

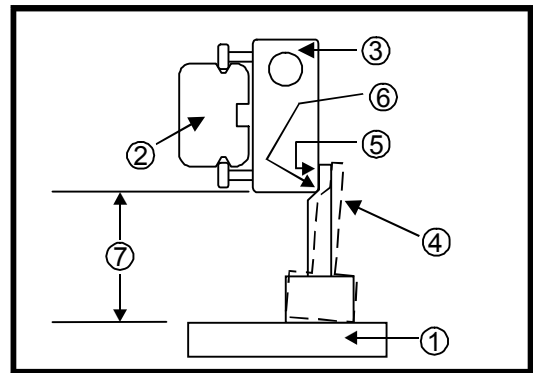
## **Focusing Methods**

The laser beam passes through the focus lens and converges to a small spot, called the focus point, approximately 2 inches from the bottom of the focus carriage when using a 2.0 lens. In order to engrave or cut properly with the laser beam, the material must be placed exactly at that focus point. To accomplish this, the Z-axis engraving table moves up and down. There are three methods used to focus the laser beam to the surface of the material, using the focus tool, using the Z -AXIS POSITION display, and using AUTOFOCUS. **The Z -AXIS POSITION menu is only accessible while the cursor is located in either the READY or the FILE DISPLAY menus. It is not accessible if the cursor is in the MEMORY CONTROL, DOS POWER SETTINGS or the PREFERENCES menus.**

## Focus Tool Method

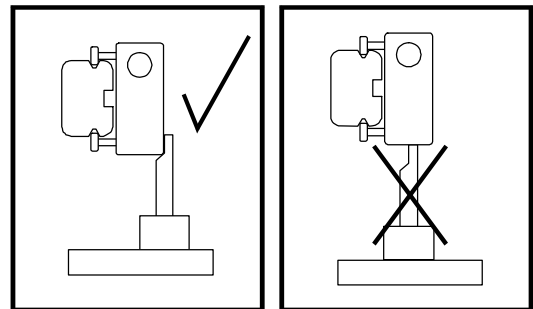
Place your material into the upper left corner of the engraving field against the rulers. Visually make sure that the height of the material will not interfere with the focus carriage when it moves over the material. While either the READY or FILE DISPLAY menu is displayed, press the Z button.

The focus carriage will move to the upper left corner of the engraving area. Use the MOTION CONTROL buttons to position the focus carriage elsewhere if your material is not positioned at (1,1). You can move the Z-axis Table up or down, at a fast rate, by pressing once or holding down either the UP or DOWN arrow button while the display cursor is positioned on top of the first digit to the right of the decimal point digit. To move the table slowly, press the SELECT button to bring the cursor over to the rightmost digit and again use the UP or DOWN button. You should practice moving the table up and down before using the focus tool.



- 1) Material
- 2) X-axis Rail
- 3) Focus Carriage
- 4) Focus Tool
- 5) Flat Edge
- 6) Top of Beveled Edge
- 7) Focal Length

Place the focus tool (4) on top of the material (1) and position the focus carriage (3) directly above it. Raise or lower the table so that the flat edge (5) the tool rests against the front side of the focus carriage. Slowly raise the table until you observe the tool either tilting or sliding away from the focus carriage. This will occur when the bottom edge of the focus carriage meets with the top of the beveled edge (6) of the focus tool. The objective is to stop moving the table at the point where the tool just starts to move or tilt. The focal length (7) distance should be approximately the length (in inches) engraved on the front side of the focus carriage. The standard and most common lens to use is the 2.0-inch focal length lens. Press the Z or the ESCAPE button to move the focus carriage back to the home position.



**WARNING:** To avoid damage to the focus lens, avoid positioning the focus tool underneath the focus carriage.

Sometimes it is desirable to be slightly out of focus when engraving or cutting. It widens the beam at the surface of the material to soften the image or create a wider cut line.



**WARNING:** DO NOT engrave or cut too far out of focus, as this can be a potential fire hazard. A maximum of .05 inches above or below precise focus should be the absolute limit.

From a physics point of view, there is no difference between raising the Z-axis table a specified distance from the focal point and lowering the table the same distance from the focal point. However, from an applications point of view, we recommend lowering the Z-axis table when intentionally **RASTER ENGRAVING** out of focus and raising the Z-axis table when intentionally **VECTOR CUTTING** out of focus.

### Material Thickness (Z POSITION) Method

Press the Z button. Verify that the CURRENT LENS displayed is the same as the one being used. If not, position the cursor on the second line in the display and press the SELECT button to toggle through the choices. When the correct lens is displayed, re-position the cursor to the top line and then over to the first or second digit. Raise or lower the table until the display shows the material thickness either in inch or metric units. Focusing using this method is now complete.

Periodically you should check if the Z POSITION method is calibrated with your focus tool. Since your focus tool is your absolute reference, make sure that you do not lose it. The SET FOCAL HEIGHT menu is used to recalibrate the Z POSITION method.

### SET FOCAL HEIGHT (Calibration) menu

To re-calibrate, the Z-axis must first be re-homed. Make sure all items are removed from underneath the Z-axis table. Position the cursor to the last line, RE-HOME Z-AXIS and press SELECT. The table will quickly move down to the bottom of its travel and then stop after it makes a few up and down moves.

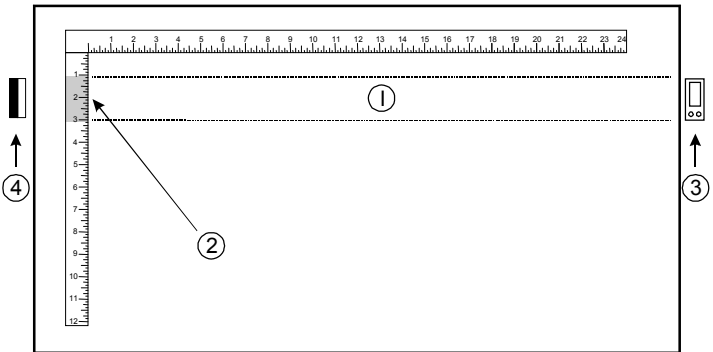
Using the focus tool that matches the CURRENT LENS displayed, position the Z-axis table so that the laser will be focused on the table's surface. If the display does not read 0.00, move the cursor down to the SET FOCAL HEIGHT menu item and press the SELECT button. Respond YES to the ARE YOU SURE? question to complete the calibration. The Z POSITION display will now read 0.00 and will be **PERMANENTLY STORED IN MEMORY** until you do this procedure again. If you have purchased other lenses, you can set each of their focal heights by making that lens the CURRENT LENS and repeating this procedure.

### AUTOFOCUS Method

This option **CAN ONLY BE USED WITH QUALIFIED MATERIALS**. Qualified materials

are materials that are very flat, non-transparent, non-elevated, and at least 2 inches tall in the Y-axis direction. To activate AUTOFOCUS, go to the "OPTIONS" menu, move the cursor to AUTOFOCUS and press SELECT. Then press ESCAPE two times to get back to the "FILE DISPLAY" menu. Place your material anywhere within the AUTOFOCUS zone (1), which spans across the table where the Y-axis ruler is indented

(2). Your material must completely obstruct the AUTOFOCUS zone (1) in the Y-axis direction (be at least 2 inches tall in the Y-axis) or it may not operate properly.



To activate the process, press the Z button once and observe the Z-axis table automatically adjust the table to the proper focusing height. Be sure that the CURRENT LENS choice in the menu system is the same as the lens installed, if not, choose the correct lens, escape out of the Z POSITION menu and AUTOFOCUS again. Periodically you should check if the AUTOFOCUS method is calibrated with your focus tool. Your focus tool is your absolute reference, so make sure that you do not lose it.

To verify that AUTOFOCUS is correctly calibrated, place an AUTOFOCUS qualified material in the upper right corner of the engraving field and AUTOFOCUS on it. Then, **WITHOUT EXITING OUT OF THE AUTOFOCUS MENU**, place the focus tool on top of the material and use the UP and DOWN buttons to set focus using the tool (as in the FOCUS TOOL method). When completed, observe the number in the Z AXIS POSITION menu. If it displays 0.00, then

AUTOFOCUS is calibrated. If not, move the cursor down to "SET FOCAL HEIGHT" menu item and press the SELECT button. Respond YES to the ARE YOU SURE? question to complete the calibration. The Z AXIS POSITION menu should now display 0.00. If additional focus lens kits were purchased, then you will need to repeat this procedure for each lens but make sure that the CURRENT LENS menu matches the lens installed and the focus tool.