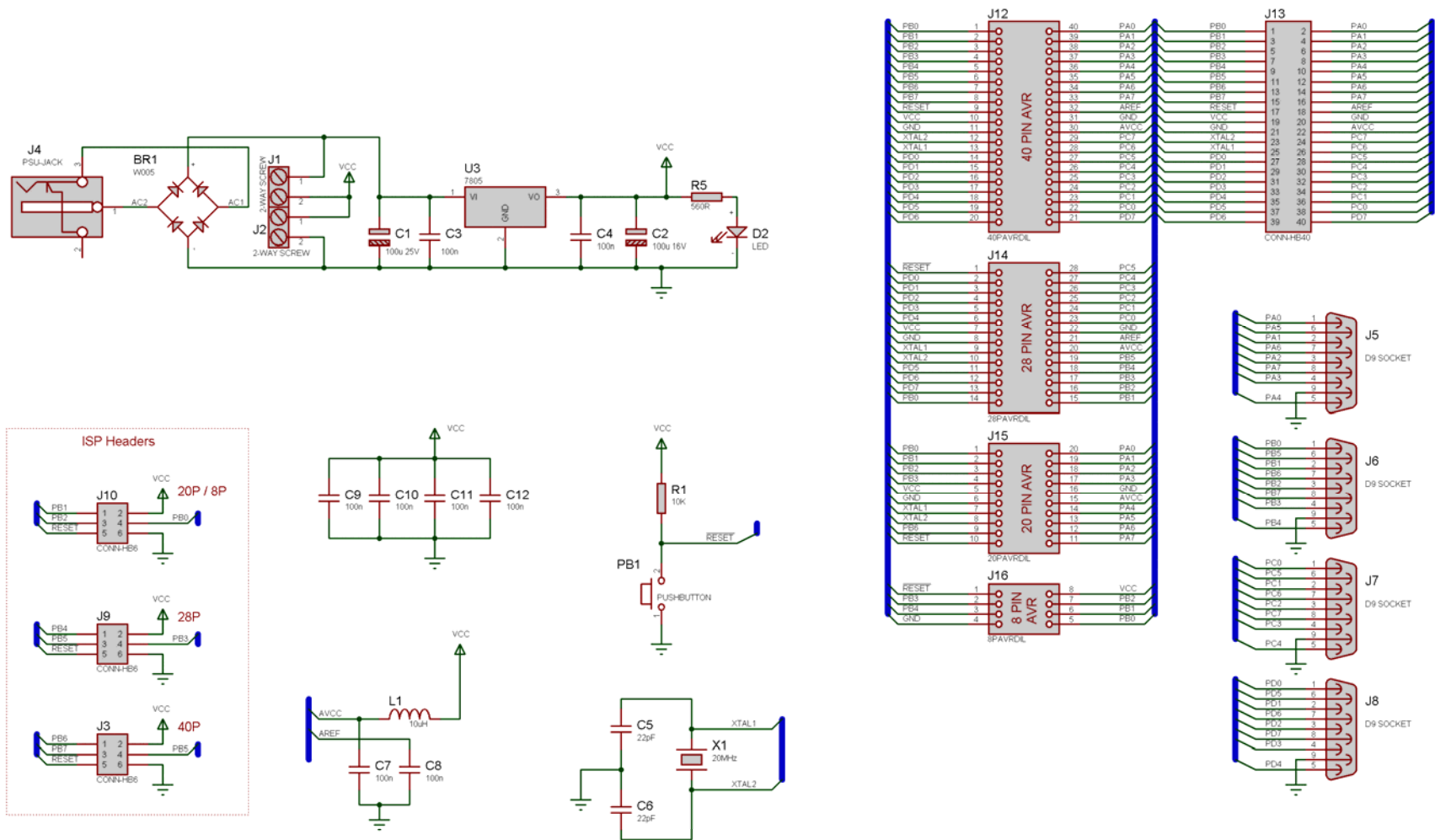
7. 3.3V operation

The EB194 AVR Multiprogrammer system is not compatible with 3.3V systems.

8. Supported devices

For an up to date list of supported devices please view the datasheet on the Atmel ISP which can be found in Atmel's web site: www.atmel.com

THIS SYSTEM INCLUDES:-

F1 FEET
F2 FEET
F3 FEET
F4 FEET
F5 FEET

B1 BAG
L2 LABEL
U1 ATMEGA324
J17 XTAL SOCKET

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