

ShopBot Three-Axis Zero Plate

Setup and Use



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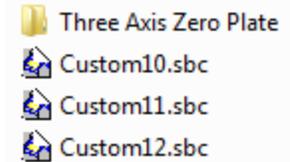
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Intro

The ShopBot Three Axis Zero Plate allows a ShopBot user to zero the x, y and z axis simultaneously to the corner of a piece of material anywhere on the table surface. It is designed for zeroing both to outside corners (such as a board sitting on the table) and to inside corners (such as the pocket of a jig). There is a separate routine for each of these processes. The plate also works as a replacement for ShopBot's regular z-zero plate.

Getting Started

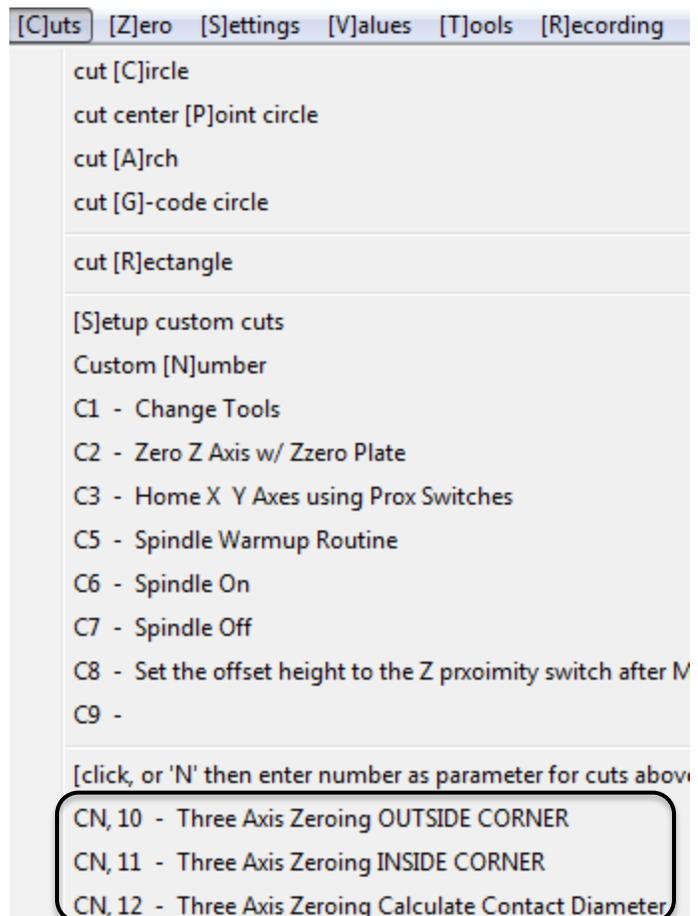
If you have not updated your SB3 software recently, be sure to update to the latest version by downloading it from the ShopBot website at <https://www.shopbottools.com/support/control-software> and installing the new version. The newest versions of the software will have the files needed to use your 3-axis Z Zero Plate.



Open SB3. Click on the **[C]uts** menu. The inside and outside corner zeroing routines now appear in your list of custom cuts (see right), along with a routine for calculating contact diameter that will be discussed later (see *Using a Tapered or V-bit*, p6). The routines can be opened by clicking on them here, or by typing **CN**, then the routine number (in this case 10, 11 or 12).

While there is a different routine for outside corners and for inside corners, they each work in a similar way: first, they touch off on the top of the plate to zero the z-axis, then they touch off on the side of the plate at 3 different points. Using these points, they calculate the location of the lower left corner of the plate, and zero all axes there.

Before zeroing, make sure that the Three Axis Zero Plate is plugged in where your z-zero plate would normally be plugged in:



Also make sure that when you touch the plate to the alligator clip, input #1 lights up (right).

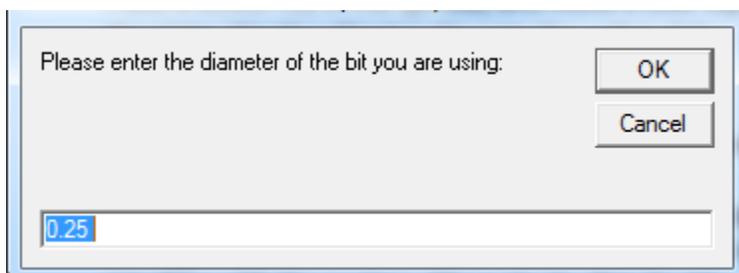
Zeroing to an Outside Corner

To zero to an outside corner, place the zero plate face down on the lower left corner of the material as shown, making sure that the plate is pressed up against the board on both edges.

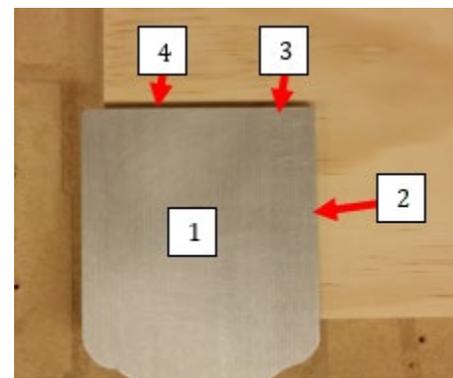
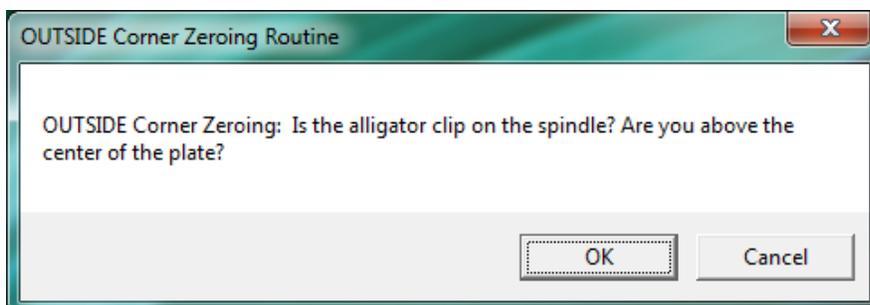
Place a drill rod in the spindle and move it over top of the plate. To use a bit instead of a drill rod, see *Zeroing with a bit Instead of a Drill Rod*, p 5. Clip the alligator clip onto the neck of the spindle to ground it.

You will need to hold the plate in place during the routine. The routine will touch off on the surface of the plate, then once on the right side, and twice on the top. As long as you hold it outside of these areas, you will not interfere with the routine. Alternatively, thin double-sided tape such as carpet tape can be used to hold the plate in place.

In SB3, type in **CN**, then **10**, then hit ENTER to start the routine. You will first be asked for the drill-rod diameter:



You will then be prompted with the following message:



Contact Points

After you hit ENTER, the routine will pause for approximately 10 seconds before beginning movement, in order to allow you to move to the plate and hold it in place.

When the routine is complete, the x, y and z axes will be zeroed to the corner of the board. The routine also tells you how parallel your material is to your ShopBot's X-axis by printing out the angle by which they differ. This angle is accurate to within +/- .05 degrees.

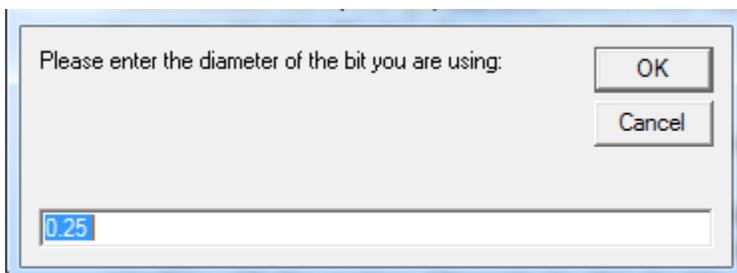
Zeroing to an Inside Corner

To zero to an inside corner, place the plate in the lower left corner of a pocket as shown.

Place a drill rod in the spindle and move it over top of the plate. To use a bit instead of a drill rod, see *Zeroing with a bit Instead of a Drill Rod*, p 5. Clip the alligator clip onto the neck of the spindle to ground it.

You will need to hold the plate in place during the routine. The routine will touch off on the surface of the plate, then once on the right side, and twice on the top. As long as you hold it outside of these areas, you will not interfere with the routine. Alternatively, thin double-sided tape such as carpet tape can be used to hold the plate in place.

In SB3, type in **CN**, then **11**, then hit ENTER to start the routine. You will first be asked for the drill rod diameter:



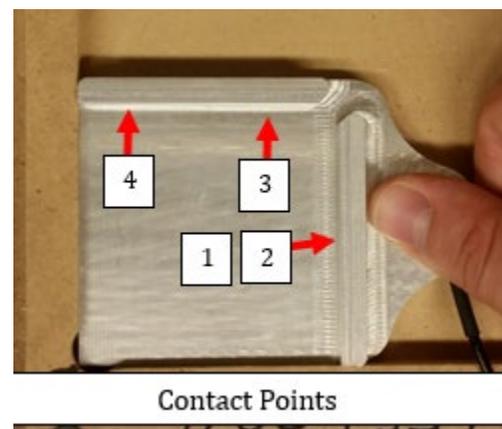
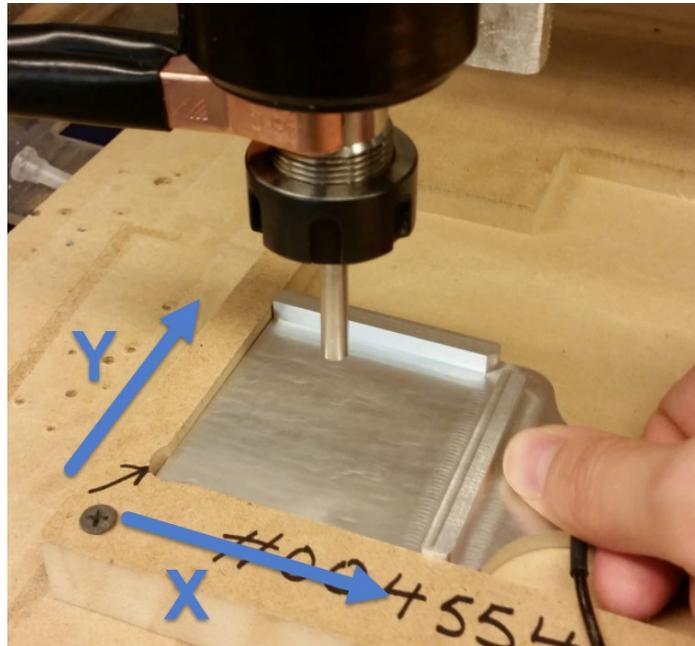
Please enter the diameter of the bit you are using:

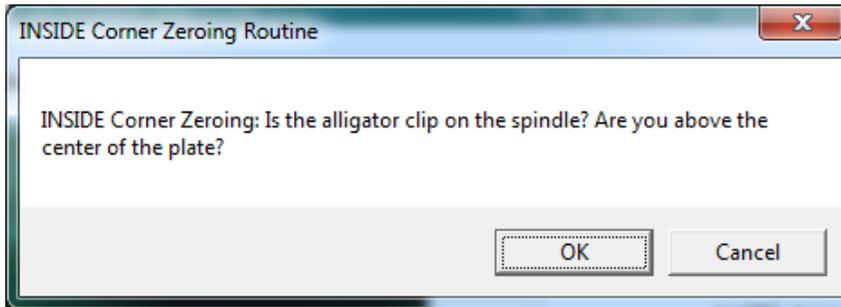
OK

Cancel

0.25

You will then be prompted with the following message:





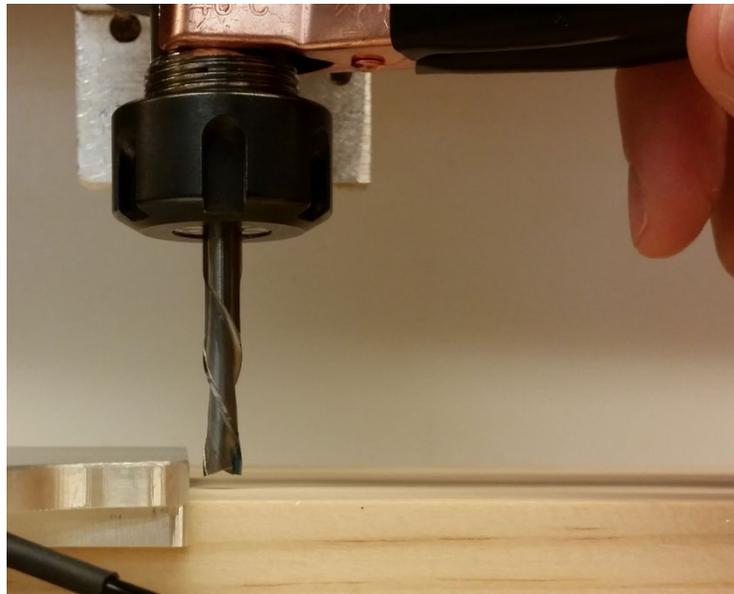
After you hit ENTER, the routine will pause for approximately 10 seconds before beginning movement, in order to allow you to move to the plate and hold it in place.

When the routine is complete, the x, y and z axes will be zeroed to the corner of the board. The routine also tells you how parallel your material is to your ShopBot's X-axis by printing out the angle by which they differ. This angle is accurate to within +/- .05 degrees.

Zeroing with a Bit Instead of a Drill Rod

The three axis zero plate can be easily used with a router bit instead of a drill rod. Simply run the inside or outside corner routine as described above, but while the routine is running, make sure to rotate the bit so that it contacts at its widest location, not at some point interior.

Because many bits are slightly tapered and/or irregular, it is recommended that you follow the procedure below to measure a bit's contact diameter in order to get the most accurate results, even if the bit is a straight-cutter or end mill.

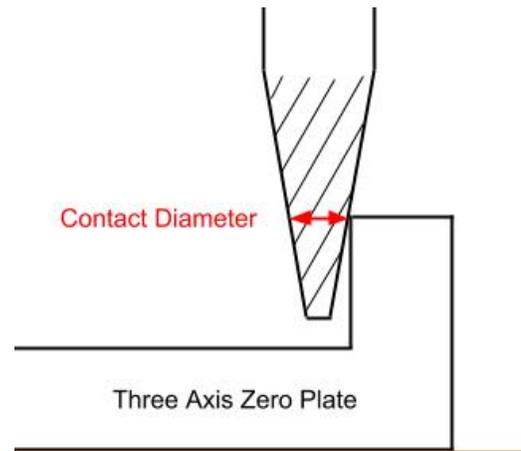
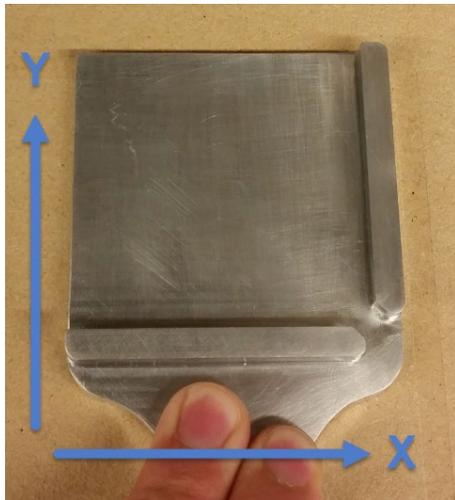


Using a Tapered or V-bit:

It is possible to use your Three Axis Zero Plate with a tapered bit, however, because the bit may contact the plate at a point that is not located on its full diameter, it is necessary to know the contact diameter of the bit. A routine is provided that will calculate the contact diameter of your bit. It is listed under the **[C]uts** menu:

CN, 12 - Three Axis Zeroing Calculate Contact Diameter

To use it, position the plate as shown, and bring the bit over top of the plate.



While the routine is running, make sure to hold the plate firmly in place in order to get an accurate measurement. The routine will contact the right side ledge on the inside, then on the outside, and will display the calculated contact diameter. Once you have the contact diameter, simply enter it when prompted at the start of an inside or outside corner zeroing routine.

Using your Three Axis Zero Plate as Your Z-Zero Plate

Now that you have a Three-Axis Zero Plate, there is no need to switch back and forth between it and a Z-Zero Plate; your Three-Axis Zero Plate is fully compatible with the **C2** command. All you will have to do is update the thickness of your z-zero plate in the SB3 Software. To do this:

- 1) Go to **[T]ools, [S]hopBot Setup** in the ShopBot control software.
- 2) Click **Next**, then **Next** again until you see this window (at right).
- 3) Change the value to 0.23.
- 4) Click **Next** twice more (may be more than twice if you have more than one spindle or an air drill), then click **I'm done**. Your settings have been updated.

Customization

Changing Three Axis Zero Plate Variables:

There are several variables used by the Three-Axis Zeroing routines that the user may wish to modify. These variables are stored in:

C:\SbParts\Custom\Three Axis Zero Plate\Three Axis Zero Plate Variables.sbp.

Changing the Input number:

The zeroing routine assumes that your plate is hooked up to input number 1. If it is connected to a different input, open *Three Axis Zero Plate Variables.sbp.* and change the value next to `&3zero_input` to the correct input number.

Changing the Pause Length:

By default, the zeroing routine pauses for about 10 seconds before beginning movement. This is to give the user time to get to the plate and hold it in place before beginning movement. To change it, open *Three Axis Zero Plate Variables.sbp.* and change the value next to `&pause_length` to your desired time (anything greater than 0.1 is acceptable).

Changing the Plate Height:

Your three axis zero plate has been precision milled to a thickness of .23". However, if you find that it consistently zeroes the z axis slightly too high or slightly too low, your plate may be slightly thicker or thinner than that nominal value. To change the plate thickness, open *Three Axis Zero Plate Variables.sbp*. and change the value next to *&p_height* to the correct input number.

Other variables can be changed as needed.

If you have feedback or suggestions for improvement, please contact ShopBot Production Support at Support@shopbottools.com

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