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# Installing the Z Proximity Switch for Desktop Tools





## Introduction

This document describes how to install a Z proximity switch on the ShopBot Desktop. The Z proximity switch is useful for helping to keep the current Z position of the tool. It provides a baseline spot to calibrate from after the machine is restarted, or any other situation where calibration should be checked.

## Safety

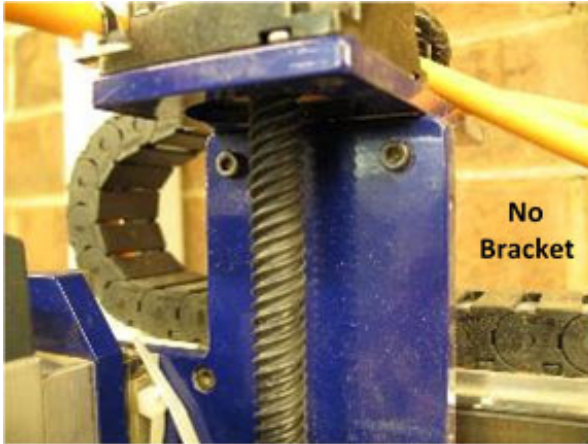
**RISK OF ELECTRIC SHOCK: Disconnect and lock out the power source to the ShopBot before installation. Failure to do so could result in injury or death and/or serious damage to the ShopBot machine.**



Option 1 - Unplug machine and add a plug cover as a lock out device to prevent accidental plugin. The one pictured at left is model # H-3436 and is currently available at [www.Uline.com](http://www.Uline.com).

Option 2 - Turn off breaker and lock out. The padlock pictured at right is model # H-3422 and the circuit breaker lock is model # H-3440 and is currently available at [www.Uline.com](http://www.Uline.com).





## Identify Machine

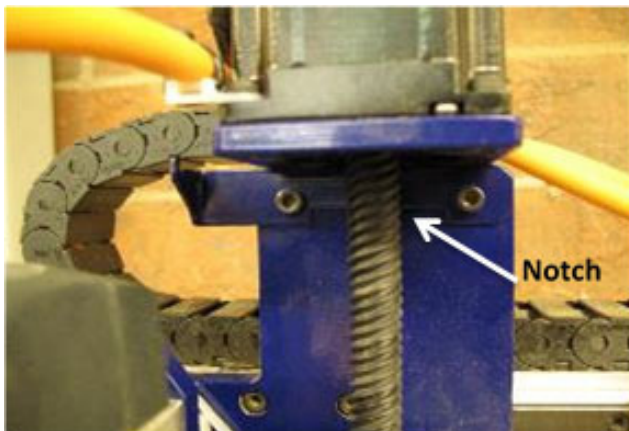
### *No bracket*

If the machine doesn't have a bracket, continue following instructions to install Z proximity switch; or purchase spring assist kit #17543\* and follow those instructions.

\* The spring assist kit prevents the router/spindle from dropping when the power is turned off. It also reduces the wear on components and helps prevent missed steps from excessive inertia allowing faster Z travel.

### *Bracket without notch*

If the machine has a bracket without a notch, modify existing bracket and follow instructions for Z proximity switch; or request bracket with notch when ordering the Z proximity switch kit and install per those instructions.



### *Bracket with notch*

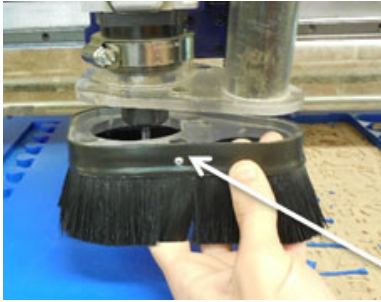
This is the most recent bracket.

**NOTE:** This instruction simultaneously refers to the five variations of the bracket based on identification of machine (above).

- No bracket
- No bracket (installing spring assist kit)
- Bracket without notch (modifying bracket)
- Bracket without notch (installing new bracket)
- Bracket with notch

The table below shows the steps required to complete the process for all five variations.

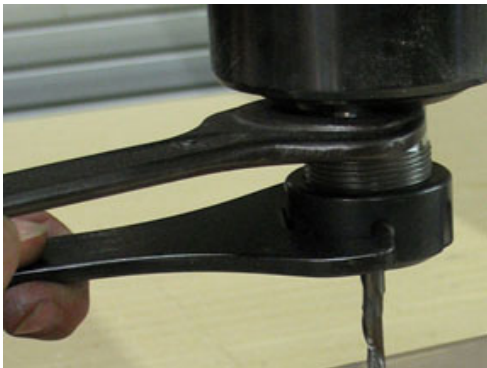
Step #	No Bracket	No Bracket (Installing Spring Assist Kit)	Bracket w/out Notch (Modifying Bracket)	Bracket w/out Notch (Installing New Bracket)	Bracket with Notch
1	X	X	X	X	X
2	X	X	X	X	X
3	X	X	X	X	X
4	X	X			
5			X	X	X
6			X	X	X
7	X	X	X		
8	X		X		
9		X			
10		X			
11		X			
12		X			
13		X			
14		X			
15	X	X	X		
16	X	X	X		
17	X				
18		X			
19				X	X
20				X	X
21				X	X
22			X		
23			X	X	X
24	X	X	X	X	X
25	X		X		
26		X		X	X
27	X	X	X	X	X
28				X	X
29			X	X	X
30	X	X	X	X	X
31	X	X	X	X	X
32	X	X	X	X	X
33	X	X	X	X	X
34	X	X	X	X	X
35	X	X	X	X	X
36	X	X	X	X	X



**Perform steps 1 through 3 for all variations.**

1. Remove dust foot that is attached with three built in magnets.

2. Remove any bits from the spindle/router.



Spindle bit removal



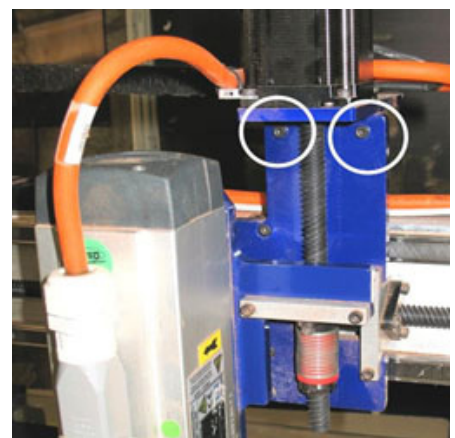
Router bit removal



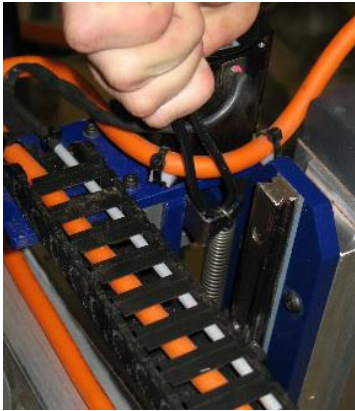
3. Place a block of material under the spindle to keep it from dropping.

**Perform step 4 for no bracket and no bracket (installing spring assist kit) variations.**

4. Remove the two motor support screws directly underneath the motor mounting plate.





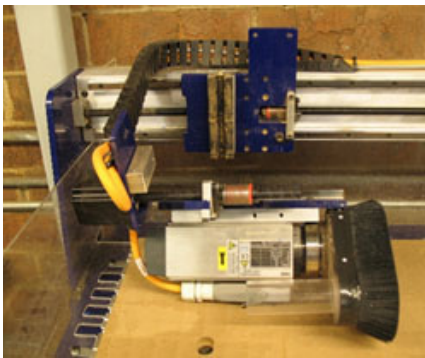
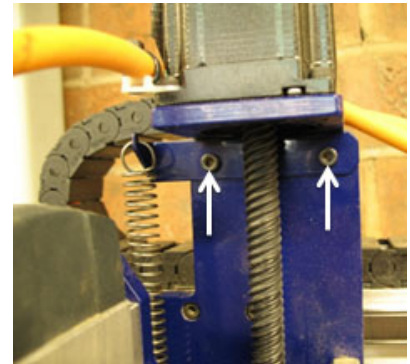


**Perform steps 5 and 6 for bracket without notch (modifying bracket), bracket without notch (installing new bracket), and bracket with notch variations.**

5. Remove spring from spring assist bracket. Use a wire to easily control the removal and to make it easy to reinstall.

**NOTE:** The spring can have a large amount of stored energy. Be careful.

6. Remove two motor support screws holding spring assist bracket.



**Perform step 7 for no bracket, no bracket (installing spring assist kit), and bracket without notch (modifying bracket) variations.**

7. Support the spindle while lifting the assembly up and off the gantry. Carefully set the Z-axis assembly onto the table. Do not twist the e-chain further than necessary.

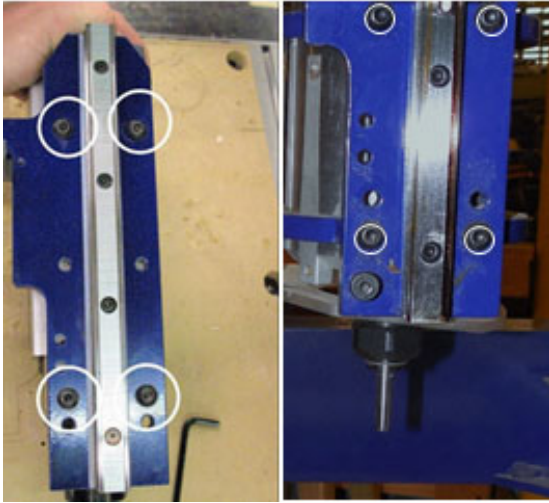
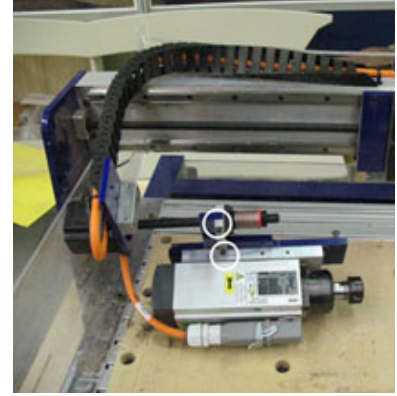
**Perform step 8 for no bracket and bracket without notch (modifying bracket) variations.**

8. Measure the location of the switch using the drawing at the end of this document. Mark the location of the left and top side of the switch in an easily visible way on the carriage plate.



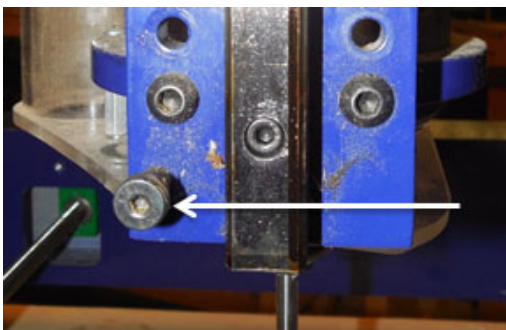
**Perform steps 9 through 14 for no bracket (installing spring assist kit) variation.**

9. Remove the two bolts in Z-axis nut block. This will separate the spindle plate assembly from the motor and E-chain.



10. For machines with a **router**: remove the router by loosening the hoops. For machines with a **spindle**: remove the spindle for extra clearance to drill and tap the hole.

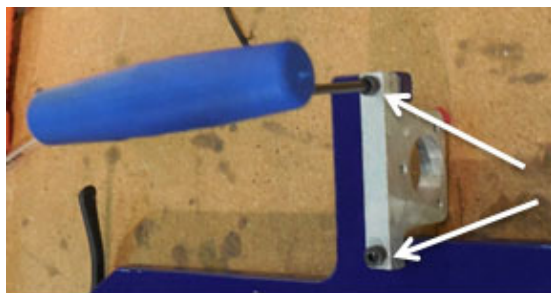
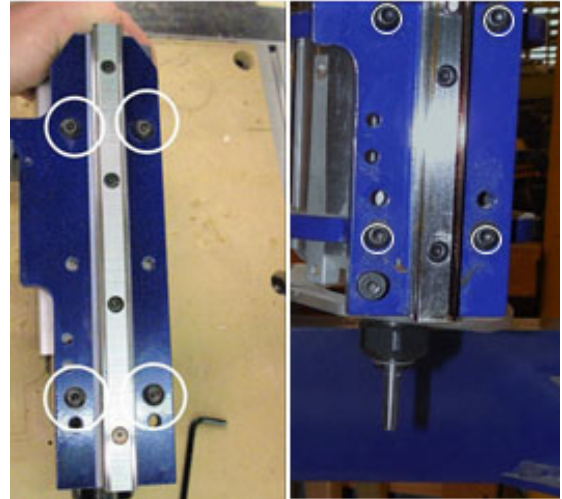
11. Use a center punch to mark the location of the hole using the drawing at the end of this document. Then, drill and tap hole on center-punched mark.



12. Install shoulder head bolt in newly tapped hole on the same side as the rail. Thread bolt all the way in until the lack of threads stop its progress.



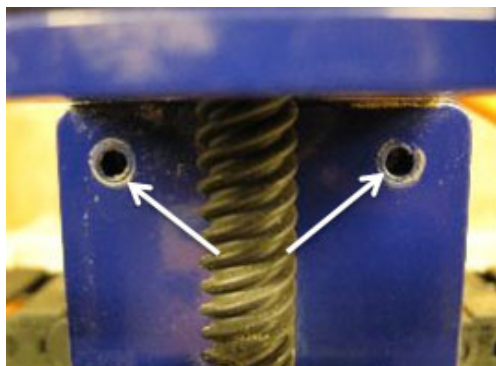
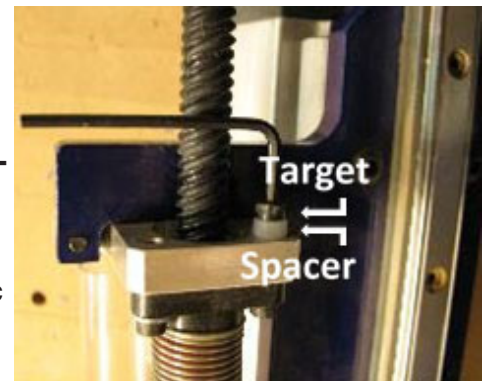
13. Reinstall spindle/router onto plate loosely. Bolts will be tightened down later when spindle is squared.



14. Reinstall Z-axis nut block.

**Perform steps 15 and 16 for no bracket, no bracket (installing spring assist kit), and bracket without notch (modifying bracket) variations.**

15. With the Z-axis assembly on the table, install the target using a thread locker such as Loctite. Make sure to install the plastic spacer.



16. Align the Z-axis assembly rail with the bearing blocks so the screw holes line up. Keep grit and dirt out of the bearings and minimize any stress on the wiring.

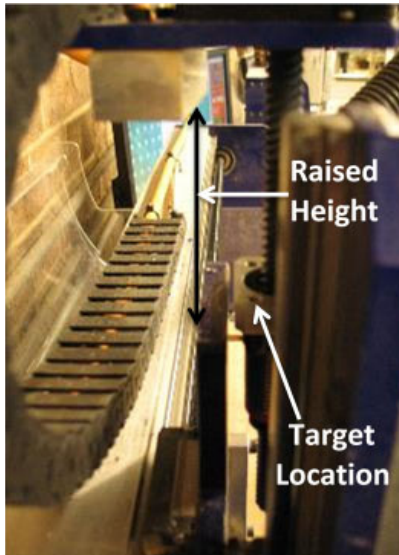
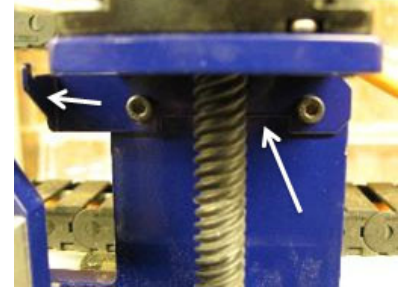
**Perform step 17 for no bracket variation.**

17. Reinstall the two screws.



**Perform step 18 for no bracket (installing spring assist kit) option.**

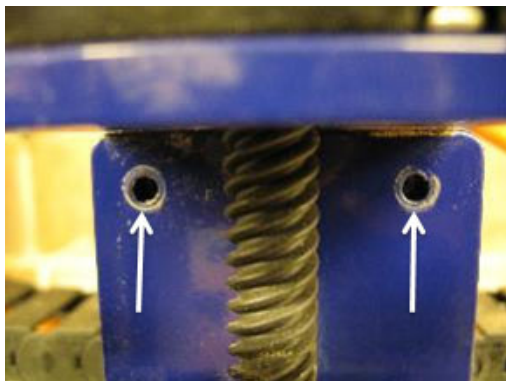
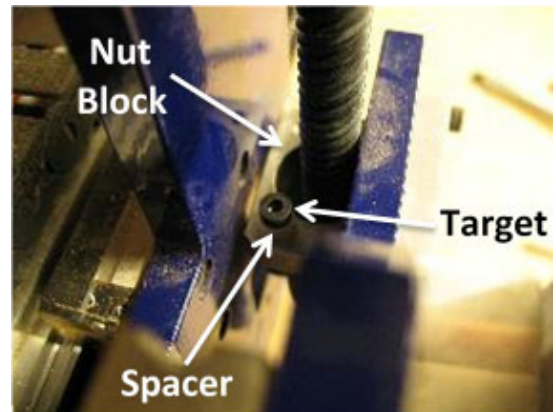
18. Install bracket with hook facing up and to the left when facing the machine front. Notch should be in the center and facing down.



**Perform steps 19 through 21 for installing bracket without notch (installing new bracket), and bracket with notch variations.**

19. Raise spindle to a height that provides easy access to target location. Place additional wood blocks under spindle to support it at this height. Take care to keep grit and dirt out of the bearings and minimize stress on the wiring when reinstalling rail into bearing blocks if assembly is removed.

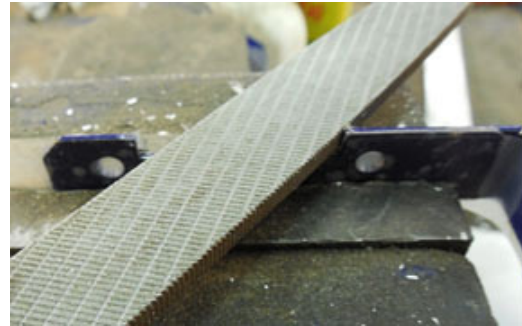
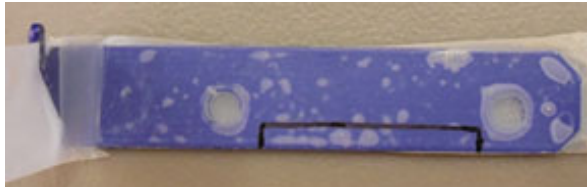
20. Install target with spacer into nut block using a thread locker such as Loctite.



21. Remove supports from under spindle and lower spindle until holes line up and then re-support spindle.

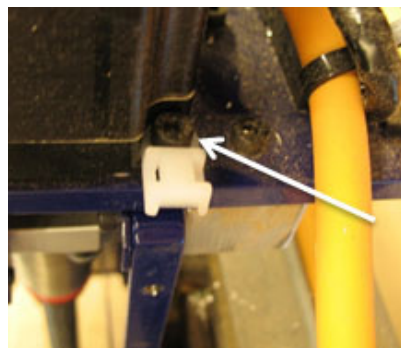
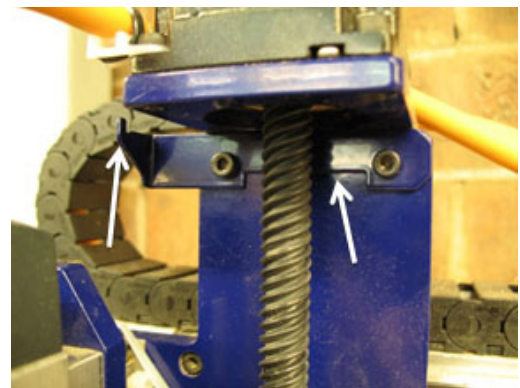
**Perform step 22 for bracket without notch (modifying bracket) variation.**

22. Modify bracket by cutting or filing a notch until there is enough room for the Z proximity switch. Use drawing to determine if there is adequate clearance. Use switch to mock it up, the switch should rest horizontally on previously marked spot. Do not install switch yet - reinstalling the Z-axis assembly could knock it loose.



**Perform step 23 for bracket without notch (modifying bracket), bracket without notch (installing new bracket), and bracket with notch variations.**

23. Reinstall notched modified spring assist bracket with notch down and spring perch to the left.

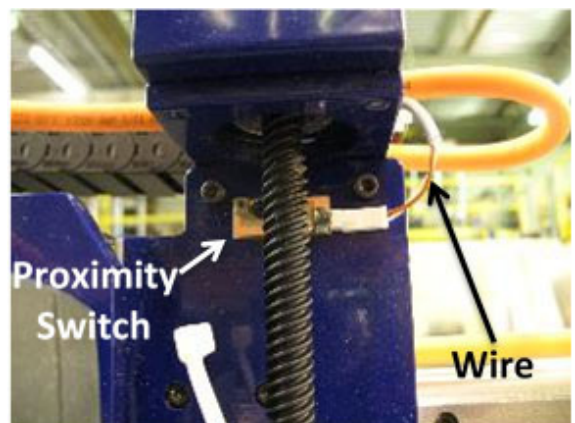


**Perform step 24 for all variations.**

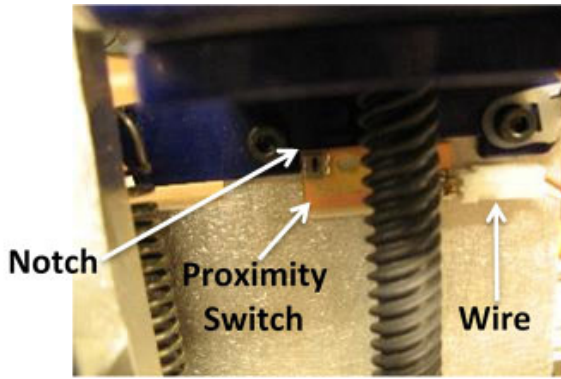
24. Install the zip tie mount by removing the back right motor mounting screw and inserting the zip tie mount under the screw head. Replace screw and tighten.

**Perform step 25 for no bracket and bracket without notch (modifying bracket) variations.**

25. The switch is mounted using double-sided tape and positioned so that it lines up with the alignment marks on top left corner. The wire will exit to the right when facing the front of the desktop.





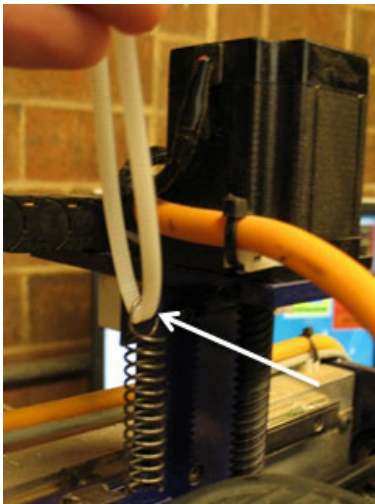
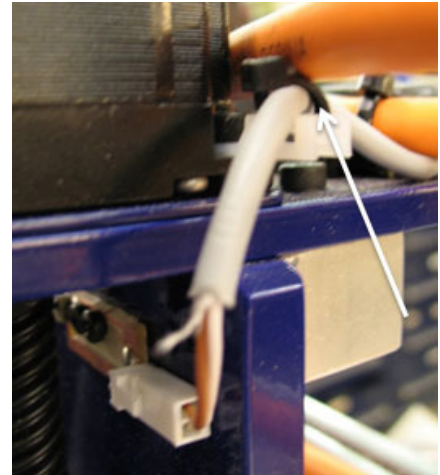


**Perform step 26 for no bracket (installing spring assist kit), bracket without notch (installing new bracket), and bracket with notch variations.**

26. The switch is mounted using double-sided tape, and is positioned so that it snugly fits in the upper left of the notch in the spring bracket. The wire exits to the right.

**Perform step 27 for all variations.**

27. Use a zip tie to secure the proximity switch wiring to the zip tie mount. Make sure wiring is secured out of the way of any moving parts.

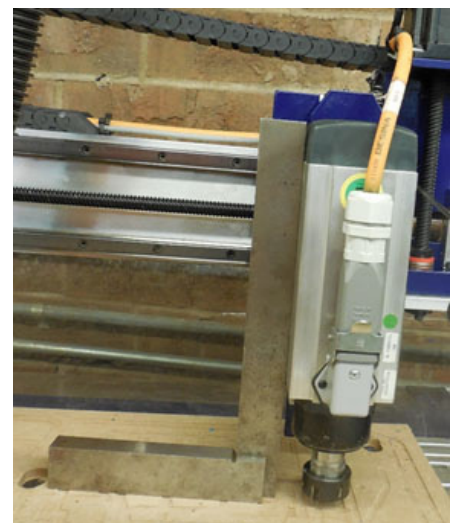


**Perform step 28 for bracket without notch (installing new bracket) and bracket with notch variations.**

28. Reinstall spring.

**Perform step 29 for bracket without notch (modifying bracket), bracket without notch (installing new bracket), and bracket with notch variations.**

29. Set a machinist square on the table beside the spindle. Adjust spindle until it is parallel to square. Hold it in this position while tightening the spindle screws.





**Perform steps 30 through 36 for all variations.**

30. Remove the aluminum deck.

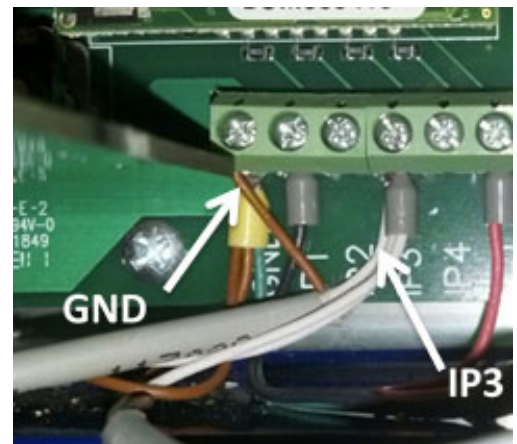
It may be necessary to blow dust out of the holes prior to removing the screws on one side and loosening them a bit on the other. Lift up on the side where the screws are all the way out, and then slide the deck out from the loosened screws.

31. Remove two mounting screws and plastic cover to access the electronics in the rear of the machine.



32. Route the wire through the cable carrier and down the right side of the gantry. Use the supplied wire ties to tether the new cable to the motor cable, but DO NOT use any wire ties inside the cable carrier. Cut and remove the existing wire ties on the top of the gantry beam and use the supplied wire ties to bundle the existing cables with the new one as a group.

33. Connect wires to the terminals marked IP3 and GND at the lower right of the board. They will share the terminal with the existing wires. The white wire connects to IP3 and the brown to GND. Once the connections have been made, test the switch by starting ShopBot 3 and establishing a connection to the Desktop. Trigger the switch. There should be a light turned on at input "3". If it does not trigger, double-check the wire connections.

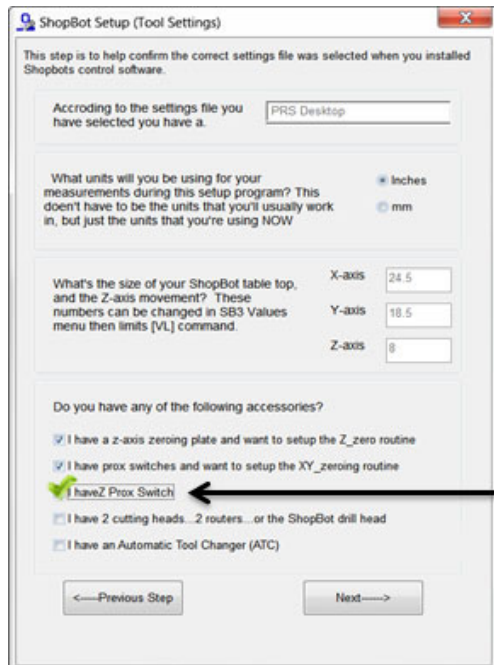




34. Use the Key Pad control to move the Z up while looking at the inputs and making sure the machine does not hit the top of its range. The target screw should trigger the switch, causing input “3” to light up as in the previous step. If the target does not trigger the switch, check the switch position.



35. Reinstall decking and electronics enclosure.

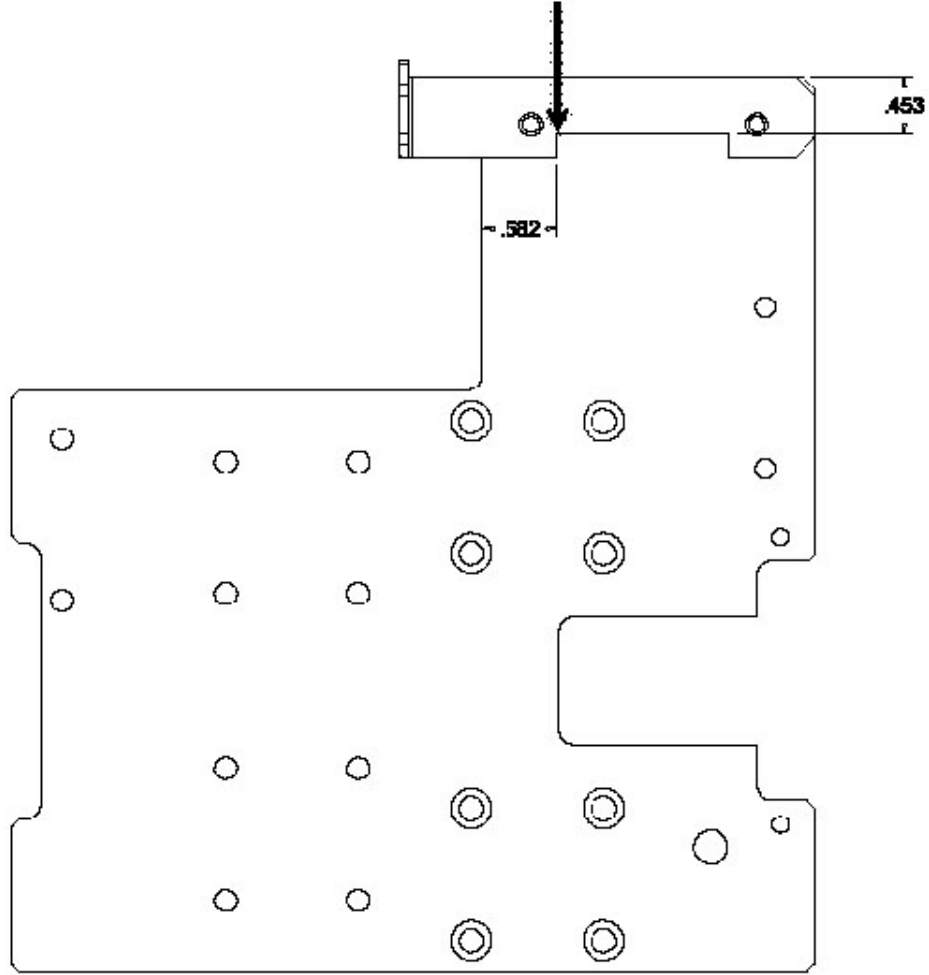


36. Ensure ShopBot control software, ShopBot 3, is updated to the latest version by downloading from <http://www.shopbottools.com/msupport/controlsoftware.htm>.

Once the new software is installed, change the settings to let it know the machine has the new switch. Access “Tools” and “ShopBot Setup” or type in the “TS” command. When the first window comes up, click “next” to proceed to the settings. Do not change values without understanding the consequences of the change. At the bottom, there is a section for accessories. Put a check mark next to the line that identifies a Z proximity switch. The Z proximity switch can now be used to calibrate the machine.

### Switch Mounting Drawing

**Top left corner of switch should be installed using this corner as alignment marks.**



## Spring Assist Bolt Tapping Drawing

