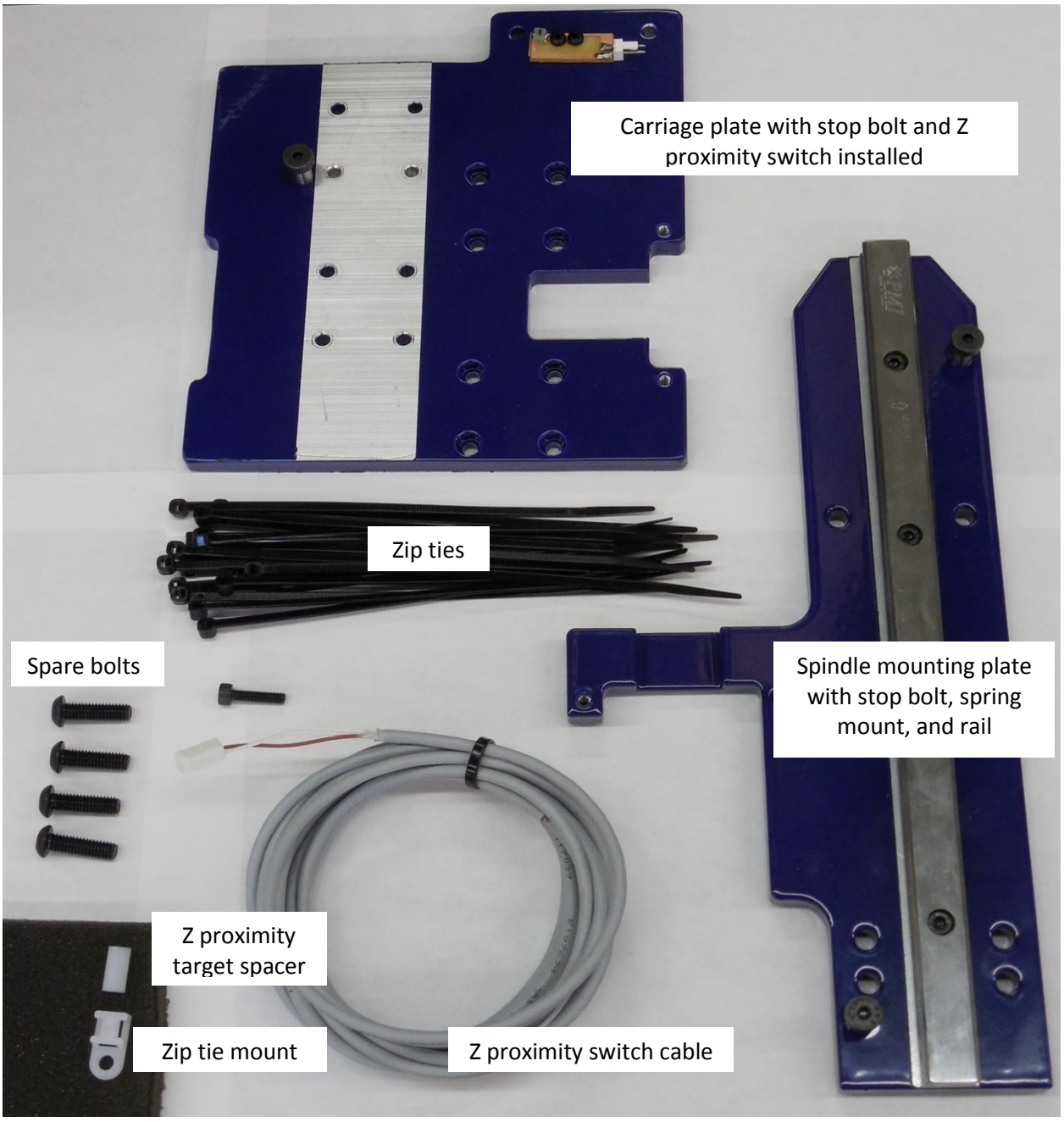
Desktop 5.5” Z Axis Retrofit

Kit parts



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Revision History

Date:	ECO:	Change:	Changed By:
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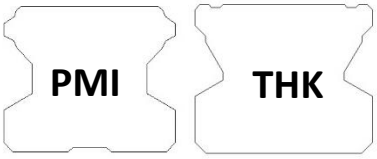
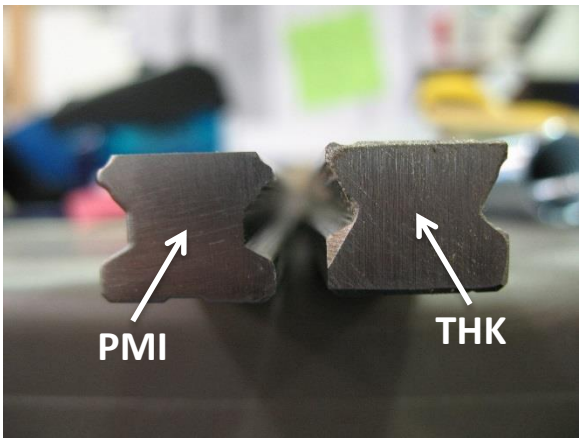
Introduction

This document covers the installation of the 5.5” Z travel retrofit, adding a Z proximity switch cable, and installing the Z proximity switch target.

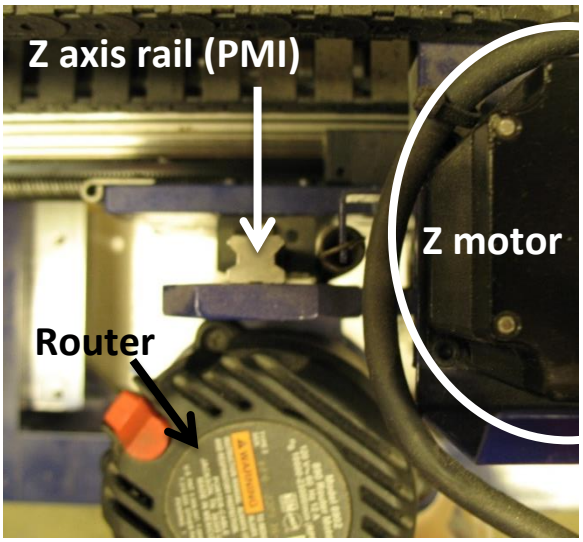
Rail identification

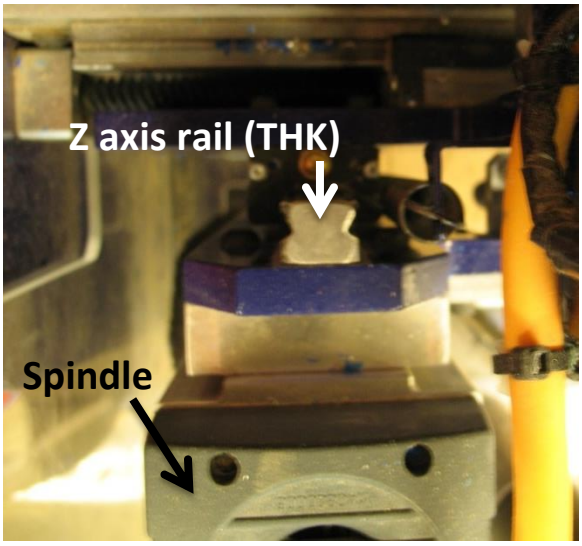
Older Desktops have one of two different types of rails. Specify the type of rail when ordering the kit. To identify which rail is present, compare its cross-section to the images below. Check the Z axis rails ONLY as the X and Y axis rails may be different.





Compare the end shape of the rail to the ones shown in the photo to the left and the line drawing above it. The cross-section of the rail can be easily seen by looking down from the top of the Z axis assembly. The rail will be attached to the back of the plate that holds the spindle or router. Note this is for the Z axis only.





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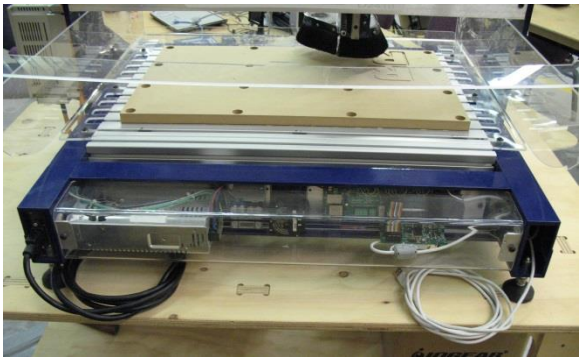
Tools needed

- 3mm hex wrench (preferably long handled)
- 4mm hex wrench
- Wire strippers
- Vibra-TITE threadlocker 12150 (or comparable)
- Small mini screwdriver (appropriate for electronics)
- Large flathead screwdriver
- Flashlight for seeing in tight spots (under tool and inside electronic enclosure)
- Eight 2 x 4 blocks to lift up tool (allows access underneath tool)
- Wire or cable tie (for easy spring removal and reinstall)
- Wire cutters (for removal of old cable ties)

Retrofit instructions

At the end of the retrofit it will be necessary to have a level surface under the spindle to square it up. An aluminum deck installed with nothing on top of it is acceptable. A spoil board or other surface, would need to be surfaced **now** before proceeding. Remove any dust collection systems before beginning the retrofit, and move Desktop tool to a location where the front and back of the tool can be accessed. Position the spindle/router at about X12, Y12.



Step 1:

Unplug power cable from wall and USB cable from computer. There should be no lights on in the rear circuitry when completely disconnected.

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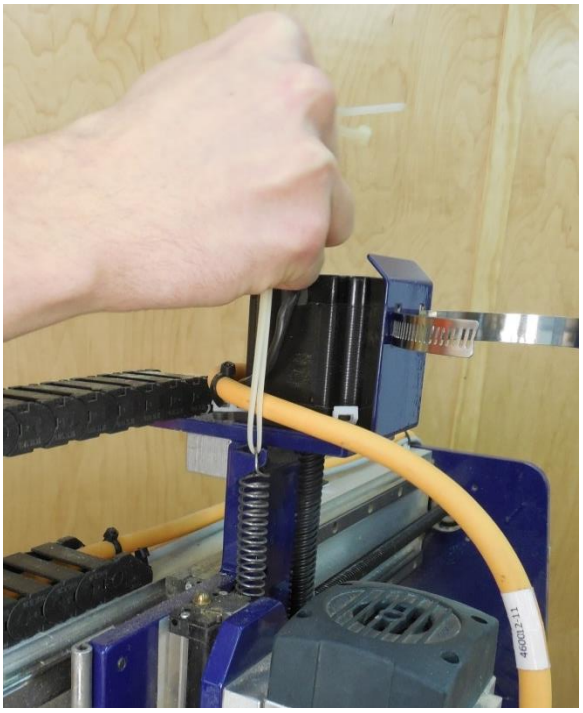
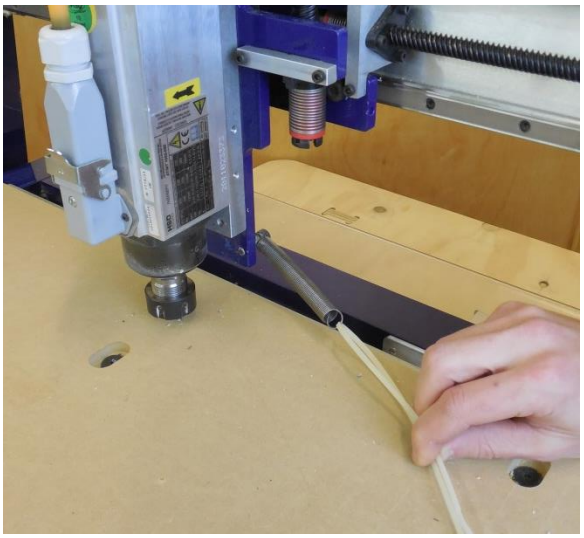


Step 2: Spring removal

Notes:

- If Desktop does not have a Z axis spring, skip to step 3.
- This Z axis spring can be added to the machine with the Desktop spring mount upgrade kit – Part # 17543. Contact ShopBot for purchase information.

Step 2a:
Insert one of the long zip ties into the top loop of the spring, and pull the spring up and off of the mounting hook. Lower the spring slowly, reducing tension in a controlled manner.



Step 2b:
Position the spring to the side of the spindle/router as shown.

Step 2c:
Slide the spring from the shoulder bolt. If the shoulder bolt head is too large, remove the bolt from the plate to release the spring.

Keep the spring for later reinstallation.

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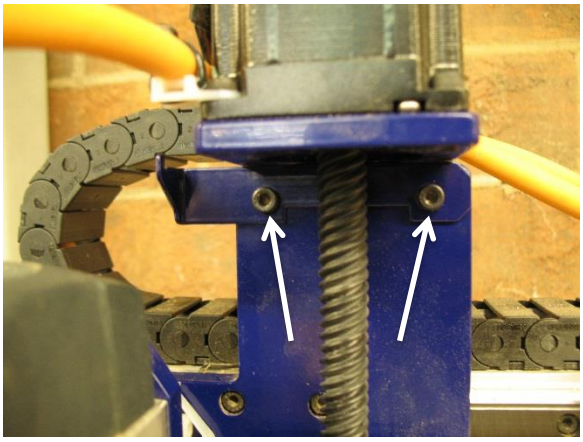
Step 3: Disconnect the spindle power cable

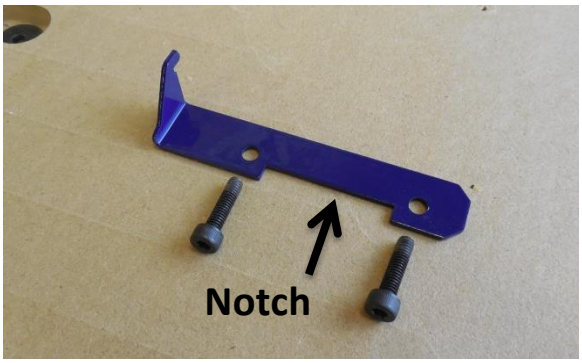
Note: The power cord on routers does not disconnect. This will require working around the limitations of its length.

To remove the power cable from the spindle or router, release the silver latch at the front of the spindle and pull the plug. Refrain from pulling on cables as that could cause a loose connection.



Step 4: Remove motor assembly screws

Use a 3mm hex wrench to remove the two M4 x 16 bolts at the top of the carriage plate that hold the motor. If present, remove the spring assist bracket.



Note: If spring assist bracket does not have a notch, there are two choices:

a) File or grind a notch into the bracket so that it will fit over the Z proximity switch and still line up with the holes in the plate. See Step 23.
b) Order a new bracket from ShopBot Tools - Mount Spring DT Z, part # 003311.

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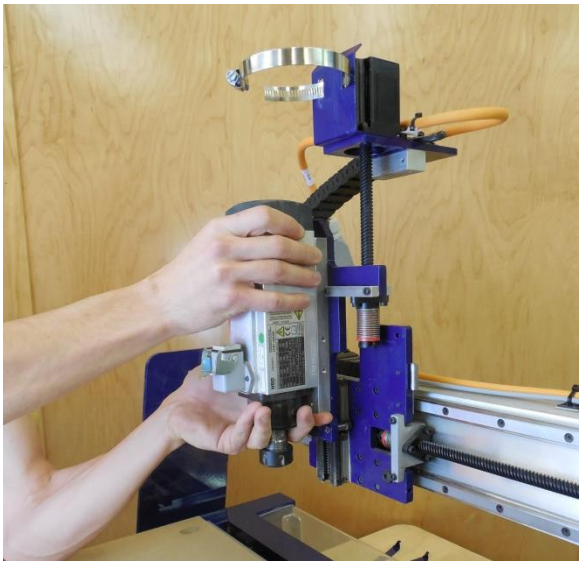
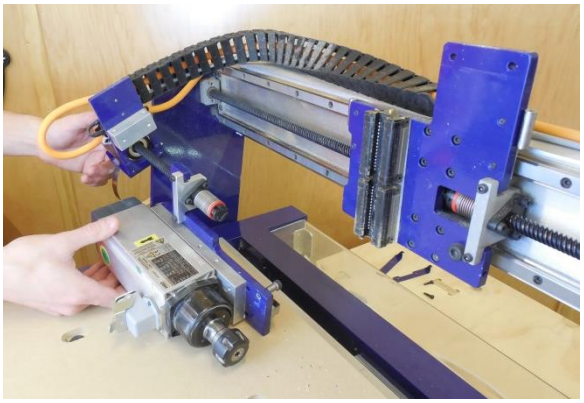
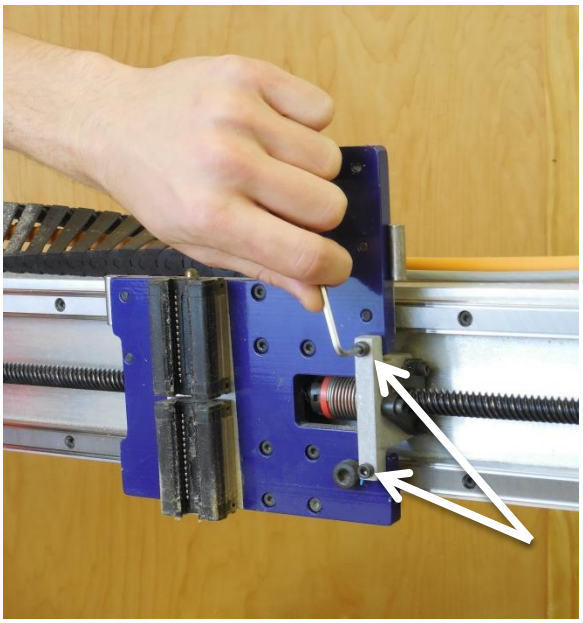


Step 5: Remove router/spindle assembly

Step 5a:
Lift the spindle/router assembly straight up from the carriage plate.



Step 5b:
Carefully lay the assembly on a table, making sure to minimize the stress placed on the wiring.



Step 6: Remove X axis nut block

Step 6a:
Remove the two screws holding the X axis nut block.

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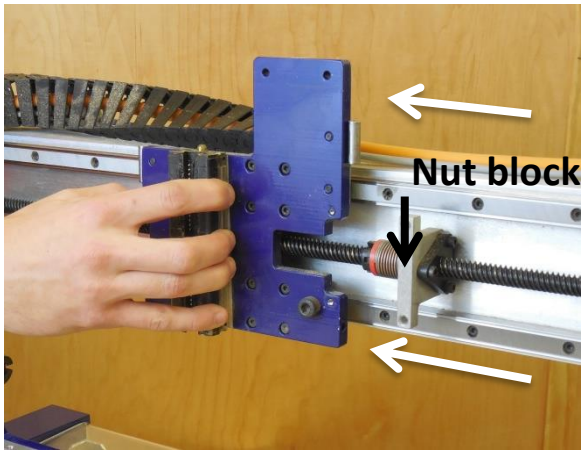
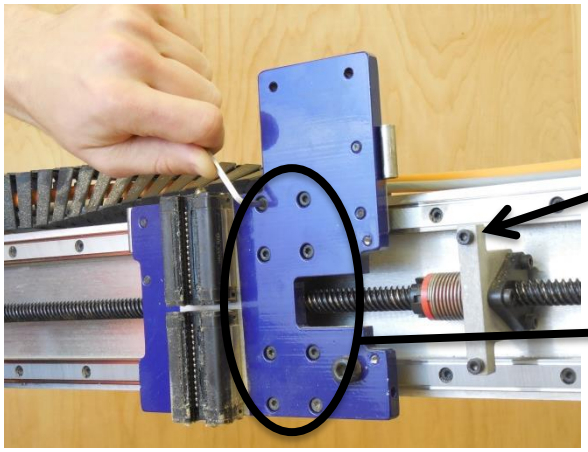


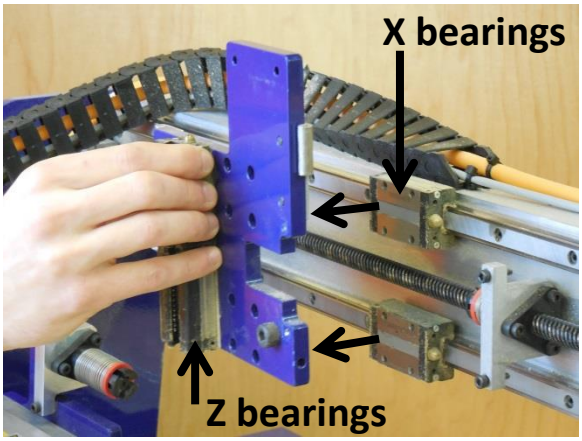
Step 6b:
Slide the carriage plate to the left to separate it from the nut block.



Step 7: Remove carriage plate

Tip: Place screws back where they were removed from to keep them from getting mixed up or lost.

Step 7a:
Remove the eight screws holding the carriage plate onto the bearings.



Step 7b:
Remove the old carriage plate once all the screws are out. Keep the bearings in the same location to facilitate reassembly.

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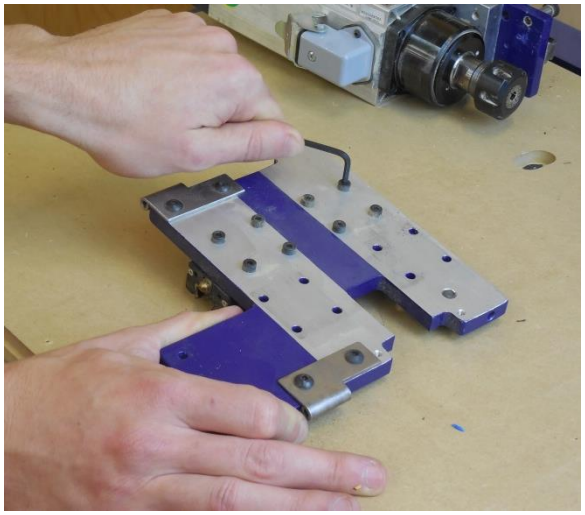
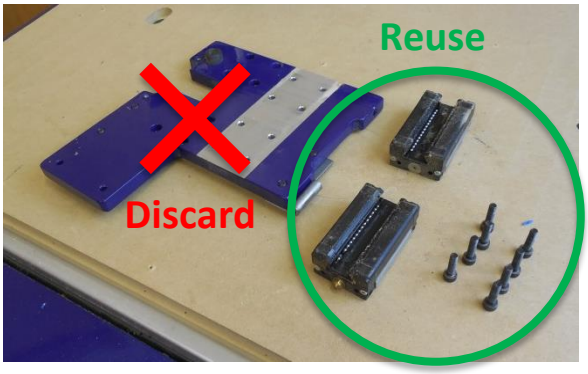
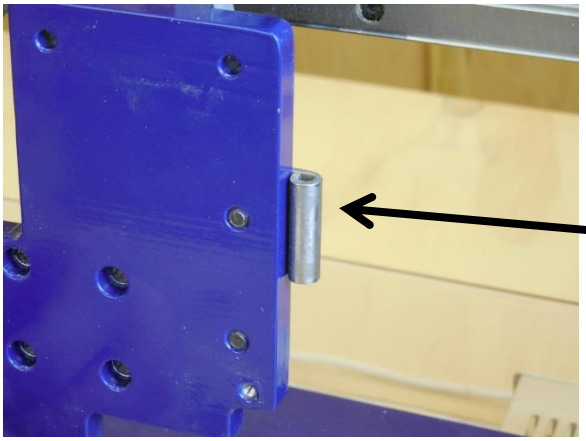


Step 8: Remove bearings

Remove the eight mounting screws and unfasten Z bearings.



The Z bearing blocks and screws will be reinstalled on the new carriage plate. Discard old carriage plate.



Note: Early model Desktop tools have mounting hardware for the outer enclosure on the old carriage plate. The mounting hardware and the outer enclosure are not compatible with the new carriage plate. They can both be discarded.

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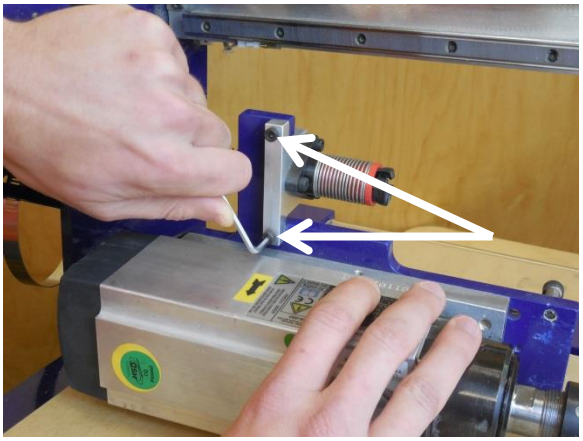
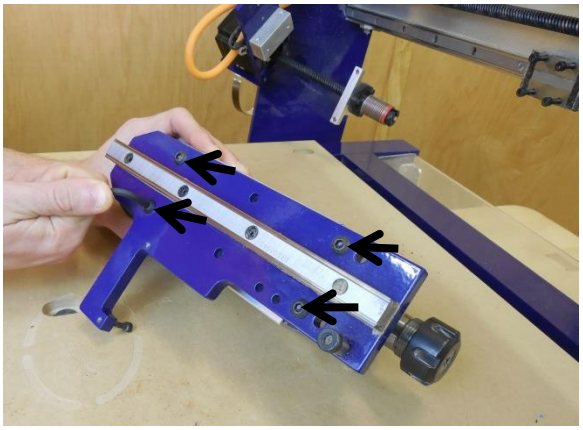


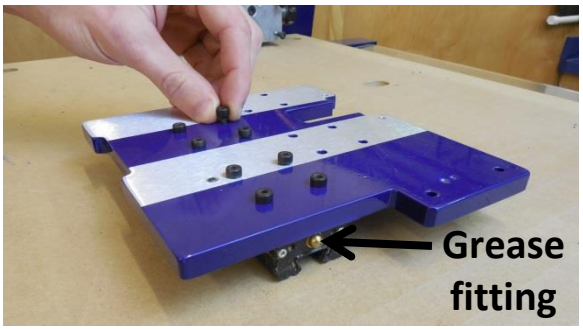
Step 9: Remove Z axis nut block

Remove the Z axis nut block as shown. The spindle and rail plate is now free from the motor and wiring.



Step 10: Remove spindle/router

Remove the spindle/router mount ring from the rail plate.



Step 11: Install Z axis bearings

Loosely attach the Z axis bearings to the new carriage plate. The grease fittings should face out and away from each other.

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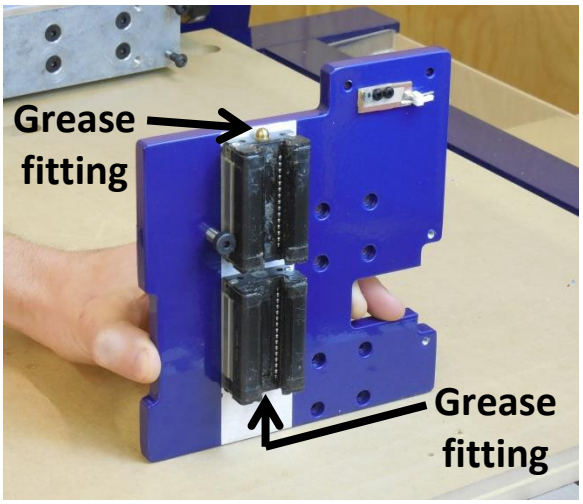
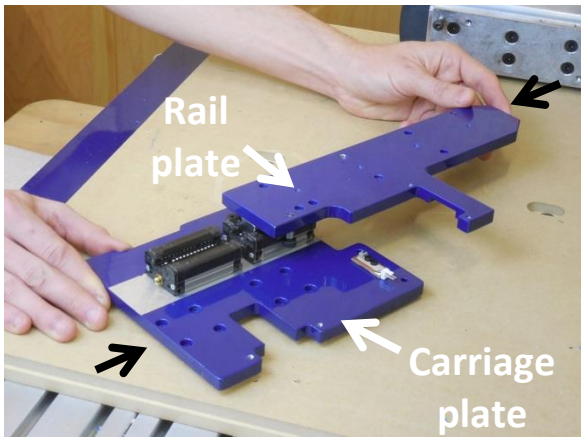


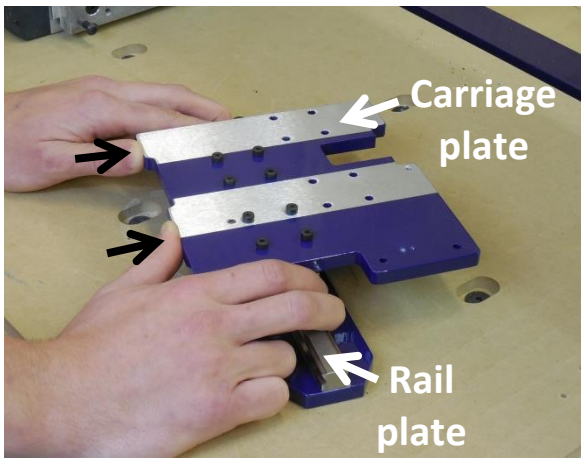
Install bearings on the unpainted surface with grease fittings facing away from each other.

Note: Bearings are pre-lubricated by the manufacturer. Please contact ShopBot support if lubrication is needed.



Step 12: Slide rail into bearings

Clean all grit and dirt from bearing surfaces and gently slide the rail plate into bearing blocks. Make sure to install the rail parallel to the bearing to reduce risk of damage.



Step 13: Tighten Z axis bearings

Step 13a:
Flip the assembly over and position plates to apply firm pressure on the carriage plate (indicated by the black arrows in the image to the left). Seat the bolts to one side of the holes, aligning the bearings to the carriage plate.

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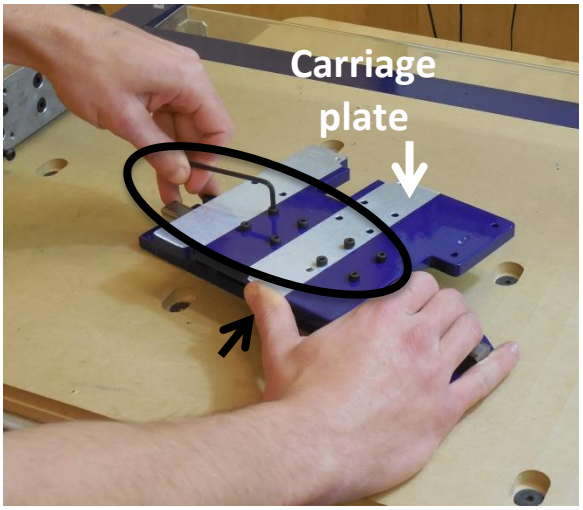
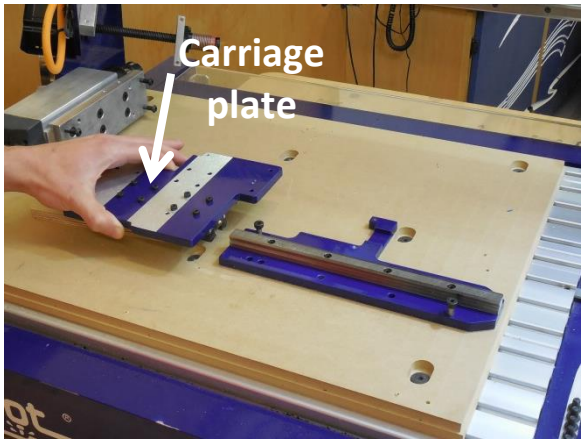
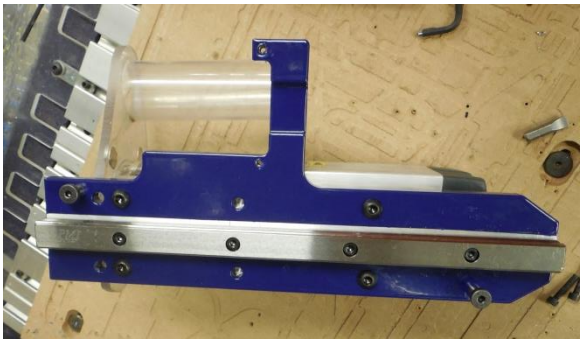


Step 13b:
Tighten bolts while holding the pressure.



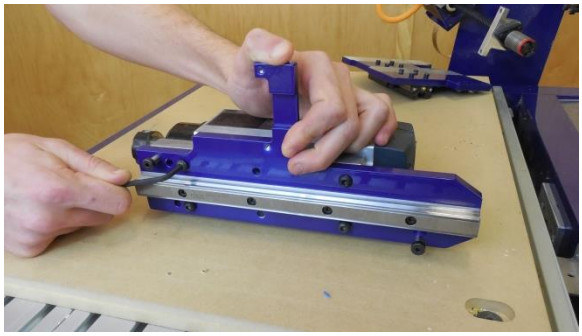
Step 14: Separate plates

Slide the plates apart and set the carriage plate aside.



Step 15: Remount the spindle/router ring

Loosely install the mounting screws and position assembly so the spindle/router ring is not touching the table.



Push down on spindle/router ring to seat the bolts to one side of the holes. Tighten the screws firmly. Note: During final alignment in step 18 it may be necessary to loosen these screws, but fully tighten them for now.

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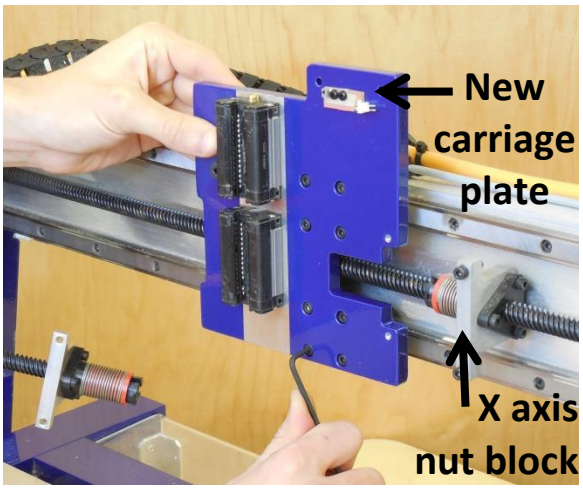
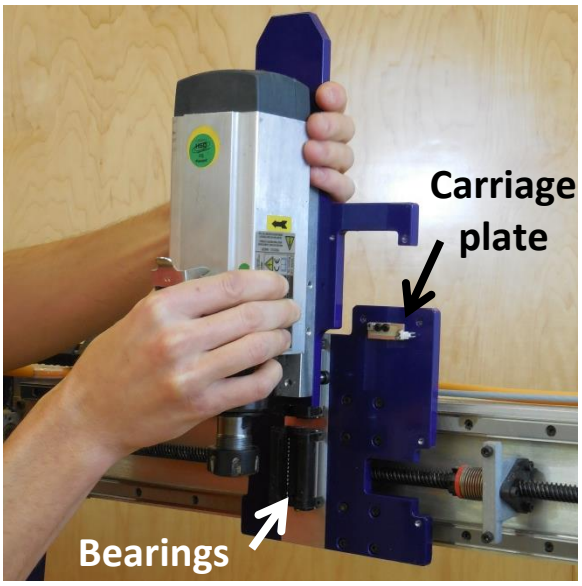


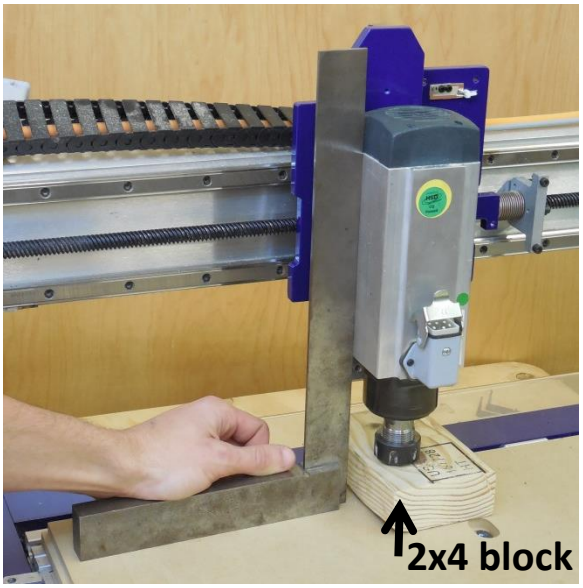
Step 16: Install new carriage plate

Install the new carriage plate onto the X axis bearing blocks. Install these screws loosely to allow for final alignment after the spindle/router is installed.



Step 17: Reinstall spindle/router

Gently slide the spindle/router plate assembly into the bearings on the front of the carriage plate. Gently lower it until the collet nut rests on the table or a temporary 2x4 support block (shown below).



Step 18: Align spindle/router

Use a square to check the perpendicular alignment of the spindle/router to the table. If needed, twist the spindle/router assembly to make it perpendicular to the table. When square, move on to the next step to tighten the X axis bearing bolts.

If unable to bring spindle square with the above method, slide the assembly up and off. Lightly loosen all but one of the mounting screws. Slide the assembly on and adjust until it is square to the table. Gently raise the assembly part way up while keeping square and retighten the top screws. Recheck for square and repeat above procedure as needed. Once square, tighten lower screws and proceed to the next step.

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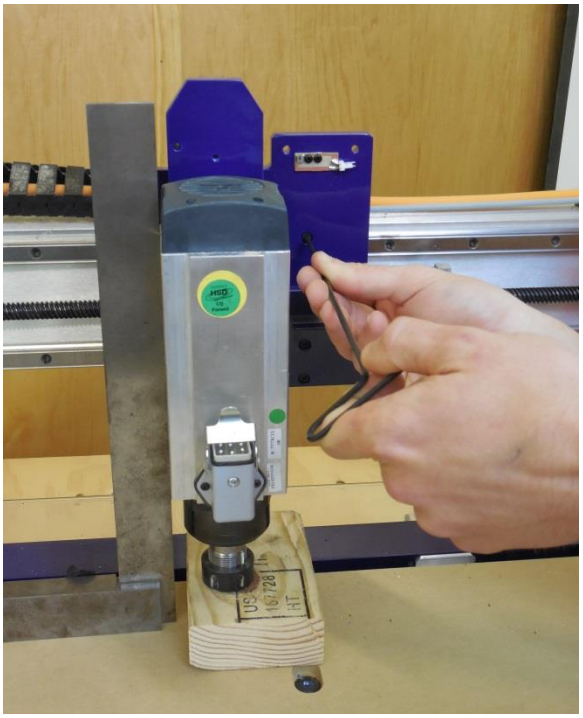
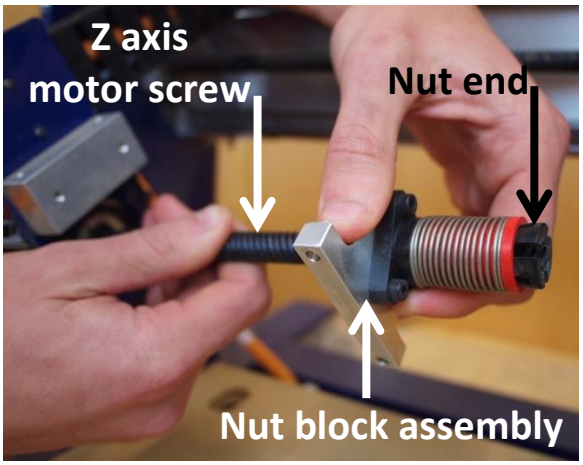


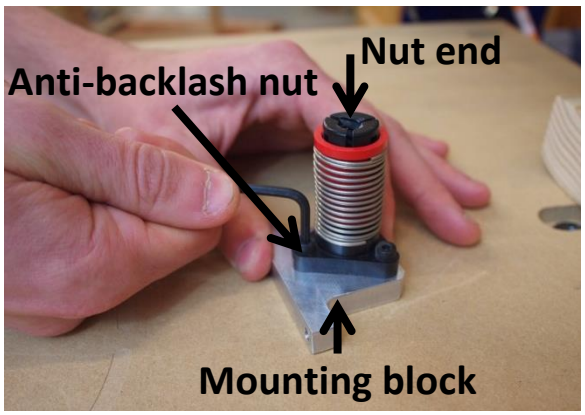
Step 19: Fasten carriage plate

Once the spindle/router is properly aligned, fully tighten the X axis bearing blocks bolts. Add or remove 2x4 support blocks to expose all screw heads.



Step 20: Remove anti-backlash nut

Step 20a:
Remove the nut block assembly from the Z axis motor screw. Do not grip the nut end as this may cause the spring to release with enough force to fly across the shop. If the spring does come off, it is easy to put back on (see note on next page).



Step 20b:
Remove the anti-backlash nut from its mounting block.

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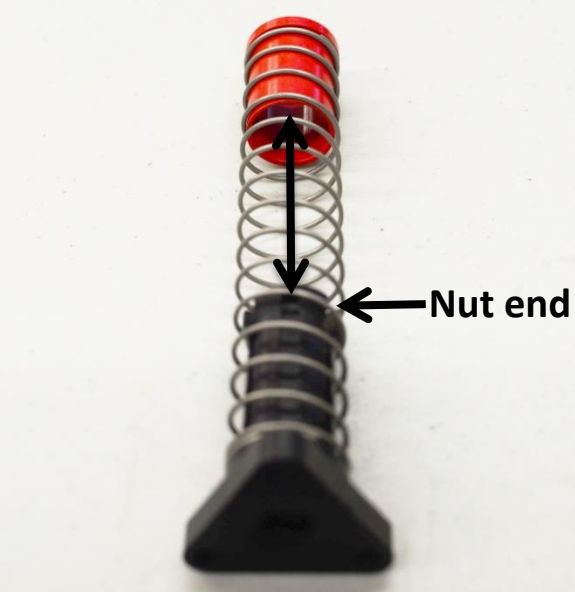
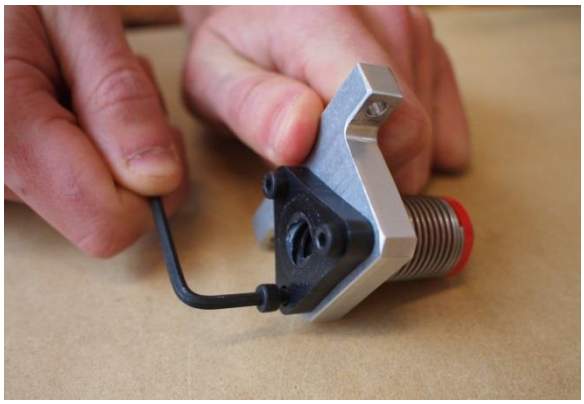


Note: If the spring pops off, it can be reinstalled by compressing the nut end while sliding the red spring retainer and spring back on until the assembly snaps back together. Make sure to line up grooves as shown.



Step 21: Reconfigure the anti-backlash nut assembly

Insert anti-backlash nut through the nut block as shown on left. Note that this is not the same orientation as before. Apply threadlocker, and install three screws.

Step 22: Install Z proximity target and spacer

Apply threadlocker, and install Z proximity target screw (M4 x 16mm) and spacer in the exact hole shown on left.

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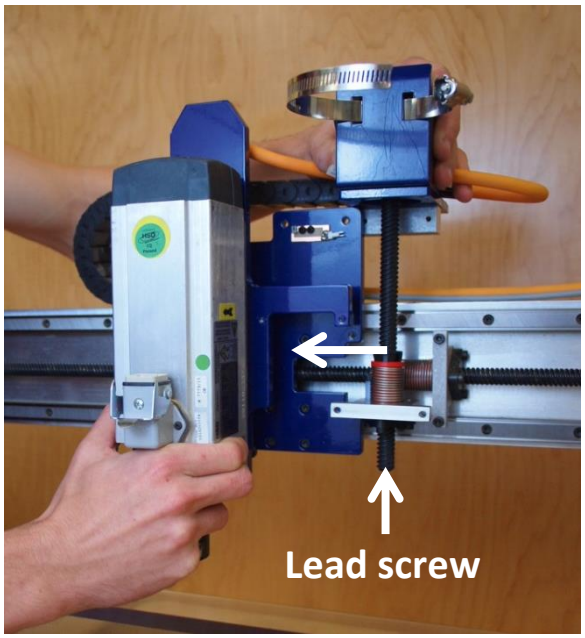
Step 23: Reinstall nut block

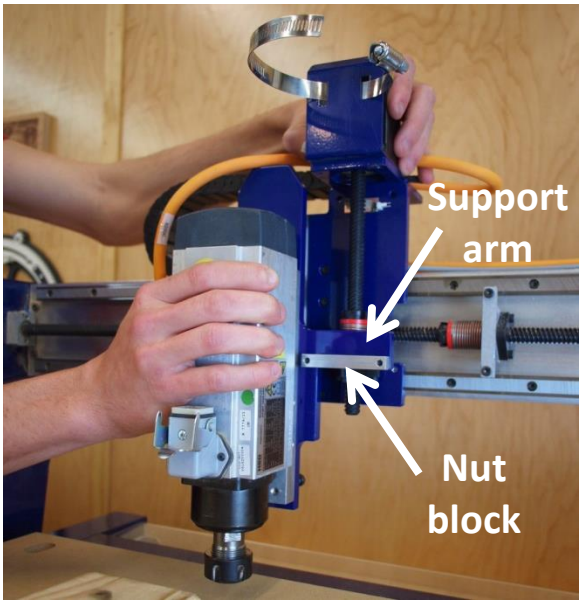
Support the spindle/router on a 2x4 block and reinstall nut block assembly. Ensure 1” to 1 1/2” of the lead screw sticks out from bottom of the nut block.

Note: If it is necessary to rotate the lead screw, do so slowly. Quick rotations of the screw can generate electricity and damage the electronics.



Step 24: Reinstall motor assembly

Slide in the motor assembly from the right until the two through-holes at the top of the carriage plate match up with the threaded holes in the aluminum block.



Step 25: Lower spindle

Lower the spindle until the support arm rests on the nut block as shown. Check that the holes line up properly.

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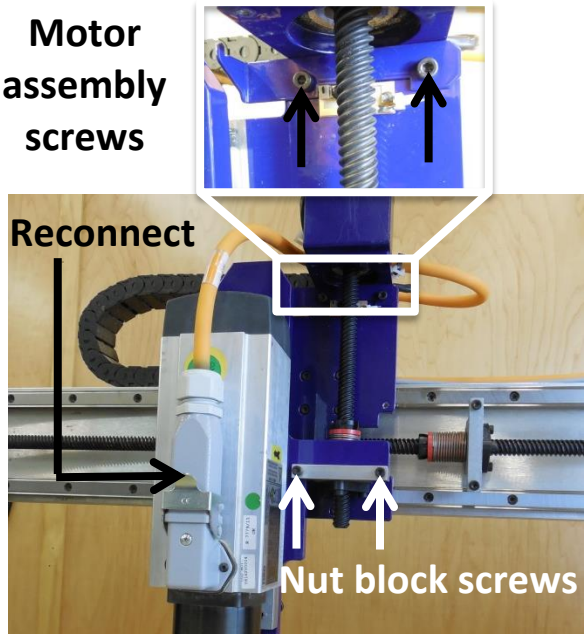
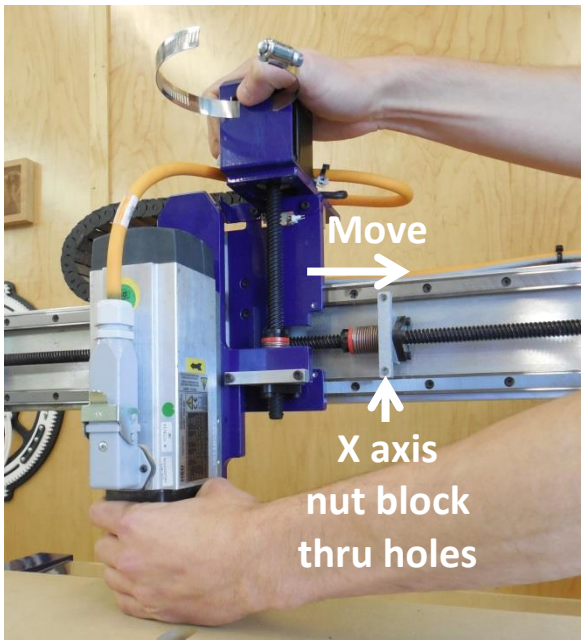


Step 26: Reinstall nut block and motor assembly

Reinstall nut block and motor assembly screws. Reinstall spring assist bracket when installing motor screws (if you have it) and reconnect the spindle power cable.



Step 27: Orient carriage plate

Slide the spindle/router assembly along the rails until it aligns with the X axis nut block.

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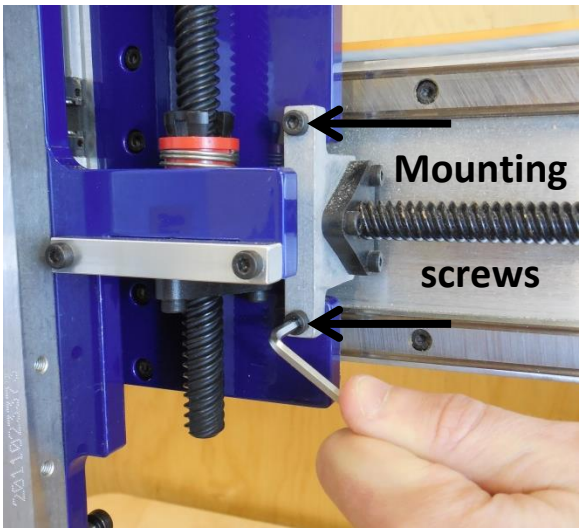
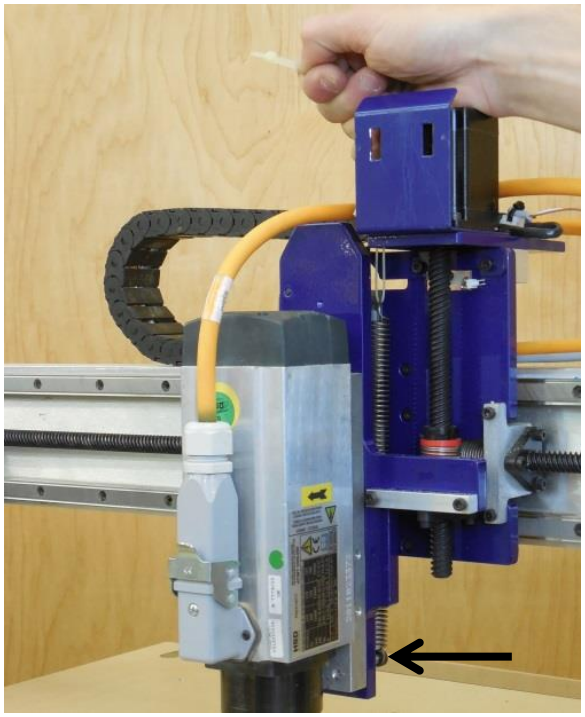


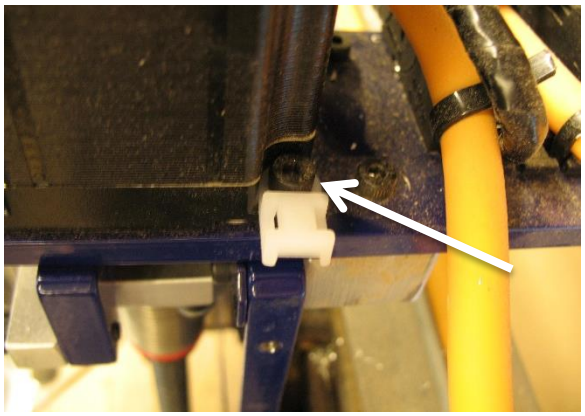
Step 28: Install X axis nut block

Block spindle to a position that allows easy access to the two mounting screws. Install and tighten the two mounting screws.



Step 29: Reattach spring

Lower spring, if present, from top and hook it onto bolt at bottom of the spindle plate (indicated by the black arrow in the image on left). Pull the spring up and reinstall it onto the spring bracket.



Step 30: Install zip tie mount

Remove the back right motor mounting screw and insert zip tie mount under screw head.

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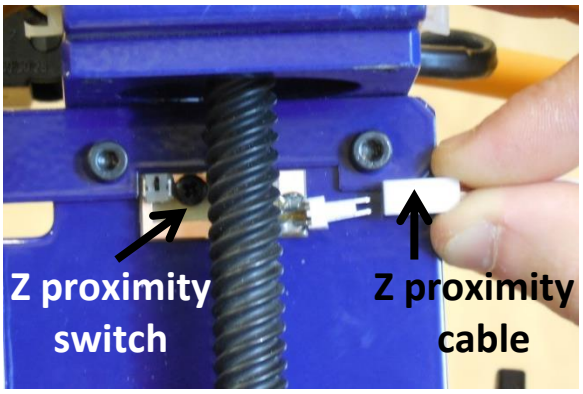
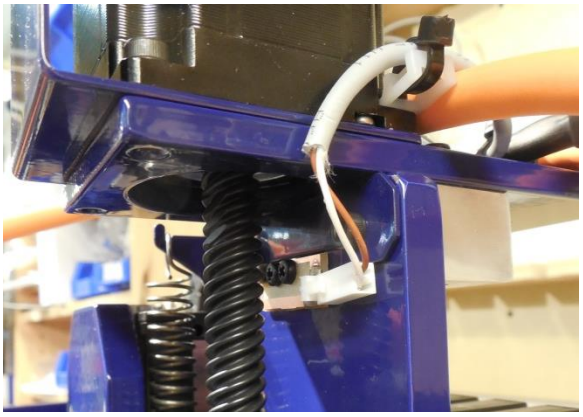


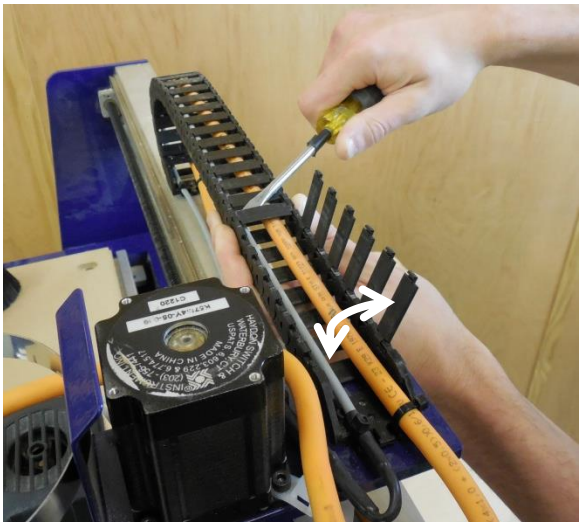
Step 31: Plug in Z proximity switch

Attach Z proximity cable (included with the kit) to Z proximity switch.



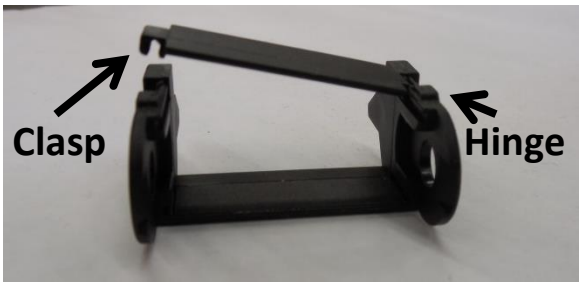
Step 32: Secure Z proximity cable

Route Z proximity cable to previously installed zip tie mount and secure with a zip tie. Make sure cable is secured out of the way of any moving parts.



Step 33: Open cable carrier

Use a screwdriver to gently pop open all the links on the cable carrier. Note that the links have a clasped end and a hinge end.



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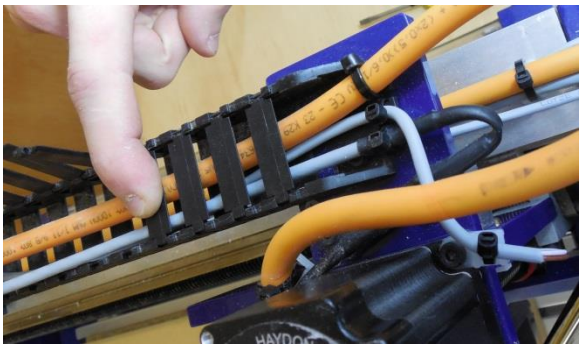
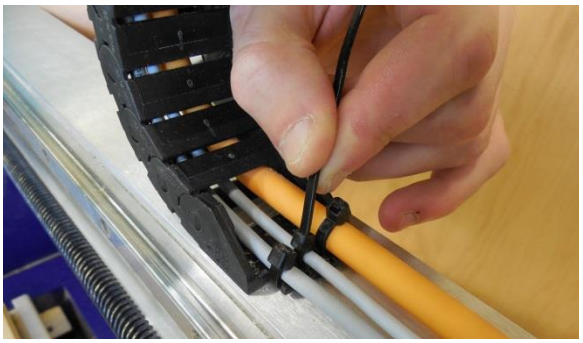


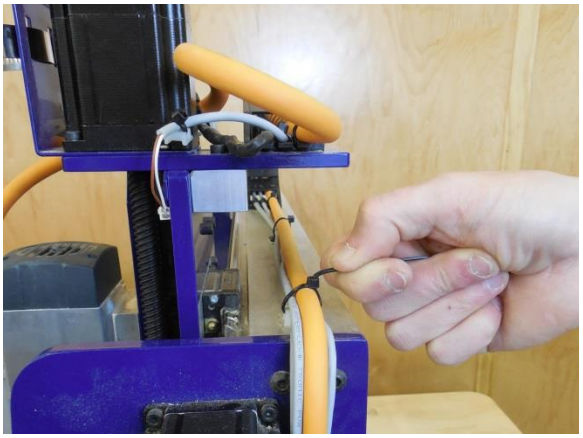
Step 34: Route cable and close cable carrier

Route the Z proximity cable through the cable carrier and gently snap the links back into place.



Step 35: Secure exposed parts of cable

Step 35a:
Secure cable at each end of the cable carrier with zip ties. Do not use zip ties inside cable carrier.



Step 35b:
Secure Z proximity cable to existing cable connection points across gantry using new zip ties.

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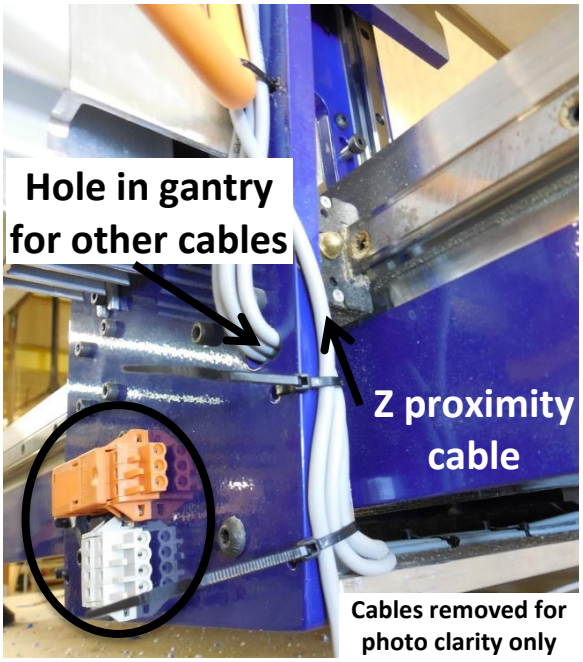
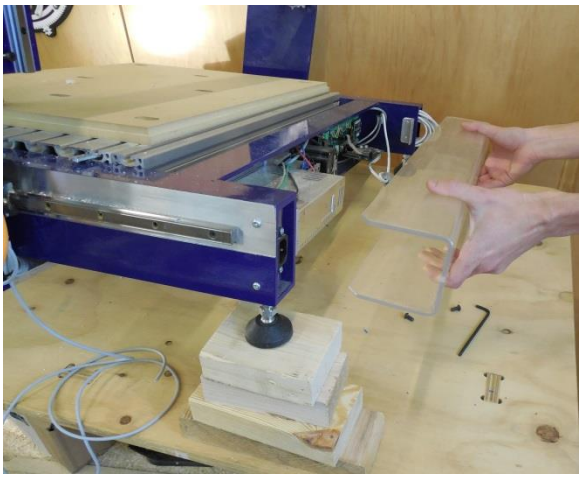


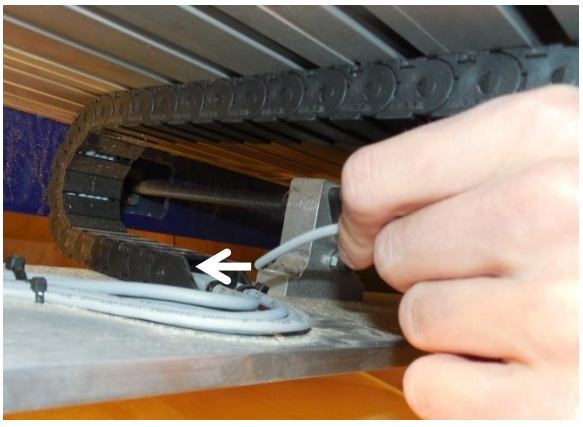
Step 35c:
Route the cable down the side of the gantry, ensuring it stays out of the path of any moving parts.

Note: The Z proximity cable does not need to be routed through the hole in gantry.



Step 36: Prop up machine

Prop up one side of the Desktop tool to allow easy access underneath. Remove electronics enclosure on rear of the machine.



Step 37: Route cable through second cable carrier

Step 37a:
Feed the Z proximity cable into the cable carrier underneath the deck until it reaches the bend.

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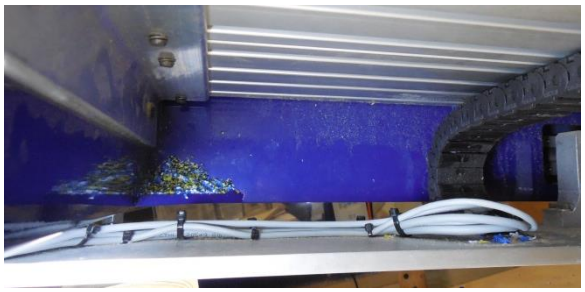
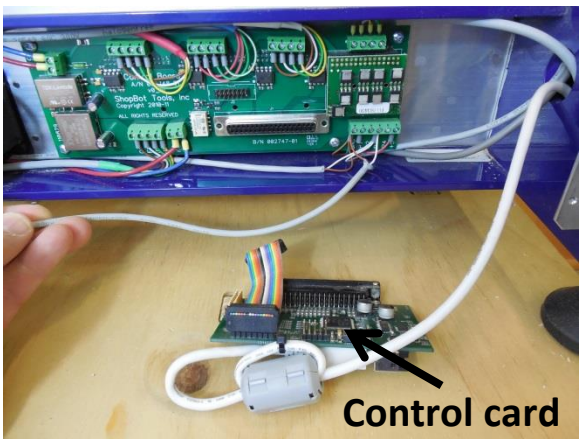
Step 37b:
Carefully open the links in the bend to access the cable. Then feed the cable through the top section of the cable carrier until it emerges out the back end.

Step 37c:
Feed the cable through the frame hole into the electronic area. Pull the cable snug so the extra is inside the electronics area.



Step 38: Secure hidden parts of cable

Fasten the Z proximity cable to the existing cables on the tie plate under the machine.



Step 39: Prepare cable for connection

Unplug the control card and lay it out of the way. Route cable along the bottom of the electronics to the bottom right corner of the main board. Trim extra cable to length, but leave it long enough to be installed loosely. Strip approximately 1” (25 mm) of the outer layer of the cable and approximately 0.2” (5 mm) of the covering on each wire to expose the bare copper.

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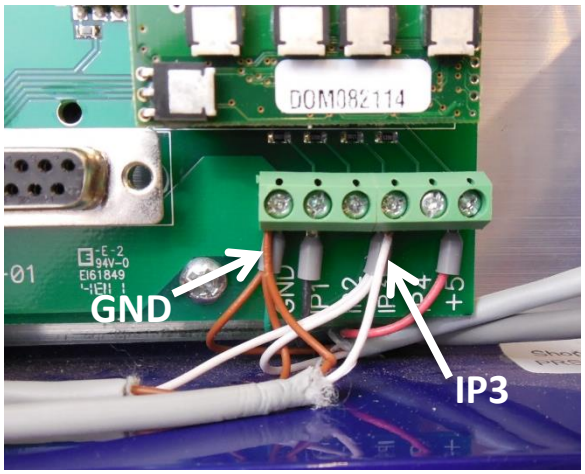
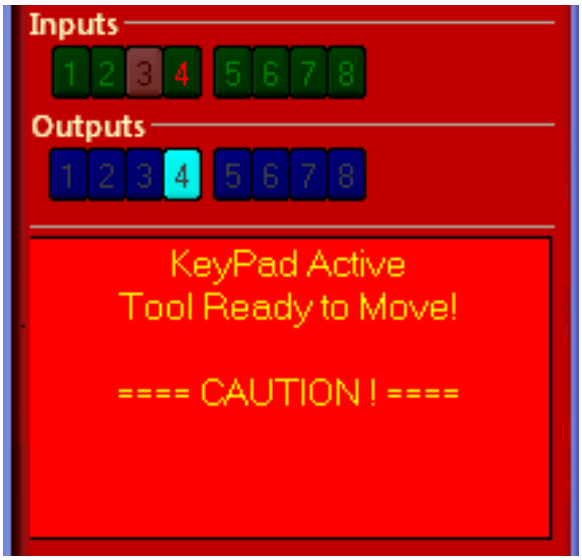


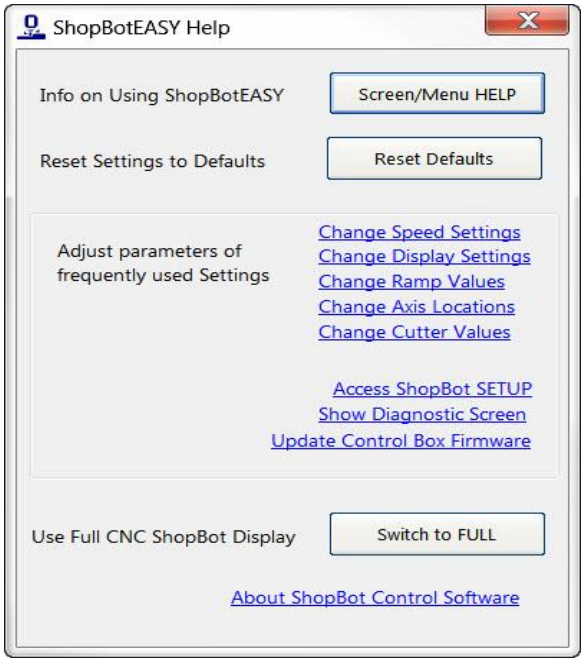
Step 40: Connect wires

Connect the white wire to IP3 and the brown wire to GND.



Step 41: Test switch wiring

Start ShopBot 3 software and establish a connection to the Desktop. Manually trigger switch with finger. Input “3” light should turn on in the red position. If it does not trigger, double-check wire connections.



Step 42: Check values

Step 42a:
Click the help button and click the “Switch to FULL” button.

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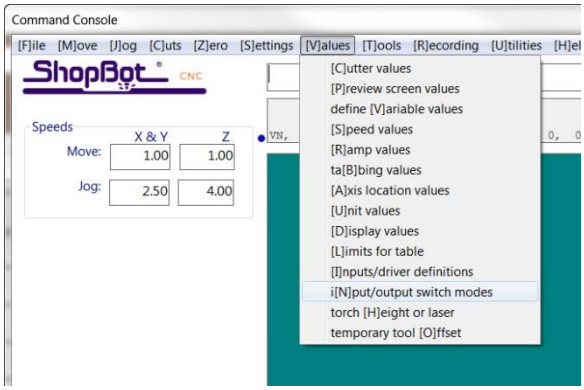
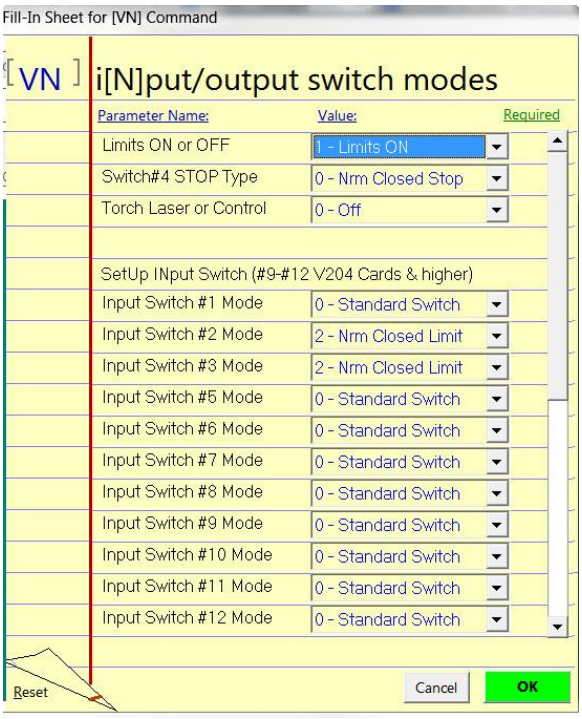
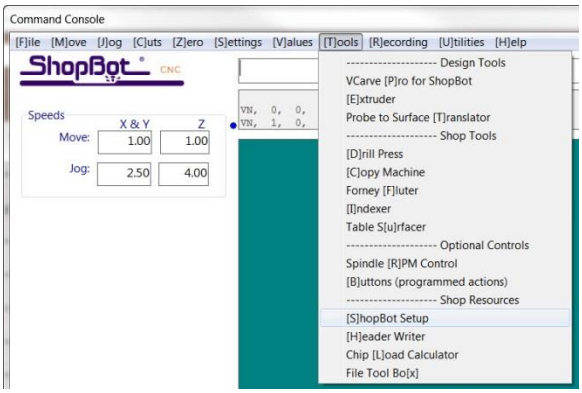


Step 42b:
Go to Values > input/output switch modes (VN)



Step 42c:
Beside “Limits ON or OFF” select “1 – Limits ON”



Step 43: ShopBot setup

Step 43a:
Go to Tools > ShopBot Setup (TS)

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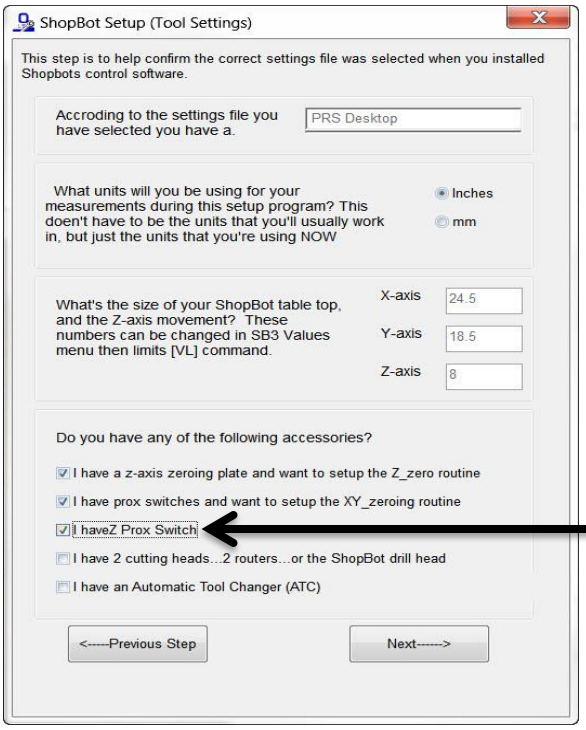

Step 43b:
Click through the first screen to reach the second screen as pictured. Check the box that tells the software that a Z proximity switch is connected.

Step 44: Test switch operation

Use the Key Pad control to move the Z up while watching the inputs, 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. If the target does not trigger switch, check switch position.

Reinstall dust collector, electronics cover, and any accessories that may have been removed. Check under the machine to make sure the Z proximity cable does not rub on the frame or other parts during operation.

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