MOTOR-1B

STEPPER MOTOR DRIVER PERIPHERAL BOARD

Technical Manual

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WARRANTY:
BiPOM Electronics warrants MOTOR-1B for a period of 1 year. If the board becomes defective during this period, BiPOM will at its option, replace or repair the board. This warranty is voided if the product is subjected to physical abuse or operated outside stated electrical limits. BiPOM Electronics will not be responsible for damage to any external devices connected to MOTOR-1B. BiPOM Electronics disclaims all warranties express or implied warranties of merchantability and fitness for a particular purpose. In no event shall BiPOM Electronics be liable for any indirect, special, incidental or consequential damages in connection with or arising from the use of this product. BiPOM Electronics' liability is limited to the purchase price of this product.

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1. Overview

MOTOR-1B is a stepper motor peripheral board for the MINI-MAX series of micro-controller boards. It offers complete control and drive for bipolar stepper motors in full, half, quarter, and eighth-step modes, with output drive capability of 30 V and ±750 mA. It requires an external power source to power the motor.

2. Specifications

- Integrated bipolar stepper motor controller A3967 (IC1) from Allegro Microsystems.
- 7-pin terminal block for external power source and motor connections (X31).
- 5-pin connector for external control (X30).
- Jumpers X15, X16, X17 to select the port pin to control RESET line of motor controller
- Jumpers X18, X19, X20 to select the port pin to control SLEEP line of motor controller
- Jumpers X1, X2, X3, X14 to select the port pin to control ENABLE line of motor controller
- Jumpers X8, X9, X10, X11, X12, X13 to select the port pin to control DIRECTION line of motor controller
- Jumpers X4, X5, X6, X7 to select the port pin to control STEP line of motor controller
- Jumpers X23 and X24 to select Microstep mode
- 20-pin Expansion Connector (X29) interface to a variety of micro-controller boards
- Dimensions are 2.35 X 2.40 inches (5.97 X 6.10 centimeters)
- Mounting holes of 0.125 inches (3.18 millimeters) are on four corners
- -20° to +85° C operating, -40° to +85° C storage temperature range

3. Expansion Connector

The 11 control pins and 5 Volt power supply pins are available on the 20-pin connector (X29) for interfacing to a variety of micro-controller boards. MOTOR-1B board can be connected to a host board either as a piggyback daughter-board using standoffs or can be placed away from the host board using a 20-wire ribbon cable (Part #: EXPCABLE-6). Table 1 shows the pin assignments for the expansion connector.

Expansion Connector (X29)

Signal	Pin	Pin	Signal
Not Connected	20	19	Not Connected
P3.2	18	17	P3.3
P3.4	16	15	P3.5
P3.6	14	13	P3.7
P1.0	12	11	P1.1
P1.2	10	9	P1.3
P1.4	8	7	Not Connected
Not Connected	6	5	Not Connected
Not Connected	4	3	GND
VCC (+5V)	2	1	Not Connected

Table 1

4. Operating modes

The RESET input (active low) sets the motor controller to a predefined home state and turns off all of the outputs. STEP inputs are ignored until the RESET input goes high.

A low-to-high transition on the STEP input sequences the motor controller and advances the motor by one step. The motor controller controls the direction of current flow in each winding. The size of the step is determined by the state of MS1 and MS2 input jumpers as shown in Table 2.

MICROSTEP Select Jumpers: MS1(X24), MS2(X24)

MS1	MS2	RESOLUTION
ON	ON	FULL STEP (2 PHASE)
OFF	ON	HALF STEP
ON	OFF	QUARTER STEP
OFF	OFF	EIGHT STEP

Table 2

The state of the DIRECTION input will determine of motor direction.

ENABLE input enables all outputs when logic low. When ENABLE input is logic high, the outputs are disabled. Inputs to the translator (STEP, DIRECTION, MS1, MS2) are all active independent of the ENABLE input state. In the event of a fault (excessive motor controller temperature), motor controller outputs are disabled until the fault condition is removed. At power up, and in the event of low supply voltage, the under-voltage lockout (UVLO) circuit disables the drivers and resets the motor controller to home state.

SLEEP input is active low and is used to minimize power consumption when not in use. SLEEP input disables much of the internal circuitry including the outputs. A logic high on SLEEP input allows normal operation and start up of the device in the home position.

5. Motor and external power supply connection

External power supply to drive the motor should be connected to V+ and GND terminals of X31. It should have enough current capacity to drive the stepper motor.

Bipolar motor (four wires):

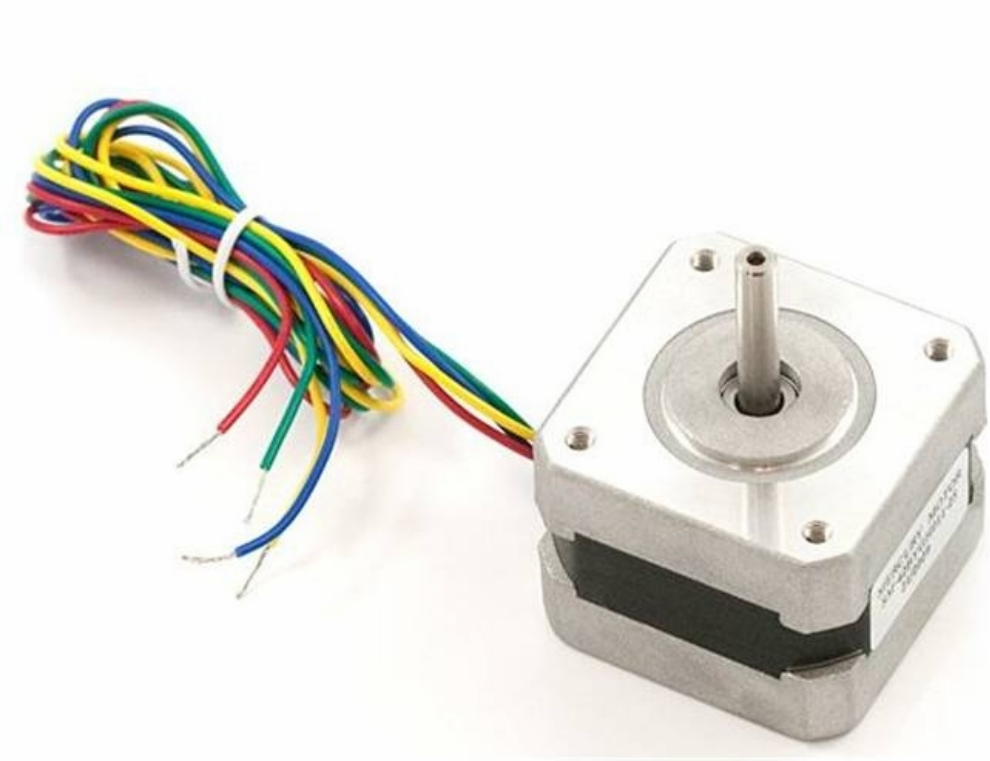


Figure 1 shows how to connect a stepper motor to the board

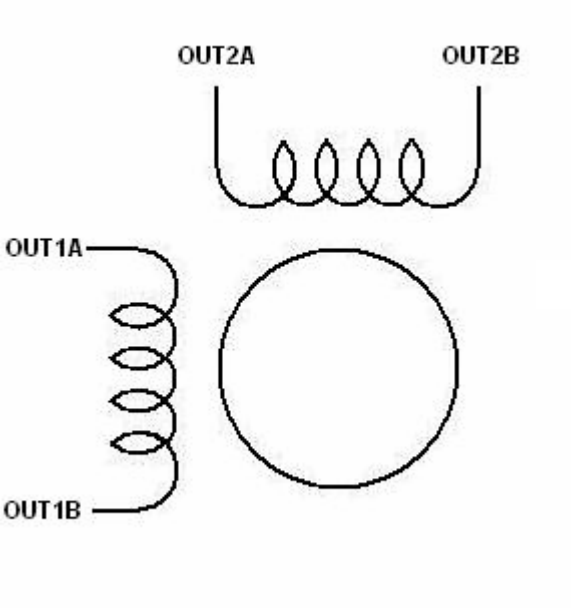
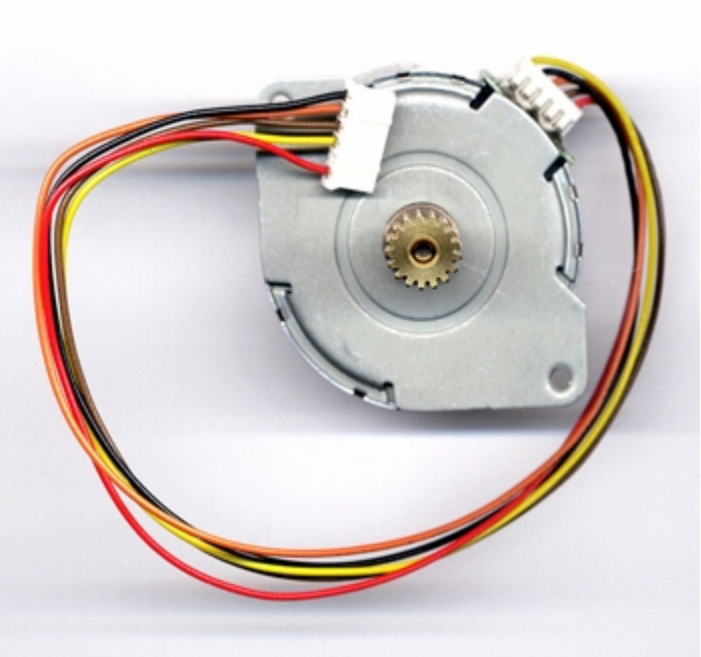


Figure 1

Unipolar motor (six wires):



To use a six-wire motor, first identify the three wires that have continuity to each other and to center tap. The resistance from the center tap to one of the end wires is half of the resistance between the end of the wires.

Use only one end wire and one center tap of each winding. Figure 2 shows how to connect a stepper motor to the board using half winding:

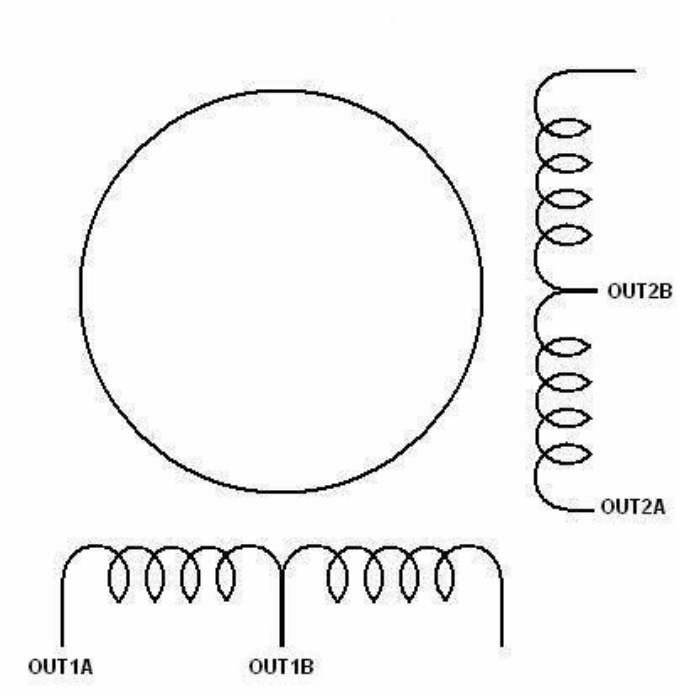


Figure 2

Alternatively, you can use the full winding (ignore the center tap wires). This results in half the rated current, but the high speed torque is reduced because full winding has four times the inductance of half-winding configuration. Figure 3 shows how to connect a stepper motor to the board using full winding:

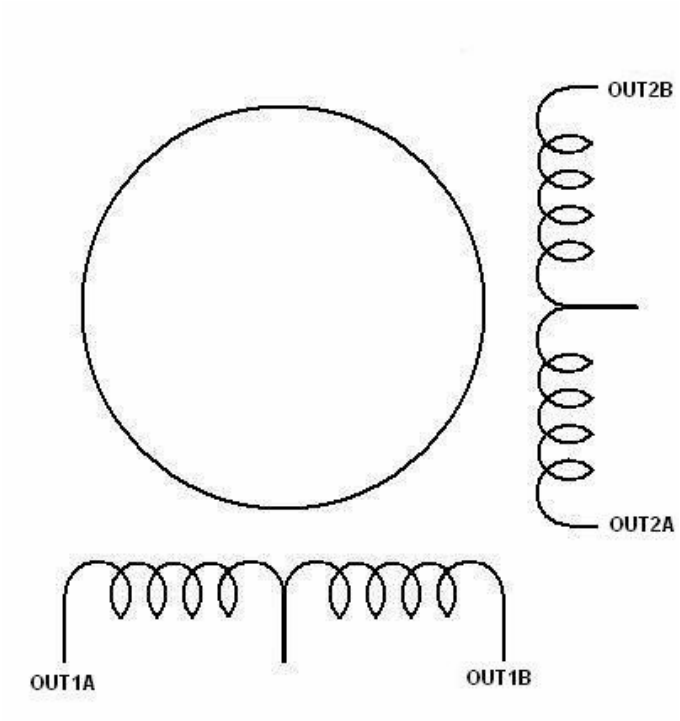


Figure 3

6. Board Layout

Figure 2 shows positions of major components, connectors and terminals on the MOTOR-1B board.

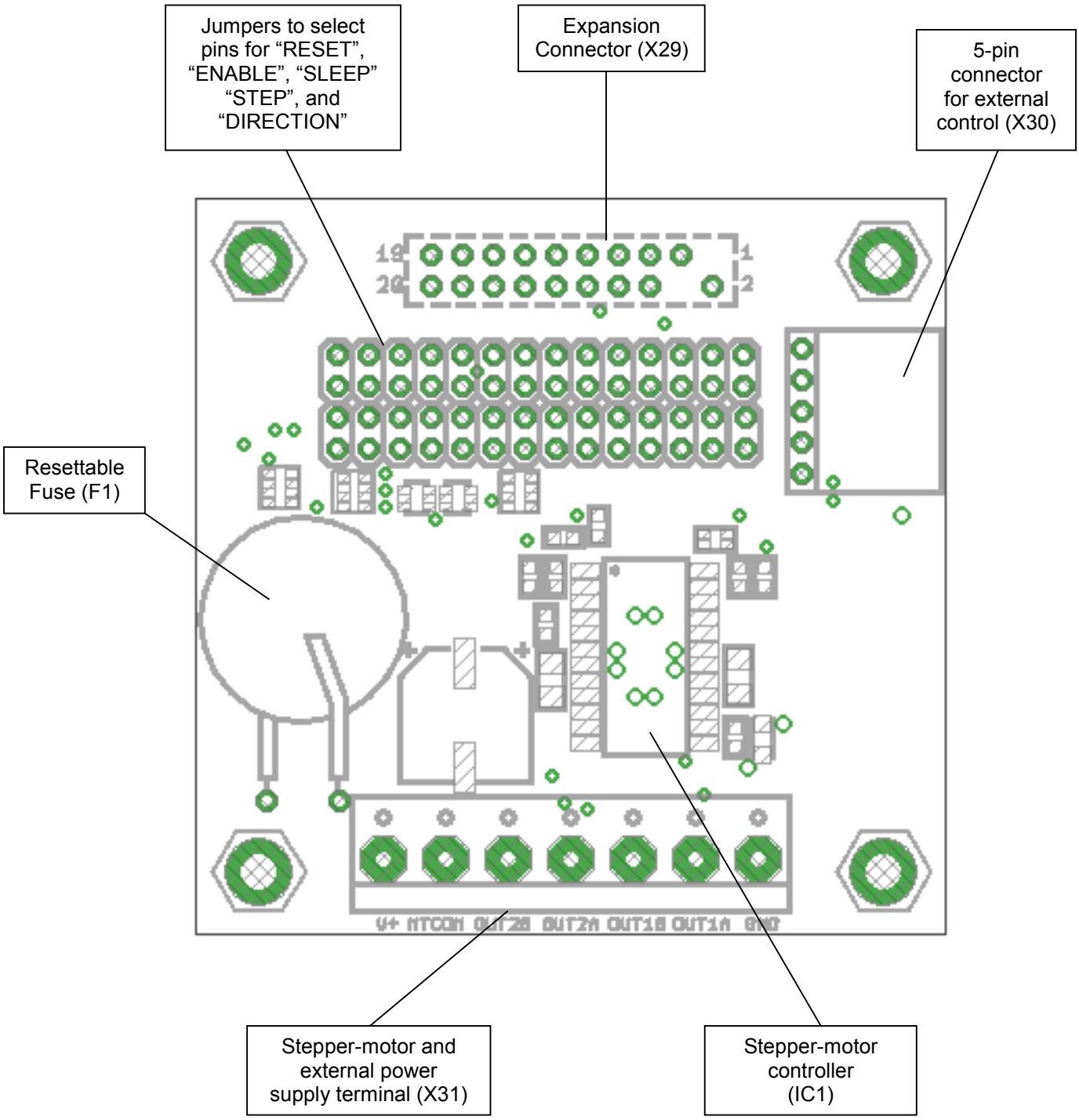


Figure 2

7. Schematics