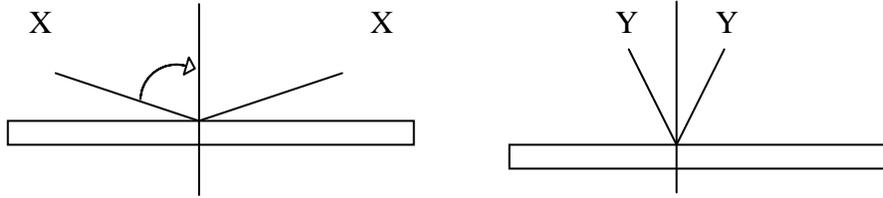


Understanding Reflection.



Light enters at an angle and leaves at an angle.

If light enters at an angle X, it will leave at an angle X.

If light enters at an angle Y, it will leave at an angle Y.

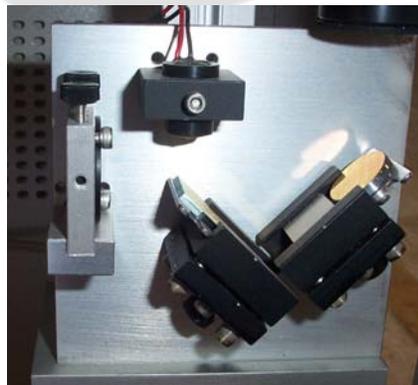
Beam Alignment

WARNING!! WEAR LASER SAFETY GLASSES WHEN FIRING EXPOSED BEAM.

The laser beam is guided to the top of the working area by using 4 reflective mirrors. Therefore, these mirror adjustments are crucial to the proper functioning of the machine. If the laser beam is not aligned correctly, the beam path will be shifted or tilted and both rastering and vectoring quality will be affected.

Beam alignment is relatively the same for all laserpro X-Y table machines. This guide will cover all models. Below are some examples of different combinations BUT are still the same when aligning. NOTE: your machine may look slightly different but alignment is basically the same.

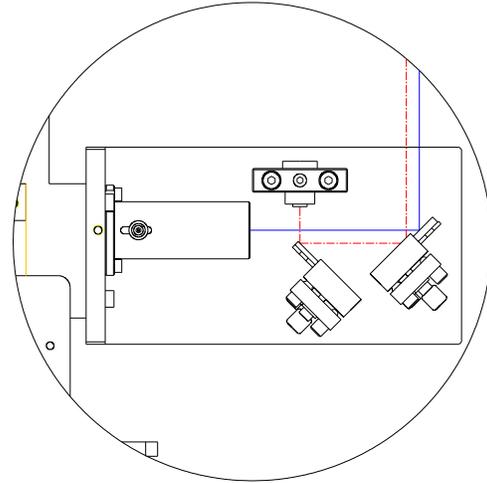
This is a picture of a typical mirror 1/red beam combination on Mercury 50 watt machine



These are pictures of a spirit 30 watt mirror 1 on the left and an Explorer 30 watt mirror 1 on the right. Both with red beam introduced here.



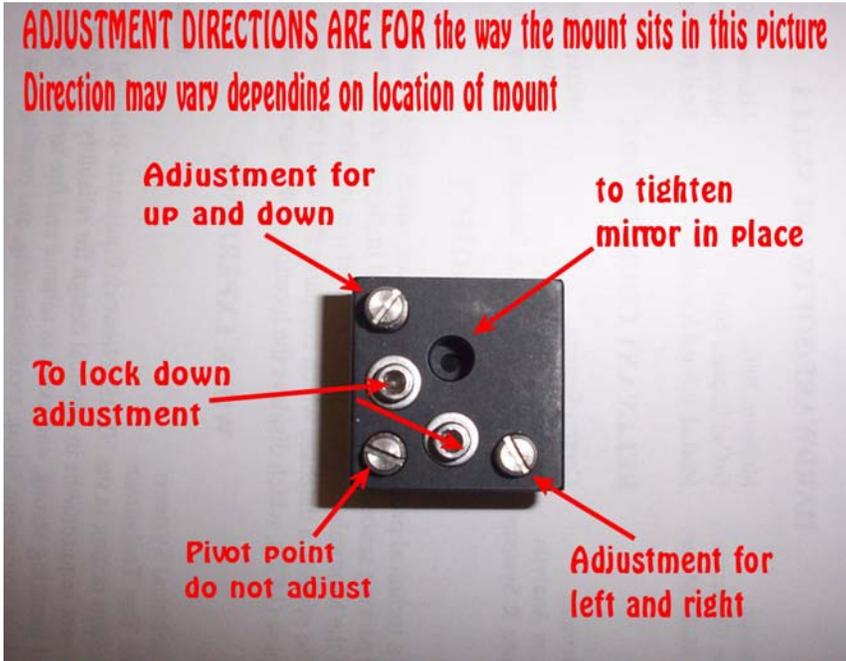
This drawing shows a common mirror one mount and where the red beam is introduced. Your red beam location may be located here OR halfway up the tube above mirror 1 and accessed through the back door or the back access panel.



Your laser beam is exiting the tube from the left and reflecting up from mirror 1 on most machines.

Mounts adjust the mirror in desired directions by turning the adjusting screws. Below are pictures of typical mounts on Laserpro machines and may vary from your machine. They work in exactly the same way for all mounts.





This picture shows the function of each screw on the mount. The directions given (up/down/left/right) are oriented to the placement of the mount in the picture. Your mounts may be oriented different then this picture BUT works the same. Down may be left Etc. Pay attention to the pivot set screw and you can see which direction the mount will move when you turn each of the 2 adjustment screws. The mount pivots off the pivot set screw.

The “lock down screws” are used for helping secure the mount where you adjusted it.

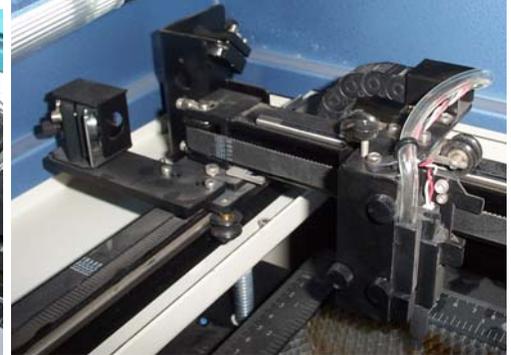
Below are some pictures of some of the Laserpro machines mirror 2, 3, and 4 with the carriage in the top left corner. All beam alignments are basically the same even though they look slightly different.



Mercury



Explorer

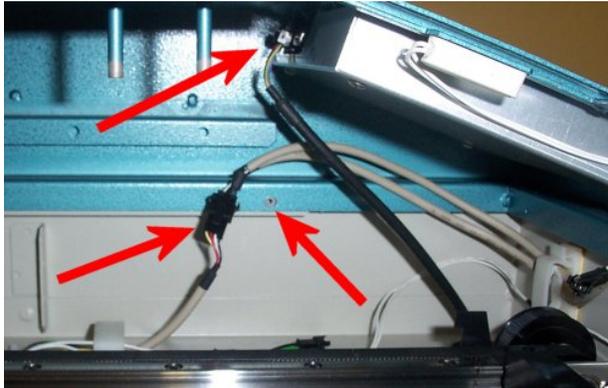


Spirit

To align:

In short words we want to make the laser beam hit center of all mirrors AND make the beam hit the exact same spot (from mirror 2->3 and 3->4) no matter where the rail/carriage is. As well as center the beam at the exit of the carriage and align red beam to the laser at the bottom right of table at mirror 4.

Step 1: Unscrew the back panel of the machine revealing the laser tube and mirror 1. **OPTIONAL:** Remove or open the top cover depending on the machine if needed. (see pictures below) If lid is removed you will **NEED** an external control panel to operate machine. (available for purchase)



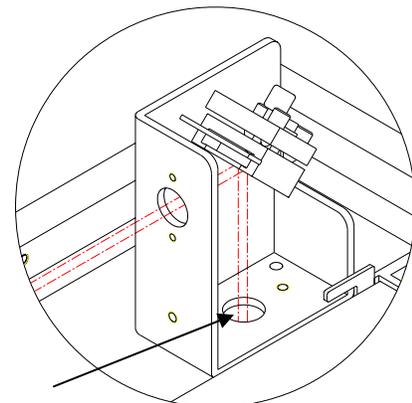
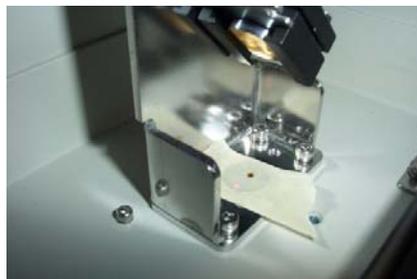
To take the lid off, unplug control panel wires and door switch wires. Remove 8 screws holding lid to frame.

On Spirit, flip open the top for easy access. **NOTE:** on Explorer and Mercury we need to manually jump the door switch wires to fire beam with lid off. Jump the wires with computer jumpers or other device. The door switches are normal open circuit. Jumping them shuts the door open light off. **WARNING!!** Spirit laser will fire with lid in the open position.



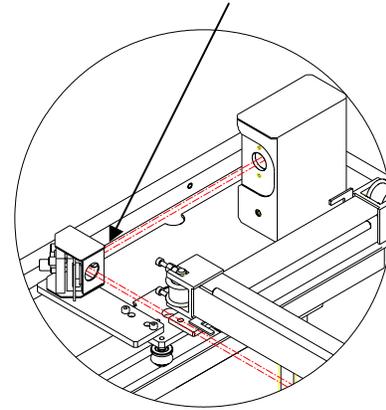
Turn on the machine and enter the hidden diagnostic menu by holding down the **Autofocus** key for Spirit and Explorer while turning on the machine. The Pause and start/stop are used for Mercury/Venus while turning on the machine. Select test laser source with arrow keys for Spirit/Explorer or press function for Mercury/Venus to select test laser source. Hit enter to select test laser source. Set laser power to about 5%.

Step 2: Remove mirror 2 cover and place a piece of masking tape over the tube opening that leads to mirror 2. Fire the laser with the key listed on the control panel screen and see if it leaves a burn mark in the center of the hole. (Just tap the key until a burn mark is observed) Check that the burn mark left by the laser beam is circular in shape.

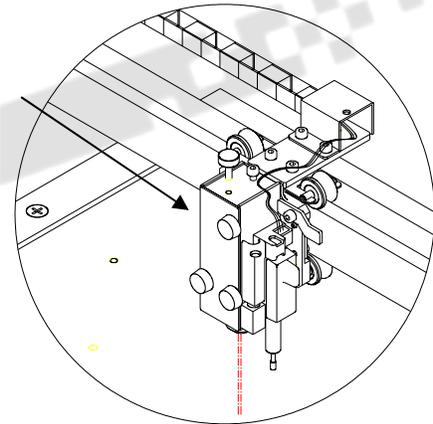
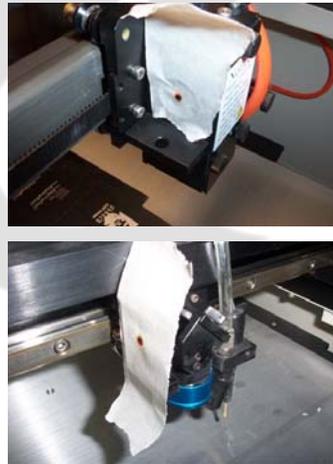


If it is not circular, i.e. oval or other shape, then the laser beam might have hit the inner tubing and is getting reflected on the way from mirror 1 to mirror 2. If this is the case, place a piece of masking tape before the tube entrance (above mirror 1), fire laser and adjust mirror 1 so that laser passes through the center of the opening. (remove tape)

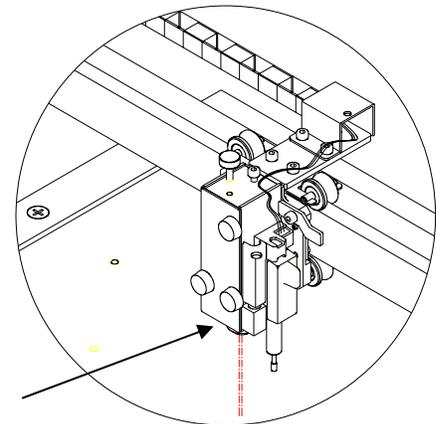
Step 3: Place a piece of masking tape on the opening before mirror 3. Move the rail along the Y-axis so that mirror 3 is close to mirror 2. Fire the laser and see if the laser beam goes through the center of the circle. Then move the rail so that Mirror 3 is to the far end of the Y rail and the furthest point from mirror 2. Fire the laser and see if it leaves a mark at the same location when it was close to Mirror 2. Adjust mirror 2 until the burn mark is on top of one another when Mirror 3 is both close and far from Mirror 2. Center of the opening is not critical at this point. We will adjust center at a later point. (remove tape)



Step 4: Place a piece of masking tape on the opening before mirror 4 (if Explorer place the tape to the left of the mirror). Move the carriage to the lower left corner of the working area. Fire the laser and note the location. Move the carriage to the lower right end of the working table. Fire the laser and adjust mirror 3 so the laser beam burn is right on top of the last. The laser should burn the same spot when the carriage is positioned at lower left and lower right. (remove tape)



Step 5: Place a piece of masking tape over the nozzle opening. (with lens removed) Position the pen carriage at one of the 4 corners of the working area. Fire the laser and adjust **mirror 1** so the laser passes through the center of the nozzle opening. Repeat for all 4 corners of the working area. After adjusting mirror 1, you may have to re-adjust mirror 2 and mirror 3 as well. (Repeating Steps 3 & 4.)





GCC AMERICA, INC.
323 Paseo Tesoro
Walnut, California 91789
Tel: (909) 718-0248 Fax: (909) 718-0251

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If the laser beam passes through the center of the nozzle opening at all 4 corners, then the laser beam should have been aligned properly. (remove tape) Cut four 20x20 mm squares at the four corners of the working area to double check that the edges of the square are not slanted.

Step 6: After aligning laser beam place the carriage in the bottom right corner. Place a piece of masking tape over the opening to mirror 4 (or in front of the mirror on Explorer) and burn a mark. Adjust the red beam mirror so the red beam is right on top of the laser beam burn mark. Now red beam is aligned to laser at the furthest point.



To avoid laser beam movement during operation, place a drop of medium strength thread lock liquid on each of the mirror mount adjustment screws.

Take the jumpers off of the door connections and return all covers and close all doors. Replace the top cover or close the lid for the spirit.

