

# Adjusting the PRS Z-axis Bearings



This document describes how to adjust the bearings on the Z-axis captured rail type of PRS tools shown above. It does not apply to other models of the Z-axis.

**ShopBot Tools, Inc**  
3333B Industrial Dr  
Durham, NC 27704  
919-680-4800 or 888-680-4466  
[www.shopbottools.com](http://www.shopbottools.com)

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## Do I need to adjust the bearings?

The PRS Z-axis has been calibrated before leaving ShopBot. However the bearings on the Z-axis may need to be adjusted after a period of use or unexpected stress. Here are some of the possible issues and how to adjust them.

### ***Test the Z-axis response***

Turn off power to the ShopBot. Push the Z-axis down, then release it. Normally, the Z should move upward under spring tension. The presence of a spindle or air drills may affect the speed and distance of this motion but the overall movement should be smooth and fluid.

### ***Are you having these problems?***

Bearings are too loose if

- Top and/or lower bearings spin freely and are not in contact with inner part of the captured rail.
- There are lateral inconsistencies in Z-axis, commonly called "slop".

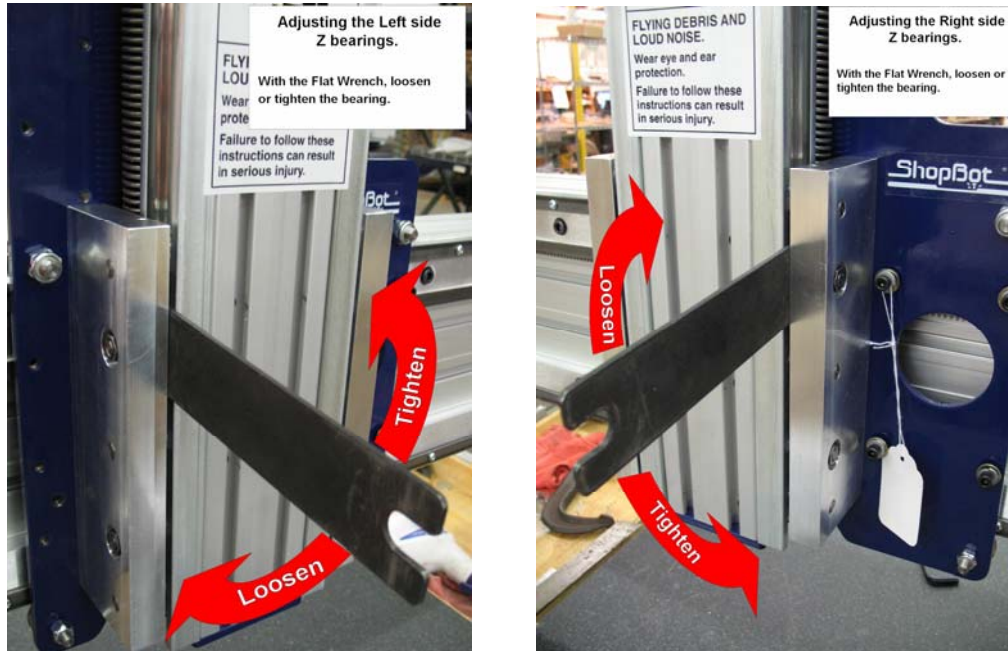
Bearings are too tight if

- Z-axis loses steps/position, binds or even stops abruptly.
- There is premature wear to the inner part of the captured rail.

If the Z-axis moves smoothly and you are not experiencing any of the issues above, then the answer is "No, you do not need to adjust the bearings".

## How to adjust the Z-axis

All adjustments take place on the front face of the PRS Z-axis. Note that the steps to adjust the left and right sides differ in the direction the wrench is turned.



There are 5 bearings on each side of the Z-axis, 3 concentric alternating with 2 eccentric. The 3 concentric bearings are in line and need no adjustment. The 2<sup>nd</sup> and 4<sup>th</sup> bearings from the top are the eccentric bearings and are the ones to be adjusted. Slide the flat bar wrench (available from ShopBot if you don't have one) between the bearing block and the captured rail until the wrench engages one of the eccentric bearings. Use the pictures above for reference (Left or Right as you face the Z-axis) as you loosen or tighten the bearings.

### To Tighten-

- **Do not over-tighten.** If the bearings are forced completely around, this may cause premature failure, loss of position, or damage to the inside of the captured rail. Tighten until slight resistance is felt on the finger tips, then check results. Repeat if necessary. The bearing is quite smooth. You may feel that it is still loose when your finger is just gliding over the bearing. Consider marking the bearing with a small dot from a Sharpie for a visual indication.
- Follow the direction of the arrows in the pictures depending on which side of the Z-axis you are adjusting. This allows you to tighten the bearings without loosening the nut that holds in the eccentric bearing.
- Tighten the bearing until the top or lower bearing stops spinning freely or the Z-axis does not move laterally.

### To Loosen-

After loosening the bearing, check the nut on the outer edge of the bearing block. Loosening rotates the bearings in the same direction as needed to remove the nut. This can lead to other complications if not corrected. It may be necessary to remove the Y-motor to access the nuts on the right side of the Z-axis.

## How to Tighten the Eccentric Nuts

### Left Side of Z-axis



After adjusting the eccentric bearing to the proper tension as instructed above, hold the position of the bearing constant with the flat bar wrench while using a 13mm socket wrench to tighten the outer nut.

### Right Side of Z-axis



It will probably be necessary to remove the Y-axis motor to tighten the nuts on the right side. Use a 3/16 hex key to remove the Y-axis motor. After adjusting the eccentric bearing to the proper tension as instructed above, hold the position of the bearing constant with the flat bar wrench while using a 13mm socket wrench to tighten the outer nut. Reattach and engage Y-axis motor.