

1. About this document

This document concerns the Matrix Multimedia Motor Driver Board, code EB022-00-1.

1. *Trademarks and Copyright*

PIC and PICmicro are registered trademarks of Arizona Microchip Inc.

E-blocks is a trademark of Matrix Multimedia Limited.

EB022 and associated software and documentation are Copyright ©2006 Matrix Multimedia Limited.

2. *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-block 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.

C and assembly strategies

For strategy information for creating 'C' and Assembly code for the Motor Driver Board see members area. This can be found at www.matrixmultimedia.com/eblocks

3. *Disclaimer*

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

4. *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 any problems please email us at: support@matrixmultimedia.co.uk. When emailing please state the operating system, the version of PPP you are using.

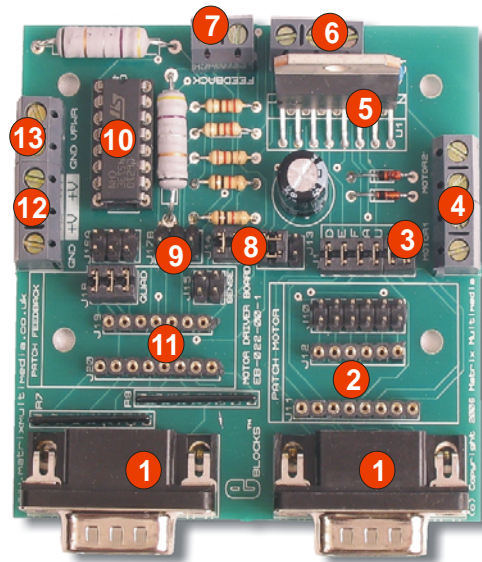
2. General Information

The Motor Driver Board allows the user to connect and drive two motors independently of each other. The inclusion of sense and quadrature terminals permits the user to employ feedback and positional control of the motor.

1. Features

- Provides the capacity to drive two motors simultaneously.
- Provides independent PWM control of each motor .
- Provides quadrature encoder capabilities to allow the user to sense both the position and direction of motor rotation.

3. Motor Driver Board Layout



Component description

- | | |
|---|-----------------------------------|
| 1. Downstream 9-way D type connector. | 10. L6210 monolithic IC. |
| 2. Motor patch system. | 11. Feedback patch system. |
| 3. Motor default selection pin. | 12. Power supply screw terminals. |
| 4. Motor 1 and motor 2 screw terminals. | 13. VPWR screw terminal. |
| 5. L298 dual full bridge driver. | |
| 6. Quadrature encoder screw terminals. | |
| 7. Feedback screw terminals. | |
| 8. Enable A/ Enable B selection jumper pin. | |
| 9. Sense default selection jumper pin. | |

The following table shows the setting for default operation.

EB022 Connectors	Settings
Motor jumper (J1)	Default
Enable (J13)	Refer to page 1 of the circuit diagram, Enable jumper system, diagram 3.
Quad	A or B
Sense (J14)	Default

NB. Ensure jumper links are positioned vertically on ENA, ENB (J13).
All other jumper links are to be positioned horizontally.

Motor Patch System

The motor patch system consists of one header pin connector (J10), an eight way SIL socket (J11) and a seven way SIL socket (J12). Selecting the patch default connector (J10) permits the user to connect IN1, IN2, IN3, IN4, ENA and ENB to any of the eight connections of the D type connector.

Feedback Patch System

The feedback patch system consists of a header pin connector (J18), an eight way SIL socket (J20) and a seven way SIL socket (J19). Selecting the Quad patch (J18) allows the user to transmit CA, CHB and CHI signals to any of the eight connections of the feedback D type connector.

The sense patch (J15) can be used to transmit SENSE signals to any of the eight connections of the feedback D type connector.

4. Testing This Product

The following instructions describe the test procedure for the EB022-00-1 Motor driver board.

1. System Setup

Multi-programmer board (EB-006) with:

EB006 Options	Setting
Power Supply	External, 14V
PICmicro device	16F877A
PSU/USB	USB
ICD2/USB	USB
SW1 (Fast/Slow)	Don't care
SW2 (RC/Xtal)	Xtal
Xtal frequency	19.6608 MHz
Port A	Feedback D-type
Port B	Switch board EB-007
Port C	Motor driver board
Port D	Motor driver board
Port E	
Test program	Motors test 1.fcf

Motor driver board with:

EB022 Default	Settings
Power Supply	External, 5V
Motor power supply	External, 3.3V – 24V
Motor Jumper Setting (J1)	DEFAULT
Enable Setting (J13)	Refer to page 1 of the circuit diagram, Enable jumper system, diagram 3.
Quad Setting	A or B
Sense Setting (J14)	DEFAULT

NB. Ensure jumper links are positioned vertically on ENA, ENB (J13).
All other jumper links are to be positioned horizontally.

2. Test Procedure

- 1) Wire power to all boards.
- 2) Wire motor and quadrature encoder to correct terminals.
- 3) Configure system and board options as above.
- 4) Download the test program to the Multiprogrammer
- 5) Press SW0 on Switch Board (EB-007). Motor 1 will start rotating.
- 6) Press SW1 on Switch Board. Motor 1 will rotate in opposite direction.
- 7) Press SW2 on Switch Board. Motor 2 will start rotating.
- 8) Press SW3 on Switch Board. Motor 2 will rotate in opposite direction.

5. Circuit Description

Please refer to the first page of the circuit diagram:

This E-block allows the simultaneous control of two independent motors using a L298 Dual Full Bridge Driver, U1. The L298 takes input logic at 3.3V or higher from an upstream E-block via J2, and provides current and voltage gain to condition the signals for driving inductive loads such as DC and stepper motors. The combination of J1 and J2 link selection blocks allow users to use the default connections (please refer to the circuit diagram) or to define their own connections to the upstream E-blocks using jumper wires. The L298 can operate at voltages up to 46V 2A peak. Care must be taken not to exceed these ratings or the L298 may be damaged.

Two enable inputs are provided to enable or disable the L298 independently of the other input signals. J13 can be wired in one of three ways: With the jumper block connectors lined up vertically, and on the top 4 connectors the enable lines are permanently connected to Vcc – always enabling the L298. With the jumper block in a horizontal position on the lower four connectors then the L298 takes its enable status from the inputs on J2.

The outputs of the L298 are connected to the L6210 which contains eight Schottky diodes arranged as two separate diode bridges. The L6210 contains a number of diodes which clamp any induced reverse voltages from inductive loads to the ground and power rails to prevent damage to the circuit.

The terminals J4 and J5 provide terminals for motor 1 and motor 2 respectively.

Please refer to the second page of the circuit diagram:

The resistors R1 and R2 are connected between the motor load and ground via the L298. The voltage across R1 and R2 is proportional to any current flowing through the motor and can therefore be used to sense the motor load or work rate. The two zener diodes clamp the resulting voltage to 3.3V to prevent high voltages being passed back to the upstream board.

The screw terminal connector J21 allows quadrature feedback to be passed back to the controlling circuit via a patch and link block system. The screw terminal J7 allows an additional input signal to be incorporated into your system. Resistors R7 and R8 provide protection for the upstream device.

3.3V Operation

This board is compatible with upstream boards operating off 3.3V.

