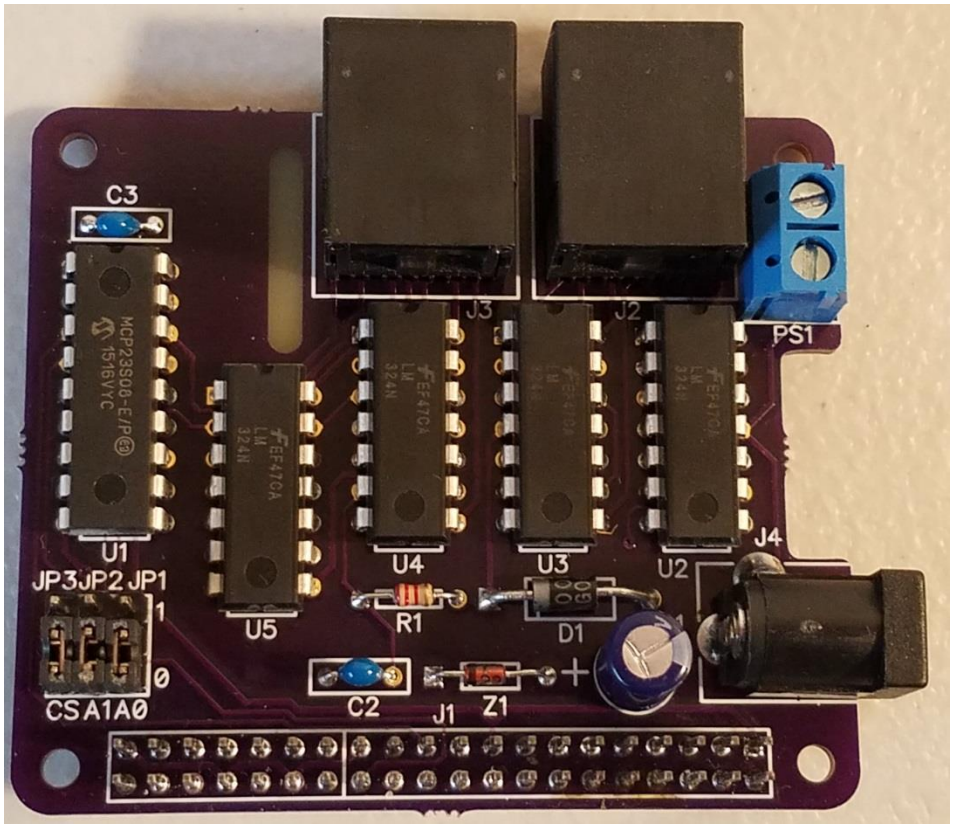


PiRyte Mini Stall Motor Beret
Revision 1.0 User Manual

PiRyte Mini Stall Motor Beret Installation and User Guide.

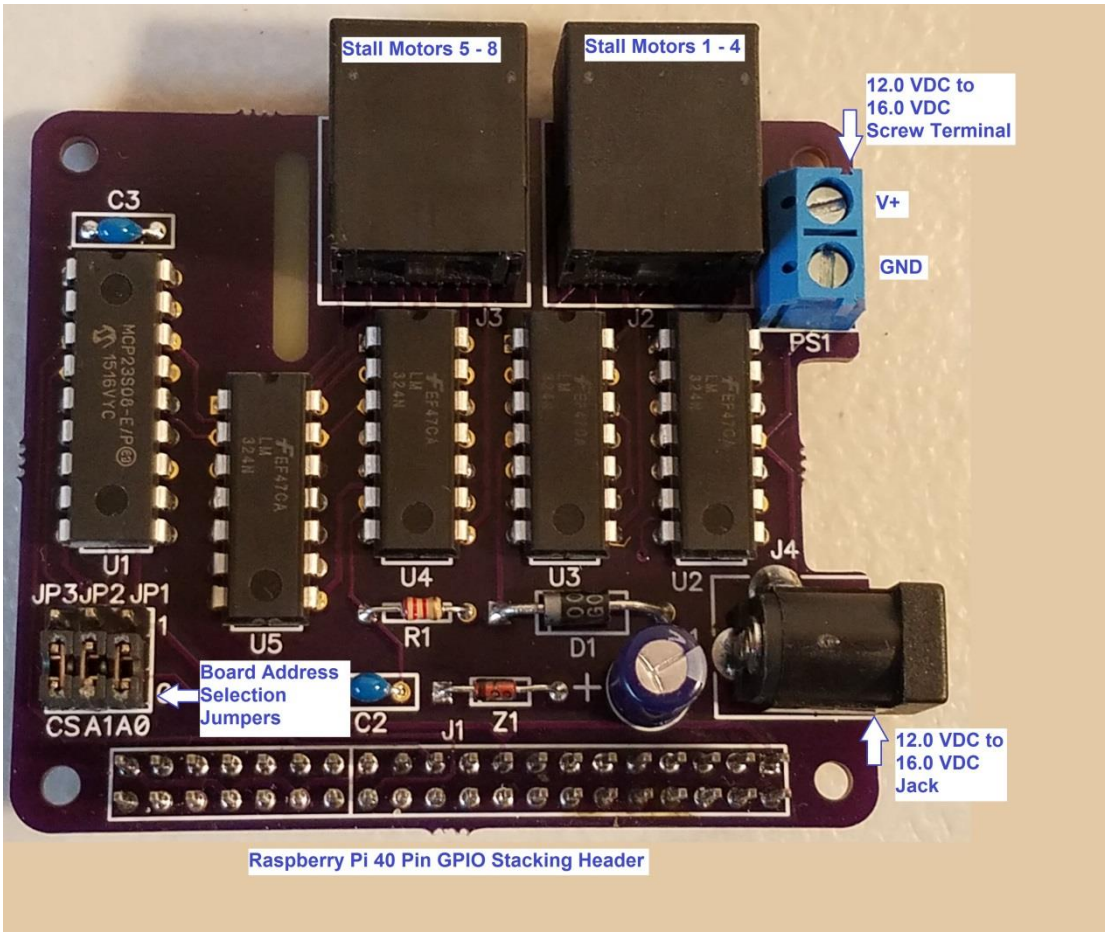
December 13, 2016

Overview

Congratulations on your purchase of the PiRyte Mini Stall Motor Beret interface board!

Please read this entire manual before using to ensure you receive maximum benefit from this board while protecting your investment in your Raspberry Pi/PiRyte stack.

While reading this document, please refer to the graphic below on the following pages.



Stall Motors

The PiRyte Mini Stall Motor Beret has the ability to drive up to eight Circuitron Tortoise type stall motors. Each of the two stall motor jacks accepts any off the shelf RJ45 Cat 5 Ethernet cable. You can then break out the cable wires however you need to at the other end either by plugging the cable into an RJ45 type break-out board like the one below, or by running individual wires to your motors.

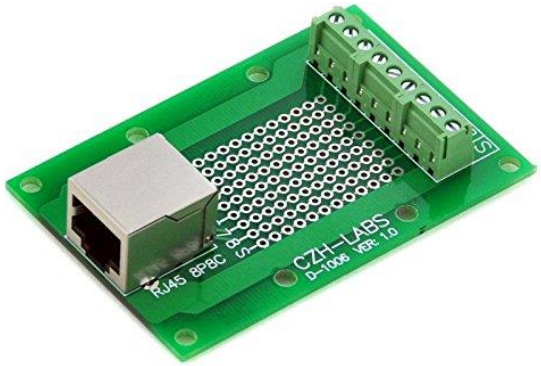


Figure 1: Readily available 8p8c RJ45 breakout board

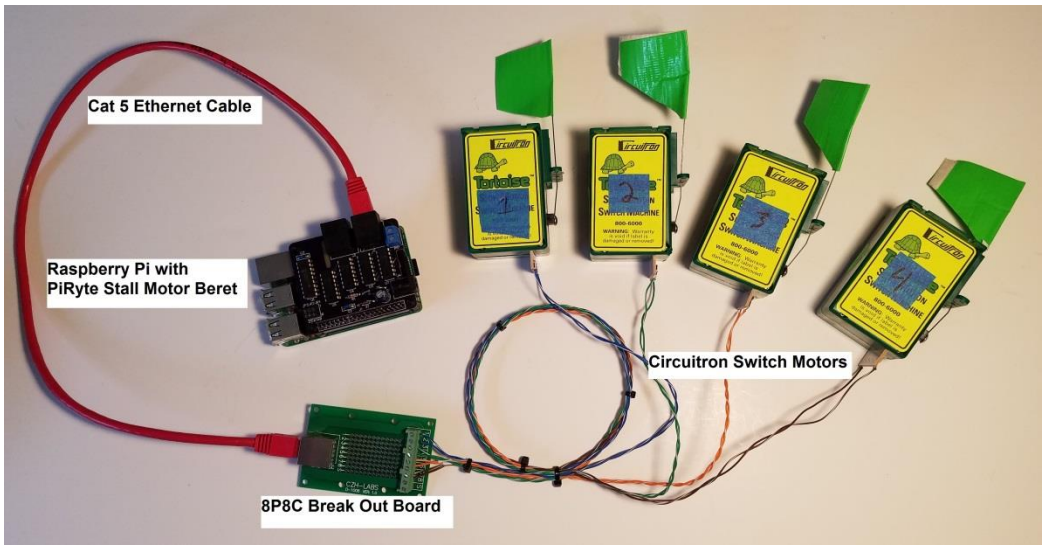
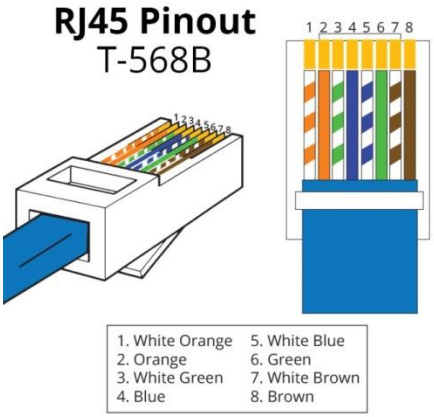


Figure 2: Circuitron motors wired to the Raspberry Pi

If you should desire to break out as individual wires, please refer to the below references:



J2 Stall Motors 1 - 4	V+ (Normal)	V- (Normal)
Stall Motor 1	Pin 1	Pin 2
Stall Motor 2	Pin 3	Pin 4
Stall Motor 3	Pin 5	Pin 6
Stall Motor 4	Pin 7	Pin 8

J3 Stall Motors 5 - 8	V+ (Normal)	V- (Normal)
Stall Motor 5	Pin 1	Pin 2
Stall Motor 6	Pin 3	Pin 4
Stall Motor 7	Pin 5	Pin 6
Stall Motor 8	Pin 7	Pin 8

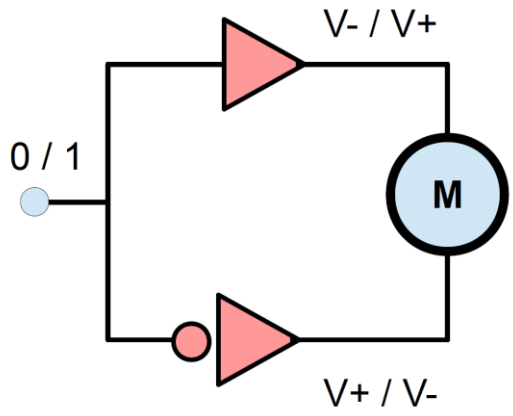


Figure 3: Circuit for driving a stall motor

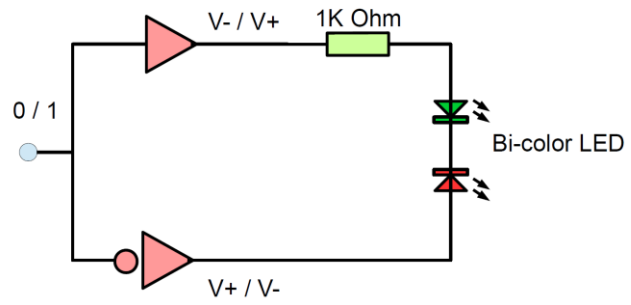


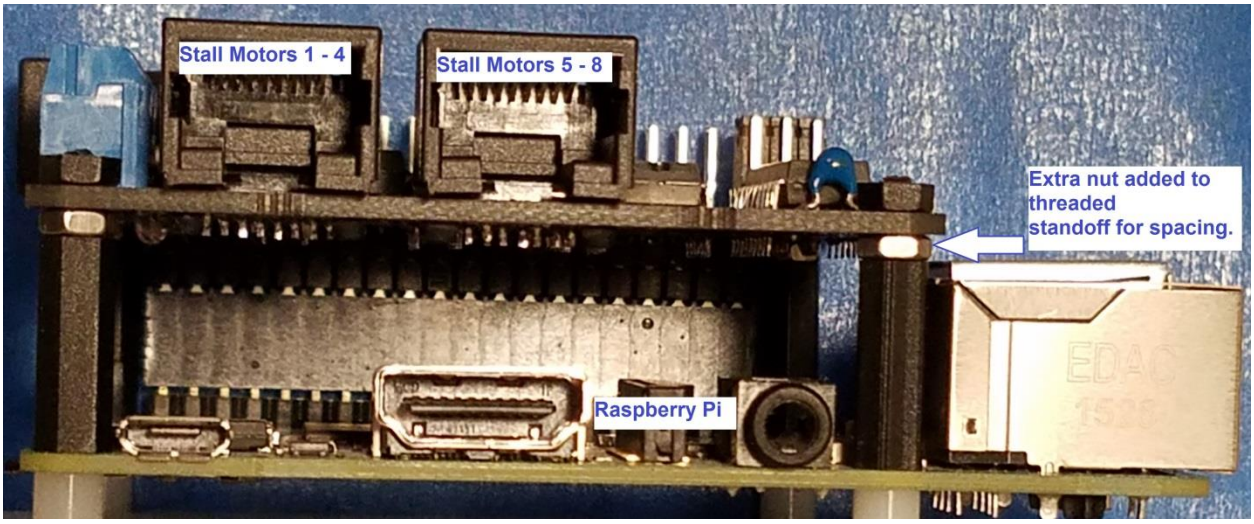
Figure 3: Circuit for driving bi-color LED

Mating the Stall Motor Beret Board to the Raspberry Pi

Your Stall Motor Beret conforms to the Raspberry Pi HAT specification with the exception that it does not have the configuration EEPROM. Additionally, the stacking headers and RJ45 jacks require that the spacing between boards to be a bit more than what is specified. Thus, it becomes a Beret and not a HAT.

Initially, the stacking connector J1 will fit into mating connectors very tightly so care must be taken to not damage boards or bend connector pins by using too much force if you wish to separate the boards later on. Therefore, it is recommended to use a rocking approach for both stacking and separating boards. For example, when stacking, gently seat the top board on top of the bottom board ensuring that J1 is properly aligned. Pick one end of the board and gently apply pressure. Release pressure, then move down along the connector and apply pressure again and so on back and forth until the two boards are properly seated. Use the same principals when separating the boards; do a little bit at a time working back and forth along the connectors.

It is recommended to use the threaded standoffs that come with the board to ensure a tight mechanical fit. If this board is the first to be stacked on top of the Raspberry Pi, then use the extra nuts as spacers shown in the image below. This will ensure proper spacing between the Raspberry Pi and the Stall Motor Beret. You do not need the extra spacing for additional boards mounted on top of the first board.



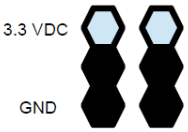
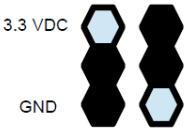
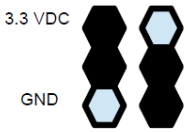
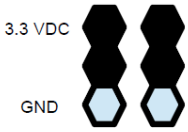
External 12VDC – 16VDC (J4 and PS1)

12 VDC to 16 VDC is required to power the stall motors. This power must be provided externally by either a 2.5 mm bayonet type plug with a positive center into J4 or by wiring directly into PS1. If you're using a power pack plugged into J4 then any standard 12 VDC 2 amp regulated power pack or wall wart should work as long as the plug is 2.5 mm and is center positive. If you use PS1, the positive lead goes into the right connector while the ground lead goes to the left connector as shown in the photo on page 2. The Stall Motor Beret is protected by a diode to prevent reverse polarity.

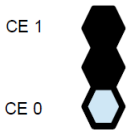
I/O Extender Address and I/O Extender Channel Selects (JP1, JP2, JP3)

The Stall Motor Beret uses an MCP23S08 I/O Extender communicating with the Raspberry Pi over an SPI buss. You have the ability to stack a total of eight Stall Motor Berets using a combination of addressing and channel selects. Four Stall Motor Berets go on channel 0 and another four go on channel 1 to drive a total of 64 stall motors. JP1, and JP2 determine the address of the I/O extender while JP 3 determines the channel select. Please refer to the accompanying tables for proper addressing.

Notice that the MCP23S08 has an address space of 0 – 3. So, if you're planning to mount boards with other SPI I/O extender chips such as the MCP23S17, you may be able to overlap address space. That is set the MCP23S08 to 0 - 3 and the MCP23S17 to 4 – 7. Another stratedgy would be to put all the Stall Motor Berets on one chip select and all the other MCP23S17s on the other chip select.

JP 2 A1 / JP 1 A0	MCP23S08 Extender Hex Address	MCP23S08 Extender Breezy4Pi Address
	0X40	Address 0
	0X42	Address 1
	0X44	Address 2
	0X46	Address 3

PiRyte Stall Motor Beret Addressing Modes

JP 3	Raspberry Pi Chip Select	Breezy4Pi Channel
	CE 0	Channel 0
	CE 1	Channel 1

PiRyte Stall Motor Beret SPI Chip Select Modes

Output Mappings

Jack	MCP23S08 GPIO	Output
J2	GP0	Stall Motor 1
	GP1	Stall Motor 2
	GP2	Stall Motor 3
	GP3	Stall Motor 4
J3	GP4	Stall Motor 5
	GP5	Stall Motor 6
	GP6	Stall Motor 7
	GP7	Stall Motor 8

The above table is provided to aid in properly configuring software to control the MCP23S08 I/O extender on the PiRyte Mini Stall Motor Beret.

If you're controlling the PiRyte Mini Stall Motor Beret with the Breezy4Pi application a board template will be available on the Breezy4Pi.com website.

Assembling the Mini Stall Motor Beret from a kit

We assume that if you are assembling the Stall Motor Beret from a kit that you are experienced in assembling and soldering circuit boards and their components.

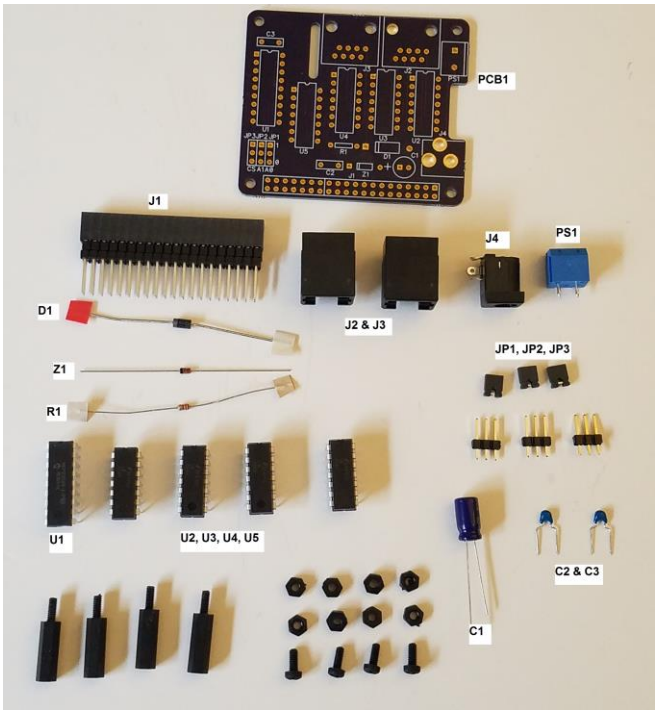


Figure 4: Parts Reference

The following order of assembly is recommended:

1. Solder in J1. Make sure that it is “upside down” i.e. with the female portion of the socket under the board so that it can mate with other PiRyte boards and the Raspberry Pi. For best results, make sure the socket is snug against the board and perpendicular to the board.
2. Solder the resistors, diodes, and small caps: R1, Z1, D1, C1, and C2. Please observe the polarity of Z1 and D1.
3. Solder in all the I.C.s. It is recommended that you don’t solder in one part at a time but instead do a few pins per part then move on to another part. This allows parts to cool down and not over heat which can lead to damage of the I.C. If you choose to use I.C. sockets, then you won’t have this issue.
4. Solder J4 and PS1.
5. Solder JPs 1 – 3.
6. Solder J2 and J3.

Warranty

Fully assembled PiRyte interface boards from the factory are warranted against manufacturing defects for a period of one year from date of purchase. As the circumstances under which this product is installed cannot be controlled, failure of this product due to installation problems will not be warranted. Such issues include but are not limited to: applying over voltages to digital inputs, not using clamping diodes on open collector outputs or trying to drive more current than the driver is capable, and improperly changing the shunts on power jumpers causing the interface board, the Raspberry Pi, or both to fail.

Unassembled kits are warranted for the parts only as home assembly cannot be controlled. However, if you do find yourself with a non-working board and have exhausted all attempts to fix the issue, then the board may be exchanged for a new kit at a discounted price.

Product that has failed for non-warranted reasons may be exchanged for new of equivalent functionality at a discounted price. Please email us using the “Contact Us” page at www.podbay3.com for more details.