Focusing the Laser Beam

To properly focus the laser beam onto the surface of the material, you need to perform two tasks. First position the focus carriage directly above the material and then use the focusing tool or the digital display to adjust the Z axis table level until the material is at the proper distance away from the focus lens.

Place your material into the upper left corner of the engraving field against the rulers. From either the “MAIN” or FILE DISPLAY” menus, press the “Z” button located on the control panel.

You will observe the focus carriage move to a pre-set focusing position of (1,1). The display will now show the “CURRENT LENS” that you are using and the current vertical “Z POSITION” of the engraving table.

The cursor in the display will be flashing on top of the tenths digit. You can now move the table up or down by pressing either the up or down arrow button. If you push the button once and let go quickly, the table will move in .1 inch increments. If you hold down the button, it will move fluidly. To make finer moves, press the “SELECT” button to bring the cursor over to the hundredths digit. Pressing the up or down arrow button once and letting go quickly will move the table in .01 inch increments. Holding down the button will make it move fluidly. Practice moving the table up and down to get the feel of it before you attempt to focus on a material. We will explain the significance of the numbers in the display a little later on but for right now, press the “Z” button to bring the focus carriage back into the home position.

Essentially, there are three ways to focus on your material. One is to use the focus tool, another is to enter in the thickness of the material, and the other is to use AUTOFOCUS.
The Focus Tool Method
Place your material onto the engraving table. Visually make sure that the height of the material will not interfere with the focus carriage when you move it over the material to set focus. Press the “Z” button and observe the focus carriage move to the (1",1") position in the engraving area. If this is not a good focus position for you, use the motion system directional arrow buttons to position the focus carriage directly over your material. Use the up or down arrow buttons to move the table so that the flat side of the tool can sit flat up against the 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 of the focus tool. The objective is to stop the table at the point where the tool just starts to move or tilt.

Remember, having the cursor, in the display, located on the tenths digit will move the table quickly and having it on the hundredths digit will move it more slowly. After focus has been established, remove the focus tool and press the “Z” button to move the focus carriage back into the home position.

If you find that you need to place your materials in a position other than the upper left hand corner, you can change the default focus position to anywhere in the field that you like. Please refer to that menu item selection earlier in this section.
The Material Thickness (Z POSITION) Method
The second method is to enter in the thickness of the material into the “Z POSITION” display. This method does not involve the use of the focus tool. For example, using a caliper or some other thickness measuring device, measure the thickness of your material and enter that thickness into the “Z POSITION” display. For example, if your material is 1 inch thick, use the up or down arrow button to raise or lower the table until the digital display reads “1.00”. That is all you need to do. Now press the “Z” button again to bring the motion system back to the home position. The beam is now precisely focused on the surface of your material. Think of it as using an imaginary focus tool.

The laser system table has been set up at the factory to read “0.00” when the beam is focused to the surface of the table when the lens that is installed on the focus carriage matches the “CURRENT LENS” in the display.

The factory has only set the “0.00” point for the lenses that you purchased at the time the system was shipped. If you purchase additional lenses, you will need to set the “0.00” point, also called the “FOCAL HEIGHT”, for each lens.

CURRENT LENS Menu
There are 4 lenses available, 1.5, 2.0, 2.5, and 4.0 inch lenses. All of them have different focal lengths so this is why we need to have a different “FOCAL HEIGHT” position for each lens. If you press the “SELECT” button while the cursor is on this menu item, you will see the right side of the display toggle into the different lens heights. You will also notice that the “Z POSITION” display change to reflect the difference in focal lengths. If you have purchased all of the other optional lenses with the laser system, all of the focal lengths have been set for you. If you just purchased the standard 2.0 lens, only that “FOCAL HEIGHT” was set at the factory. This is due to the fact that all lenses have slightly different focal lengths even if they are both 2.0 inch lenses so each one’s “FOCAL HEIGHT” must be calibrated on the machine.

SET FOCAL HEIGHT Menu
Use this selection to set the “0.00” for each lens. Using the focus tool that matches the “CURRENT LENS” displayed, position the 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. The display will ask “ARE YOU SURE?”. Move the cursor down to “YES” and press the “SELECT” button. 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.
The AUTOFOCUS Method
In order to use this method, you must first turn it ON. We described how to turn it ON earlier in this section. After you turn it ON, please follow the step by step instructions below.

To Use AUTOFOCUS:

- The AUTOFOCUS sensor sends out an invisible beam across the table between the 1 inch and the 3 inch mark in the Y axis ruler for the M-300 Platform and the 2 and 4 inch mark for the V-400, X-600 and X2-600 Platform laser systems. You will notice that it is indented slightly.
- Place your object between these two points vertically and anywhere on the table horizontally. Refer to the diagram below.

![Diagram of AUTOFOCUS Zone](image)

- Make sure that the laser system is in the main menu screen or the “File Display” menu. AUTOFOCUS will not work in the other menus.
- Press the “Z” button once on the control panel of the laser system. You will observe the Z-axis Table (Engraving Table) move down and then up again, adjusting the table to the proper focusing height. If the “Current Lens” choice in the menu system is not the same as the lens you have installed, correct it by placing the cursor on the second line of the display, and pressing the “Select” button to toggle you through your choices. Once the desired lens is displayed, escape out of the menu and AUTOFOCUS again. This will bring the table up to the correct height. The display will now show that the “Z Position” is “0.00” for that Focus Lens.
- If you desire to adjust the “Z Position” so that you are slightly out of focus, without exiting out of the menu, simply bring the cursor over to the “0.00” part of the display and adjust the table to the desired offset. The display will now show you how much you are out of focus. If you were to escape out of the display and perform the AUTOFOCUS procedure again, the “Z Position” will again show “0.00” to remind you that you are precisely in focus.
- If you have purchased additional lenses besides the 2.0 inch lens upon original delivery of the laser system, those other lens heights have been set at the factory. If you purchase additional lenses after you have received your machine and need to set the “Focal Height” of that lens, or you need to adjust your AUTOFOCUS, please follow the next procedure.
To Adjust AUTOFOCUS:
From time to time, you may need to re-adjust your AUTOFOCUS. The only time that you should need to re-adjust the AUTOFOCUS is when you have received a new or different length Focus Lens, have recently Flash upgraded the operating system of the laser, or had a dirty sensor or reflector and are adjusting it after you have cleaned those parts.

- Place a very flat object on the Engraving Table, within the AUTOFOCUS Zone, that is at least 1 inch thick.
- AUTOFOCUS on this object by pressing the “Z” button once.
- While you are still in the “Z Position” display, move the Focus Carriage using the motion control keys so that it is above your object that you placed on the table.
- Place your Focus Tool on top of your object and compare the Focus Tool reading with the actual height that the AUTOFOCUS set the Engraving Table to. If it is not the same, bring the cursor up to the first line of the “Z Position” display and press the “Select” button. Now focus on your object by using your Focus Tool and adjusting the “Z Position” until your are manually focused on top of your object.
- Press the “Escape” button, move the cursor to the “Set Focal Length” line and press “Select”. It will ask you if you are sure so move the cursor down to the “YES” line and press “Select”. The AUTOFOCUS will now have been re-adjusted to be exactly at the same height as your Focus Tool. The purpose of “Setting the Focus Length” is to calibrate AUTOFOCUS with your Focus Tool so that whether you use AUTOFOCUS or use the Focus Tool, you will always be putting the Engraving Table at the correct focusing height.
- If you have purchased additional lenses, repeat this procedure for each lens by changing the “CURRENT LENS” on the display and your focus tool, to the one you are calibrating.

AUTOFOCUS Maintenance:
If the AUTOFOCUS reflector or sensor becomes dirty from engraving smoke, it may malfunction. A sign of AUTOFOCUS malfunction is upon activation, the table either moves all the way down to the bottom or all the way up to the top and will try to keep on moving until you power the machine off. If this did happen, you will need to clean your sensor and reflector and then perform the AUTOFOCUS adjustment procedure. An indication that the sensor and reflector are clean is that you will see a little green light appear on the side of the sensor. If you see both green and red lights, the sensor and/or reflector are dirty or blocked. NOTE: Make sure that the table is down far enough so that the sensor “sees” the reflector before assuming that there is a problem.

To clean, dampen a tissue with water and gently wipe across the sensor and reflector in one direction. Gently wipe again with a dry tissue.