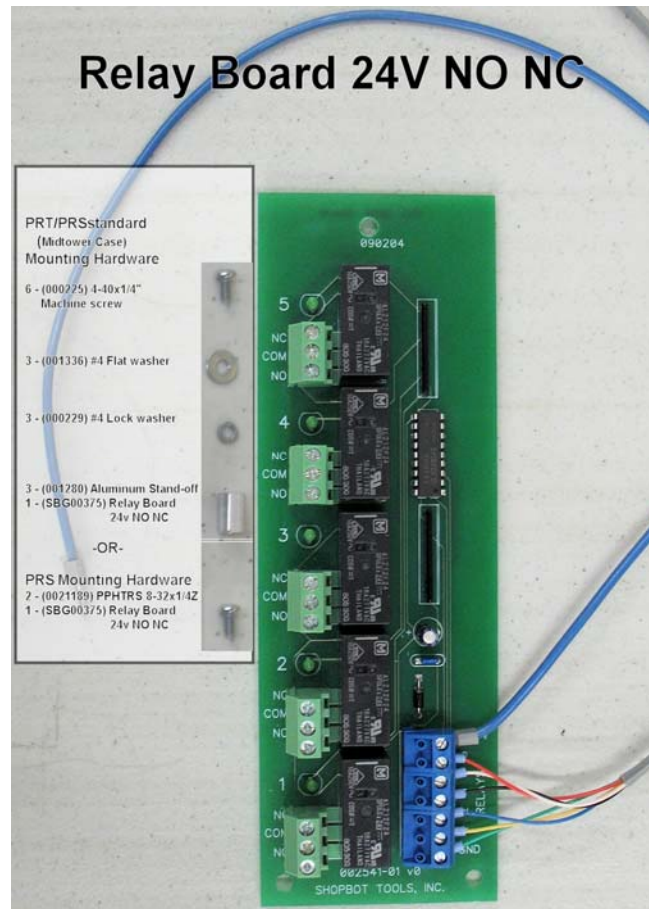


5-Position Relay Board (24v) Installation and Operation



The 24v relay board allows users to control on/off switching of 110V-220V (**15A max**) and other low voltage devices in the ShopBot Control Software. It can be installed in all ShopBot models. Some models may require the addition of a 24V power supply (#12547) also.

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WARNING

ELECTRIC SHOCK CAN KILL

Use extreme caution when working near electrical circuits. Dangerous voltages exist inside the power supply that can cause serious injury or death. Use extreme caution throughout this installation.

Installing the 5-Position (24v) Relay Board

In the PRSalpha, PRTalpha, or PRSstandard (RBK).

Turn off and disconnect all power going to the control box.

Open the control box door.

The relay board should fit to the left of the alpha control board. Check to see if mounting holes are already present in the control box.

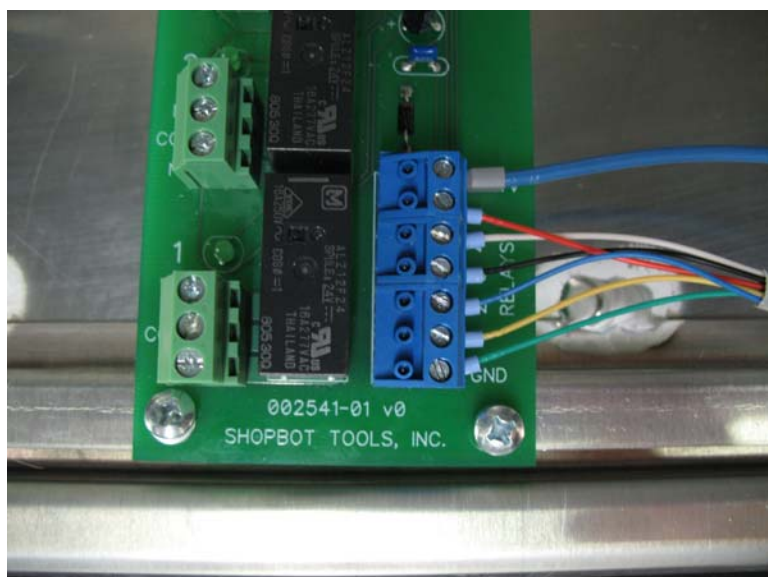
If holes are present, use the two 8-32 x 1/4" screws to mount the board then continue to wiring the 24v Relay Board for the PRS or PRTalpha.

If holes are not present,

Slide the board into the slot at the back of the control box and mark the locations to drill on the front edge of the box.

Remove relay board and drill 2 9/64" holes to mount the relay board.

Mount the relay board in the slot at the back of the control box. Use two 8-32x1/4" screws to secure board to the front edge of the box.



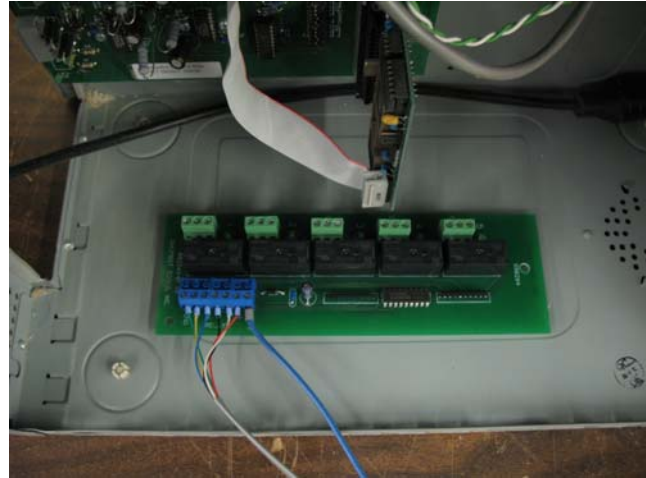
In the PRSstandard or PRTstandard

Turn off and disconnect all power going into the control box.

Remove the side from the control box.

If the control box does not have a 24V power supply (#12547), install this now. See instructions for installing the power supply in the 24v Power Supply Install PRT document (SBG00311).

If 24V power supply is present, continue to the next step.

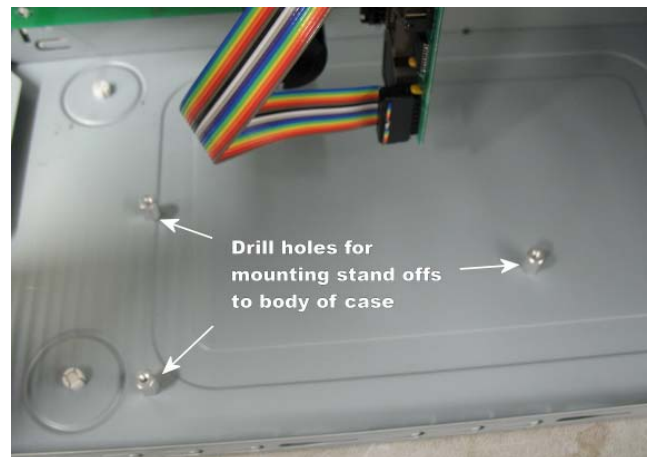


Locate an open area on the floor of the control box where relay board will fit.

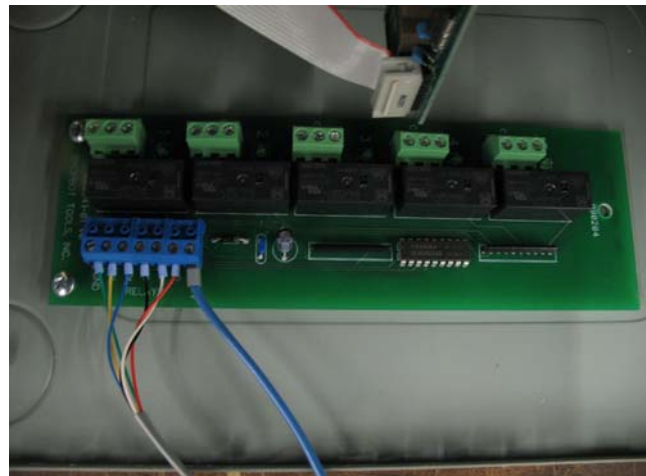
Mark the location for 3 mounting holes to be drilled through the control box wall.

Drill three (3) 3/16" holes in the wall.

Mount the aluminum stand-offs with three (3) 4-40x1/4" screws. Use lock washers on the reverse side.



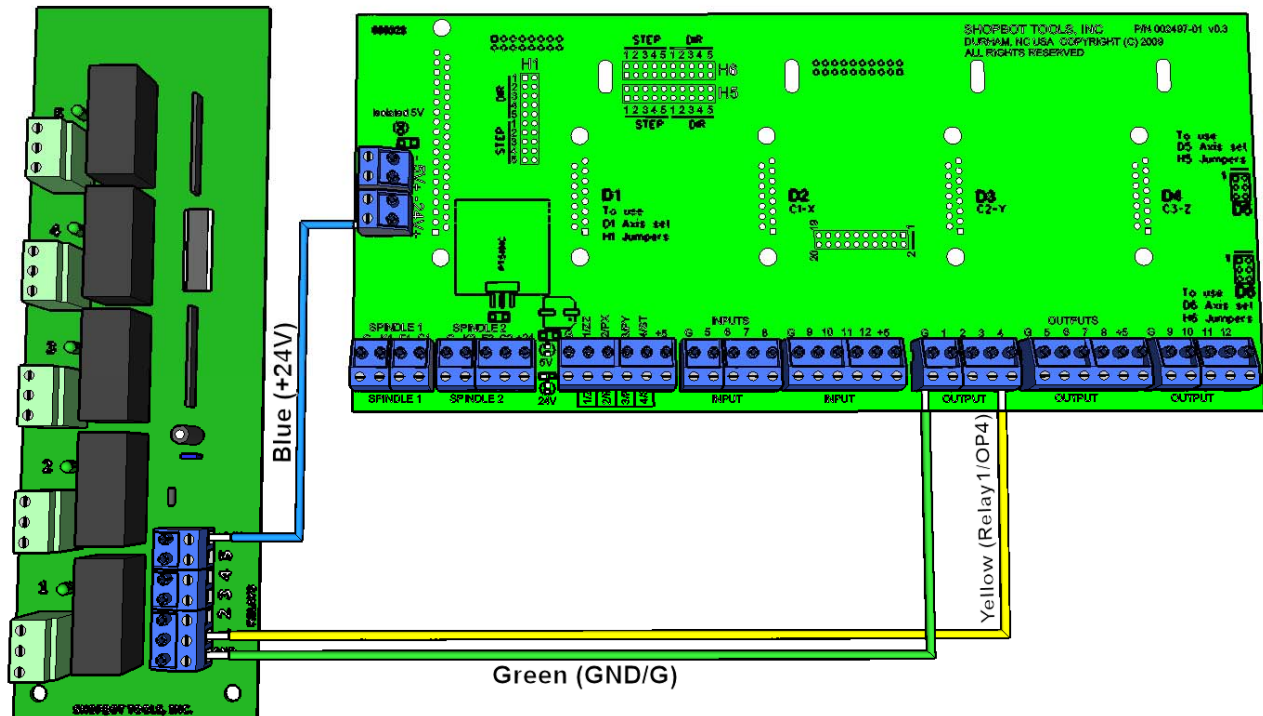
Mount the relay board using the other three (3) 4-40x1/4" screws and flat washers.



Locate the green ground wire on the relay board (GND) and connect this to the blue terminal block position marked (G) on the control board. Note: there are several ground positions located on the control board, any of these will work.

Outputs

The Outputs determine how the connected item will be switched on/off through the software. The operator may want to use the relay board to synch with normal operations on the machine. The diagram below is an example of this. Because Output 4 is active every time the ShopBot is in motion, a warning light might be installed to signal the operator that the machine is about to move or is live. A list of commonly used outputs is included at the end of this document.



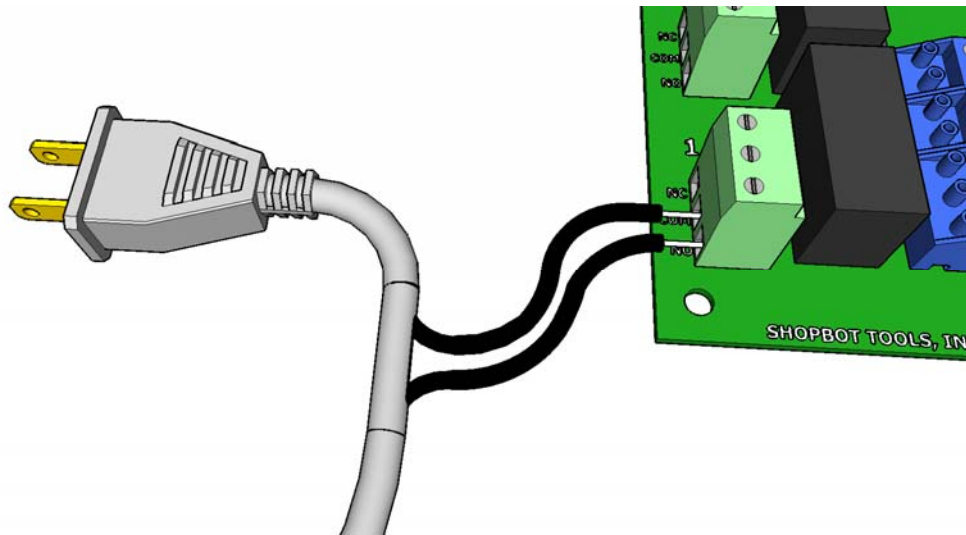
Wire output 4 from the control board to the blue terminal block position 1 on the relay board.

Note: Relay board positions do not relate back to any software interface control; they represent only the device position that is to be switched on/off. See Relay Diagram for: PRSalpha (Additional Devices), V4G with 63V Power Supply, and PRSstandard (RBK Board) at the end of this document for reference.

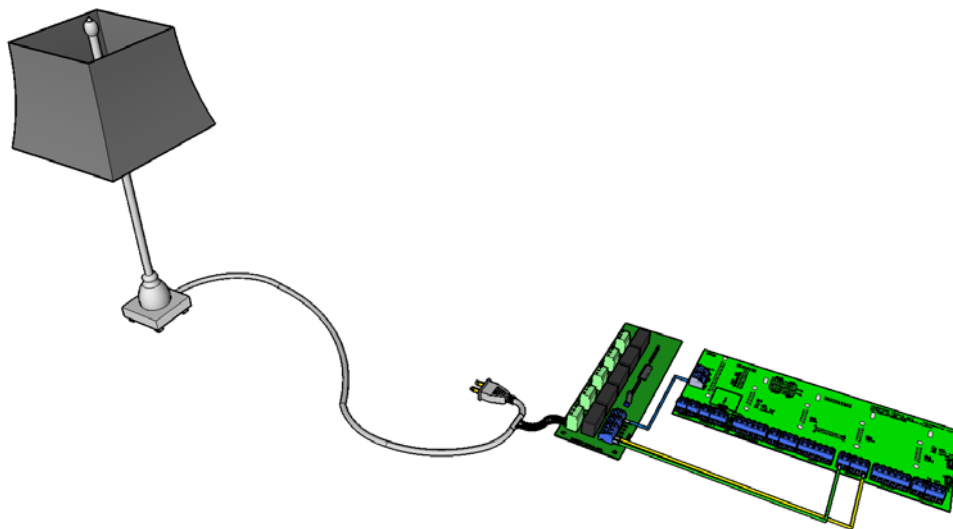
A Single Device

The relay board has 5 positions into which devices may be wired. Each position has a **normally open (NO)** and **normally closed (NC)** position as well as a **common connection (COM)**. In this example of the warning light, assume that the light is normally open. Locate the hot leg of the device (typically the wire connected to the small blade on the plug). Make a loop in this wire and route one end into **COM** and the other end into **NO** on the green terminal block of the relay board. This is essentially allowing a switch to be placed in line with the device.

Note: Place the loop for the device in a location that is practical. This will need to be routed into the control box and still allow for the device to be plugged into its own power source. The model below is for illustration only.

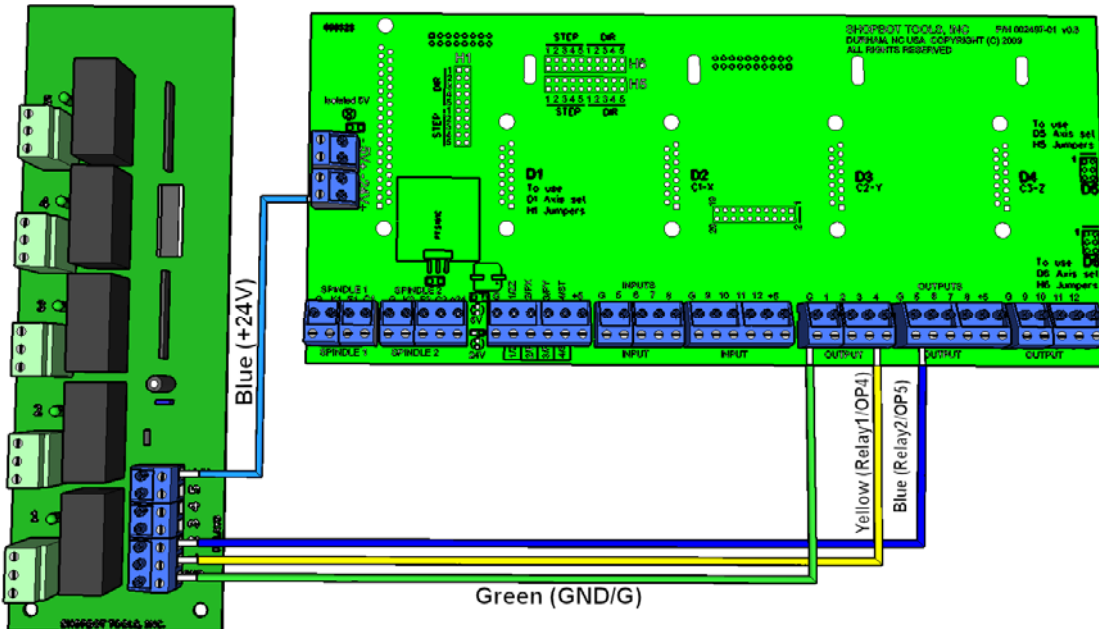


In simple terms, you have a working light installed that will turn on when output 4 is off and turns off when output 4 is switched on. Reverse the wire from **NO** to **NC** for a normally closed device.

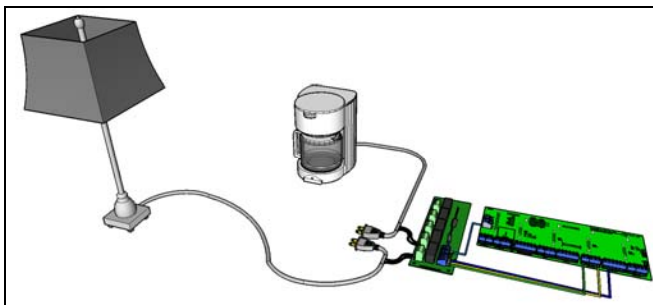
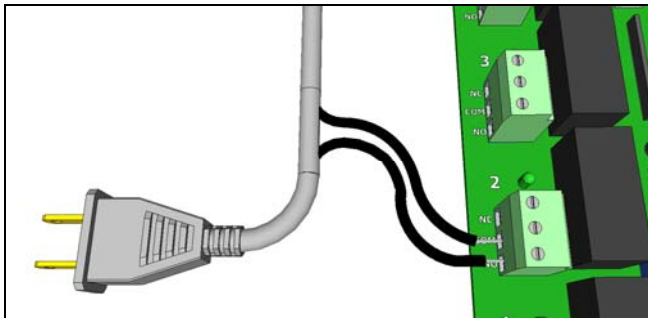


Multiple Devices

In the example below, assume that we are adding to the existing light already being controlled by the relay board. Let's call it a coffee maker. It will be controlled through the software by output 5. Wire the desired relay position (for this example relay position 2) to output 5 on the control board.



Locate the hot leg of the device (typically the wire connected to the small blade on the plug). Make a loop in this wire and route one end into COM and the other end into NO on the green terminal block of the relay board.



Air Drills

This section is for the PRS/PRT alpha only. Note that PRTalpha must have a RetroZ-axis upgrade before the PRS air drill can be mounted on a PRTalpha. PRS air drills are not recommended for PRS/PRT standards (open loop control systems). Early PRS air drills (single valve units prior to May 2011) that turn on and plunge at the same time may have up to 4 drills on a relay board. These only required a single output per drill. Later PRS air drills (double valve units) plunge to depth and cycle the drill on and off between holes require 2 outputs per drill and would require a second relay board and an updated PRSalpha board . For tracking purposes label the wires from the air drill (drill #1, drill #2, etc.)

The +24v and Gnd powering the air drills should come from the 24v power supply (V+ and V-). This power may be jumpered from terminal positions as needed with the addition of multiple air drills.

PRS air drills (single valve prior to May 2011)

See Relay Diagram for PRSalpha (Air Drills) at end of document for reference.

Relay board to Control Board connections.

For the **primary air drill (drill #1)**

Place the **blue wire** from position 2 (or the desired position) on the relay board **to output #5** on the control board. This will signal the solenoid to turn the drill on and to plunge to depth.



For additional air drill (**drill #2**)

Place the **black wire** from position 3 (or the desired position) on the relay board **to output #6** on the control board. This will signal the solenoid to turn the drill on and to plunge to depth.

For additional air drill (**drill #3**)

Place the **white wire** from position 4 (or the desired position) on the relay board **to output #7** on the control board. This will signal the solenoid to turn the drill on and to plunge to depth.

For additional air drill (**drill #4**)

Place the **red wire** from position 4 (or the desired position) on the relay board **to output #8** on the control board. This will signal the solenoid to turn the drill on and to plunge to depth.

Air Drill to Relay board connections

Locate the **black** and **red** wires from the PRS single valve air drill. Connect the **Red** wire to the NO of the desired relay position and the **Black** to a ground **GND** (V- on the 24v power supply). The relay position **COM** will need to be wired to **+24V** (V+ on the 24v power supply) in order to power the solenoid on the air drills.

PRS air drills (double valve)

See Relay Diagram for PRSalpha at end of document for reference.

Relay board to Control Board connections.

For the **primary air drill (drill #1)**.

Place the **blue wire** from position 2 (or the desired position) on the relay board **to output #5** on the control board. This will signal the solenoid to turn the drill on. Place the **black wire** from position 3 (or the desired position) on the relay board **to output #6** on the control board. This will signal the solenoid to plunge to depth.

For additional air drill **(drill #2)**

Place the **white wire** from position 4 (or the desired position) on the relay board **to output #7** on the control board. This will signal the solenoid to turn the drill on. Place the **red wire** from position 5 (or the desired position) on the relay board **to output #8** on the control board. This will signal the solenoid to plunge to depth.

Note: a second 5-position relay board will be needed for controlling more than 2 PRS double valve air drills and the new alpha board.

For additional air drill **(drill #3)**

Place the **blue wire** from position 2 (or the desired position) on the second relay board **to output #9** on the control board. This will signal the solenoid to turn the drill on. Place the **black wire** from position 3 (or the desired position) on the second relay board **to output #10** on the control board. This will signal the solenoid to plunge to depth.

For additional air drill **(drill #4)**

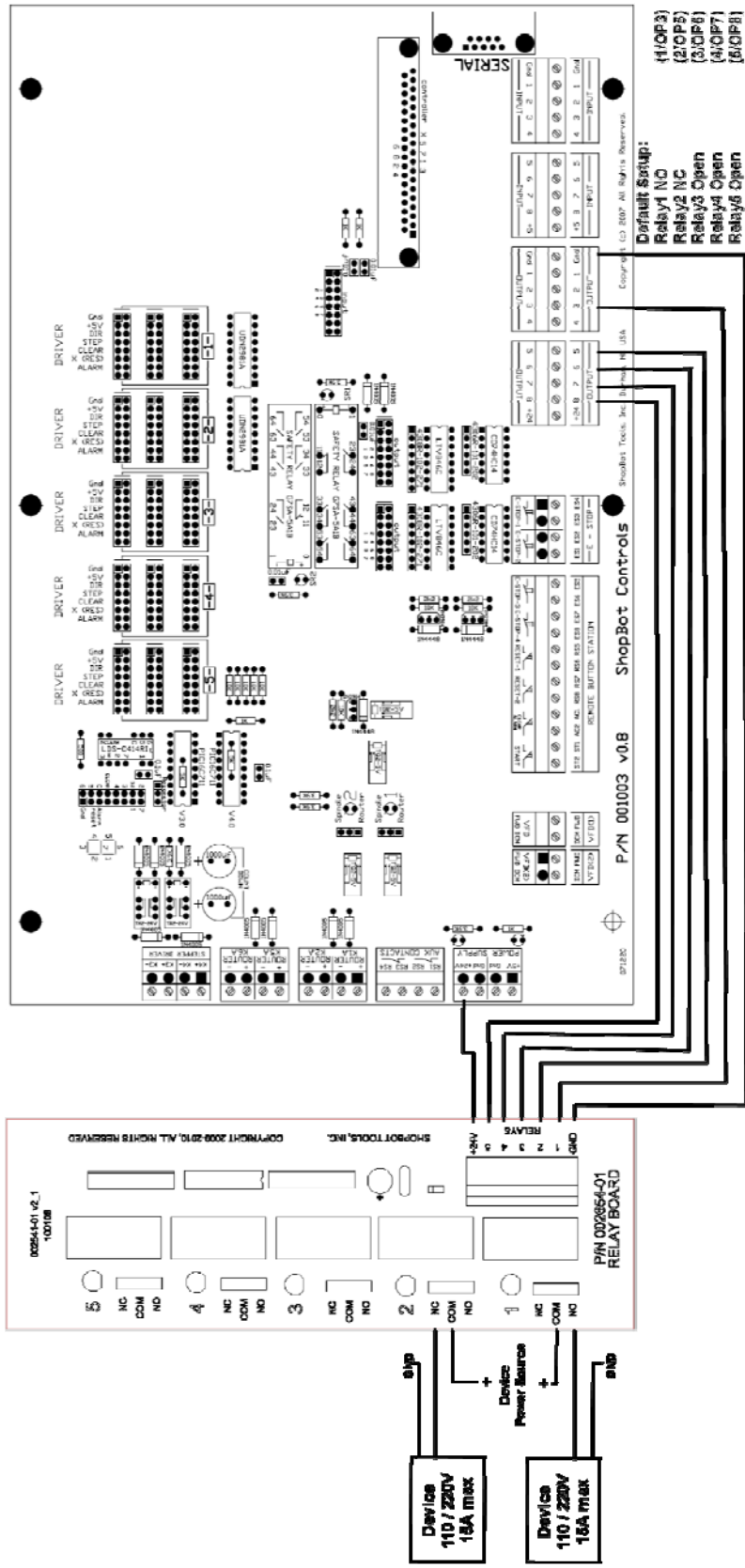
Place the **white wire** from position 4 (or the desired position) on the second relay board **to output #11** on the control board. This will signal the solenoid to turn the drill on. Place the **red wire** from position 5 (or the desired position) on the second relay board **to output #12** on the control board. This will signal the solenoid to plunge to depth.

Air Drill to Relay board connections

Locate the **black/brown** and **Blue** wires from the PRS double valve air drill **labeled Drill**. Connect the **Black/Brown** wire to the NO of the desired relay position and the **Blue** to a ground (V- on the 24v power supply). The relay position **COM** will need to be wired to **+24V** (V+ on the 24v power supply), in order to power the solenoid on the air drill.

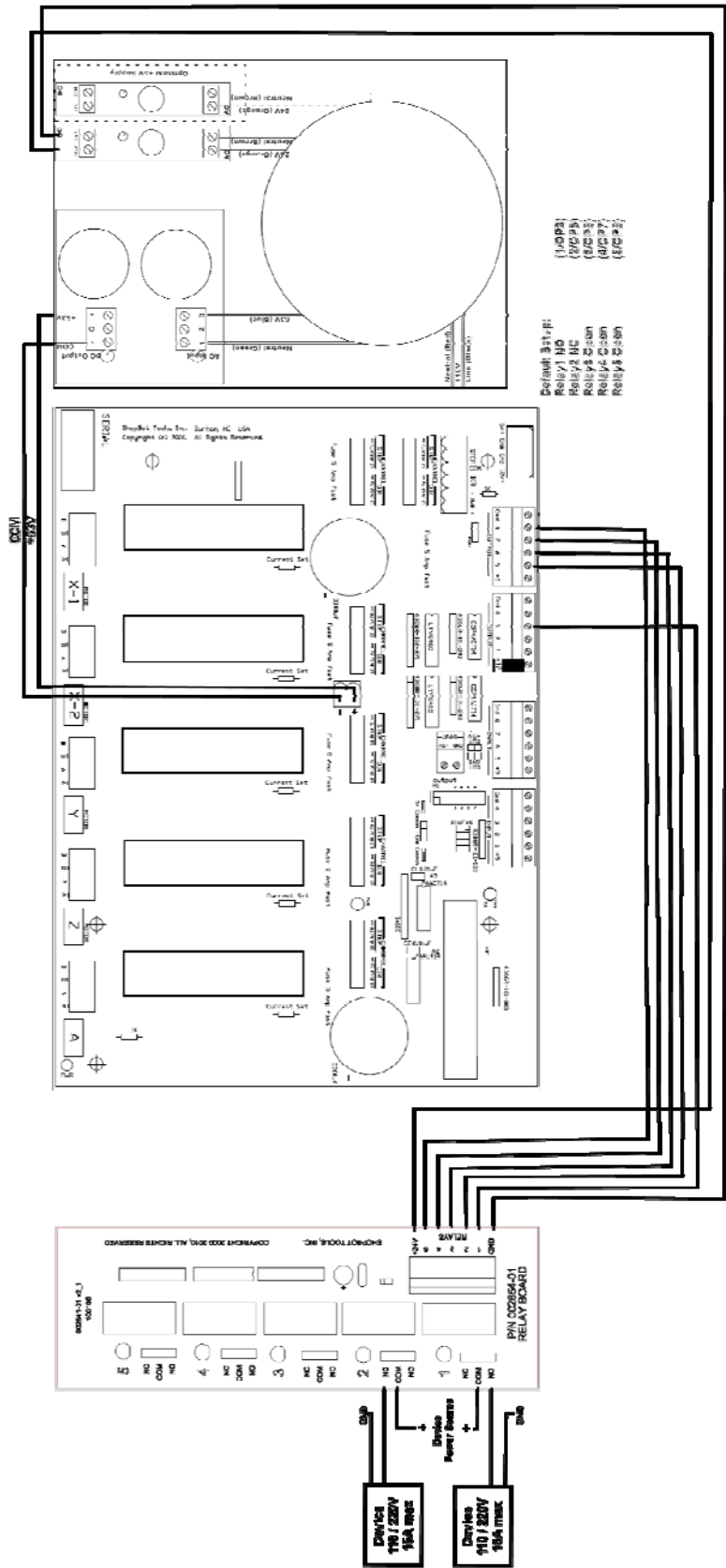
Locate the **black/brown** and **Blue** wires from the PRS double valve air drill **labeled Cylinder**. Connect the **Black/Brown** wire to the NO of the desired relay position and the **Blue** to a ground (V- on the 24v power supply). The relay position **COM** will need to be wired to **+24V** (V+ on the 24v power supply), in order to power the solenoid on the air drill.

Relay Diagram for PRSalpha (Additional Devices)



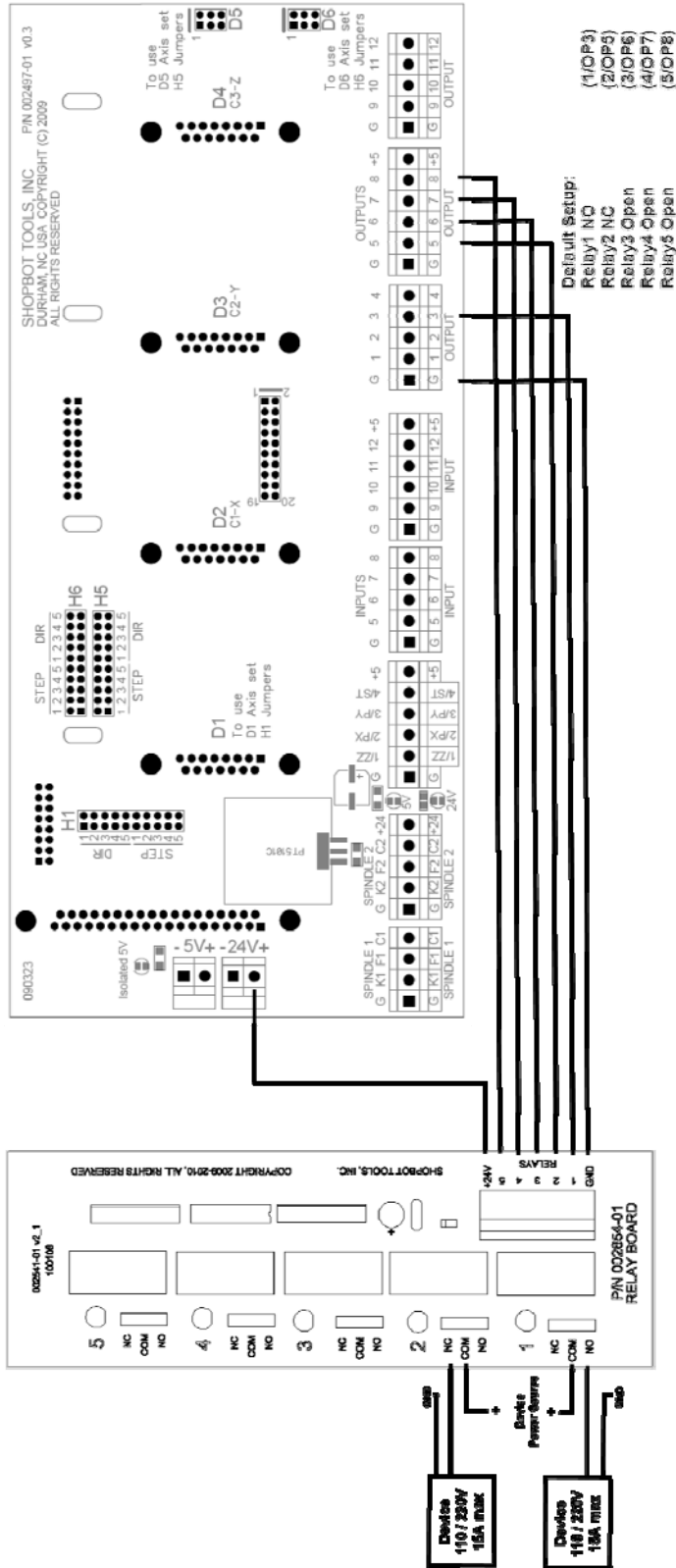
Relay Diagram for PRSalpha (Additional Devices)

Relay Diagram for V4G with 63V Power Supply



Relay Diagram for V4G with 63V Power Supply

Relay Diagram for PRSstandard (RBK board)



Relay Diagram for PRSstandard (RBK Board)

Using the Relay Board to Control Devices

General operation and setup

The purpose of the relay board is to enable control 110v-220V (15A Max) and other low voltage devices (i.e. shop vacs, warning lights, etc) through the control software. This is done by connecting the device through the relay terminal and turning the relay position on or off with the appropriate output.

The relay boards have 5 positions. Each position has a green terminal block connection located on the left of the board that is associated with that relay position. This relay position corresponds to the blue terminal block on the right side of the relay board. The signal coming into the relay board will be direct from what output position the blue terminal block is connected.

The relay board positions 1-5 do **not** correspond with outputs 1-5 unless you set them that way (not recommended). By default we will assume that relay1 is on output3 (OP3), relay2 is (OP5), relay3 is (OP6), relay7 is (OP7), and relay8 is (OP8).

Commonly used outputs

These are the commonly used outputs with the ShopBot software that are regularly called thru various post processors. Using any of these as a user-defined output is fine as long as the operator takes responsibility for appropriately switching on and off these outputs within his/her own files. Any ShopBot post files that are run in conjunction with a user-defined output may or may not have desired results with the connected device. Review and understand all switching of these outputs in the SO-Set Output Switch section of the Command reference by typing (HC) or (HU p.50) inside the ShopBot control software.

Output1	Spindle/Router#1
Output2	Spindle/Router#2
Output3	ATC Dust Skirt
Output4	Warning (Tool In Motion)
Output5	Air drill#1 (plunge)
Output6	Air drill#1 (Drill on/off)
Output7	Air drill#2 (plunge)
Output8	Air drill#2 (Drill on/off) & ATC Tool release

Testing the Relay Installation in KeyPad Mode

Make sure that the device that you are planning to control is plugged in and any on/off switch is in the on position.

In the ShopBot (SB) control software, open the KeyPad mode (K). The output switches are located at the bottom of the KeyPad screen. If the switch is in the up position, the output is on. If the switch is in the down position, the output is off. Click on the output switch for the relay position to which the device is wired to turn the device on. Click again to turn off.

Tip: ALT + (Output #) will toggle the selected output on/off.

If testing an air drill, follow the directions included with the drill.



Using Settings Outputs (SO) in a file

Commands in a .sbp file can be added to manage the devices connected to the relay board. Create the files as usual and save the cutting file. Open the file using File Edit (FE) inside the SB control software or a text editor. Insert the Settings Outputs (SO) command within the file at the point where you want the device to turn on or off. This line should read as such:

SO,<output#>,1 (on) or 0 (off)

For example, if a device connected to relay position 1 (OP3) is to be turned on at the beginning of the file and turned off 20 seconds after the movement in the file were completed, the cutting file would be:

```
SO,3,1           `turn device on
SA,              'set to absolute mode
&ZUP = 0.25      'clearance height to move bit between cuts
J2,0,0.75
M2,2.4375,0.75
JZ,&ZUP
J2,4.4375,0.75
JZ,&ZUP
Pause,20         `pause 20 seconds
SO,3,0           `turn device off
```

Adding a header and footer to control a device (on/off) in an existing file can be done by using the **Header Writer** under **Tools (TH)** in the SB control software. For more information on **Header Writer**, go to **Command Reference** under **Help (HC)** of the SB control software and search the **(TH)** command.