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Spirit Series Beam Alignment

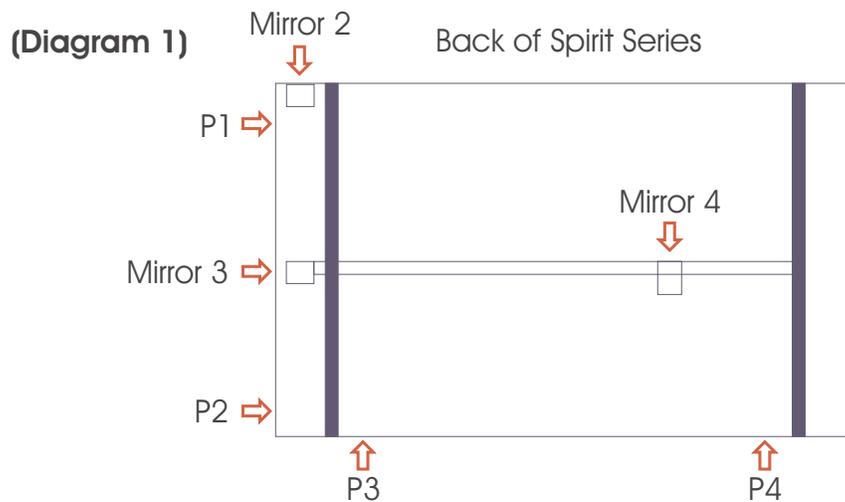


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Rev 1.00004

Remember to always wear safety glasses while doing any open beam tests.

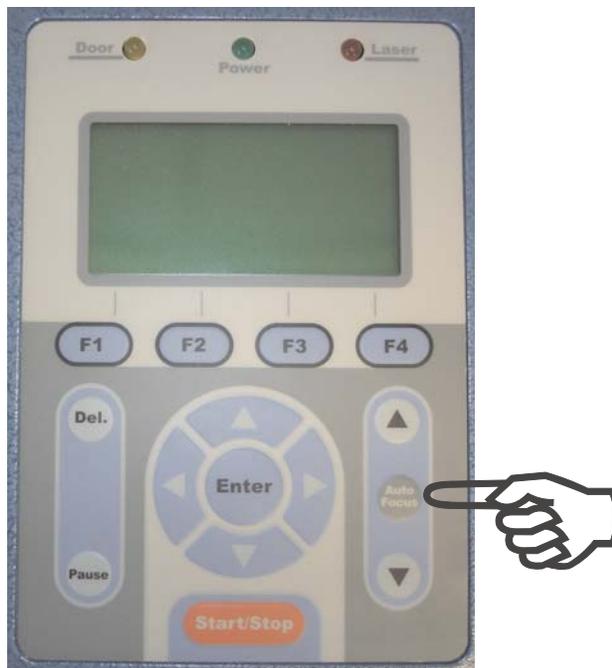
This document will show you how to check and align your LaserPro Spirt Series Optics. The first thing to do is check the current alignment. Briefly the logic is to have a perfectly straight beam path from Mirror 2 (Back top left) to mirror 3 (Left end of X axis). From mirror, 3 to mirror 4 (the one in the lens carriage). Mirror 0 is for the red beam. Mirror 1 only controls where the beam hits the lens. If mirror 1 is adjusted incorrectly you may have slanted edges when vector cutting in x or y.

The first step is to check your machines alignment. We will check it in 4 places P1, P2, P3, and P4.

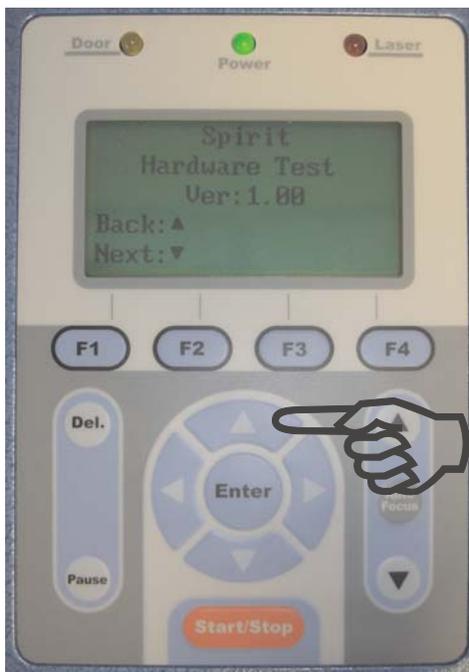


To start place a piece of tan masking tape, transfer tape, or small white label to back of mirror 3's housing. (Cover the hole the laser beam enters to get to mirror 3, see Figure 2 on Page 3)

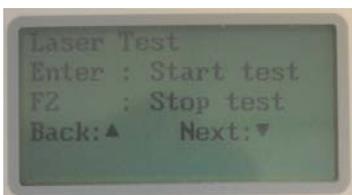
Turn on the machine while holding down the **Auto Focus** key on the Control Panel.



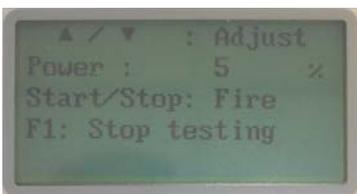
Remember to always wear safety glasses while doing any open beam tests.



After the unit initialize the Display will look like this.



Press the **Up Arrow** above the **Enter** key until the display looks like this. It will say **Laser Test**



Press Enter and the display looks like this. Power should now read 5%. High wattage laser may need to be lowered to 4 or 3%. Use the Up and Down arrows as required to adjust the power. In general you want the power to be strong enough to burn but low enough to make the mark very light.

You are now ready to check your beam alignment.

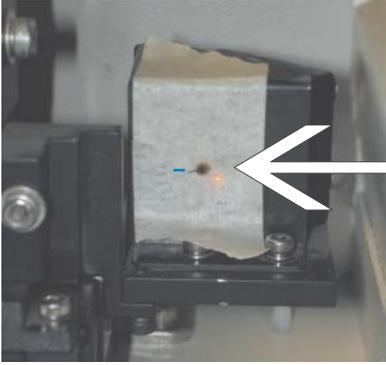
Position the X axis in PI (Diagram 1 on page 2) The X axis should be pushed all the way back.
Close the Lid.

Press the START key fo about a second, or less. A small amount of smoke should be seen.

Pull the x axis arm toward you and look at the back of Mirror 3. There should be a small brown/black burn mark. If there is not repeat **Orange** above until you burn a small spot. If you burn a big spot you will need a new piece of tape and repeat again.

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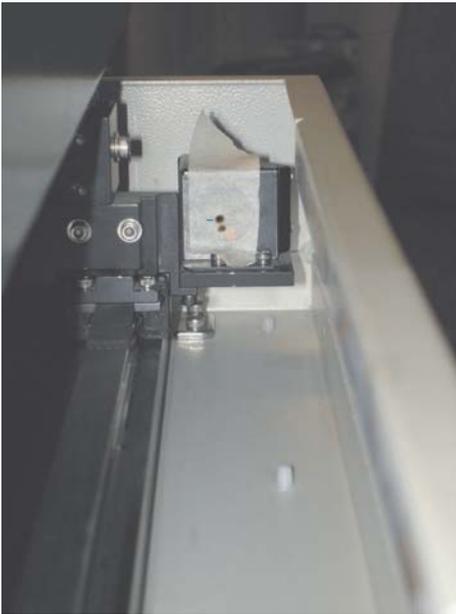
Back Side of Mirror 3



Small burn mark

(Place Pen mark just to left of burn mark for later identification as shown)

Figure 2



Position X axis to P2 (Bring it all the way forward)

Put a small pen mark to the side of this dot so you will know which dot was fired first.

Repeat step in **Orange** on previous page to create second dot. If the dots are on top of each other you are done with mirror 2. Please go to page 6 for basics of beam alignment read the directions on how to do all but you can skip adjusting Mirror 2's Prism Mount

If you have two separate burn marks continue with this page.



If your dots look something like this you need to adjust mirror 2. Please note your Red Dot will NOT line up with your burn marks. Do not attempt to line Red Dot up it will not be in the same spot as the C02 beam.

Dot 1 is from P1 and 2 is P2.

P1 dot will never move. We need to adjust the dot at P2 to hit the one from P1.

If Mirror 2 or 3 requires adjustment you will need to open the top of the machine. Remove the two shipping screws located in the rear left and right side. Reach behind the lid and grasp the handles and lift the top of the machine until the supports lock in place.



Remember to always wear safety glasses while doing any open beam tests.

To do beam alignment you will need to understand a few basics.

1. First closest position to the mirror (P1 or P3) burn mark will not move. (see diagram 1 below)
2. We move P2 to line up on top of P1's burn, and P4 to line up with P3.
3. The mirrors are aligned by adjusting **2** of the three screws on the prism mount.
One screw moves the beam path up and down while the other is left and right.

See Prism Mount Photo on Pg 6 before making adjustment.

4. The red beam will **not** line up with the burn marks.
However, we adjust the screws and watch the results by following the red beam's motion.
In other words if the P2 is .06" high and .03" left from P1's burn, we will adjust the screws to move the red beam .06" down and .03" right.

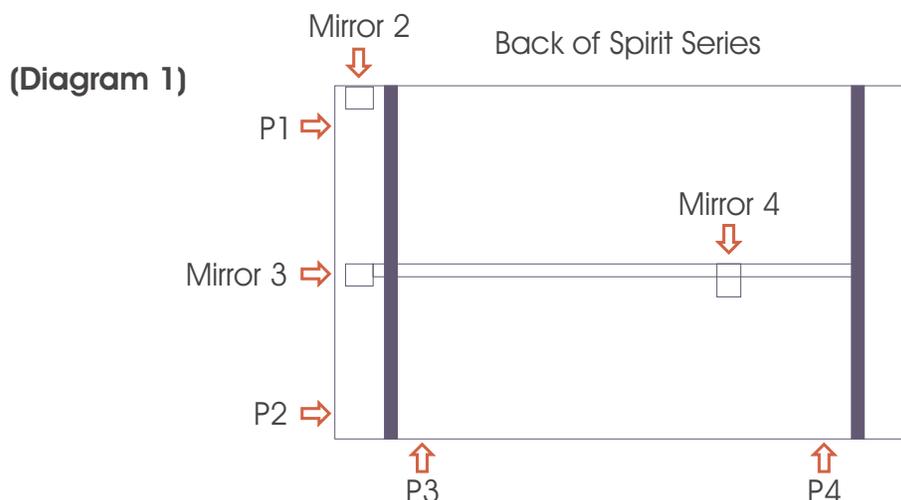
You may find it easier to put a pen mark as far from the red beam as P2 is from P1
Adjust the prism mount to move the red beam so that it is on the target spot you drew.

5. You need as small of a burn mark as possible to make alignment more accurate.
6. Any adjustment made should be quite minor. A small adjustment may produce a large change.

Place a piece of tape on the back of mirror 3's sheet metal cover covering up the round hole.
Do a test fire as described in **Orange** text on page 3.



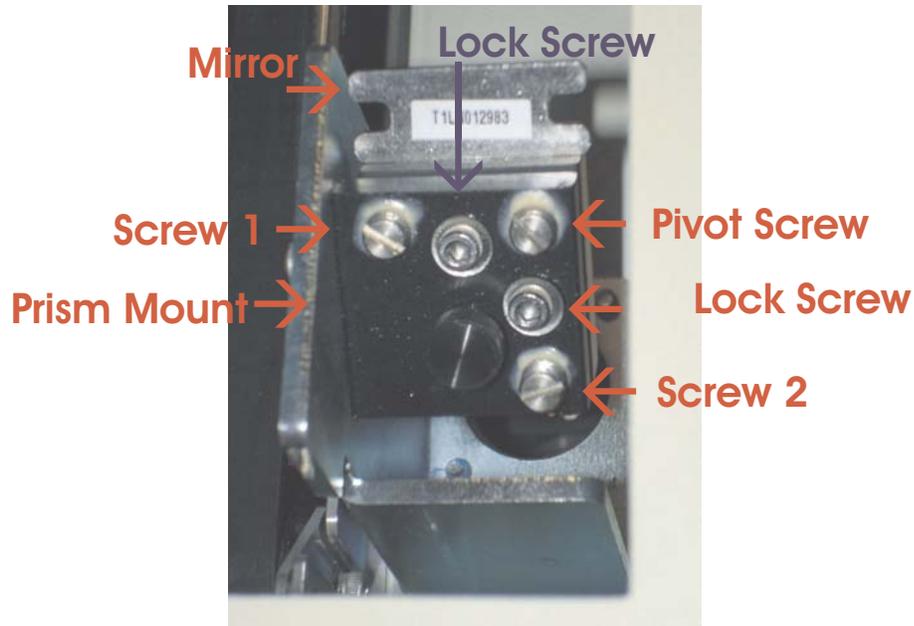
If your results are not similar to the above you will need to adjust mirror 2 so that only 1 burn mark and the red dot are visible on the test tape..



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Once you have adjusted the prism mount run the P2 burn again. If it lands on top of your original P1 burn you're done. If not re-adjust to correct. You may wish to use a new piece of tape and run P1 and P2 again. Repeat as often as necessary until P2 line up directly on top of P1

Prism Mount for Mirror 2
(Looking from back of laser with lid off and cover shifted to right)



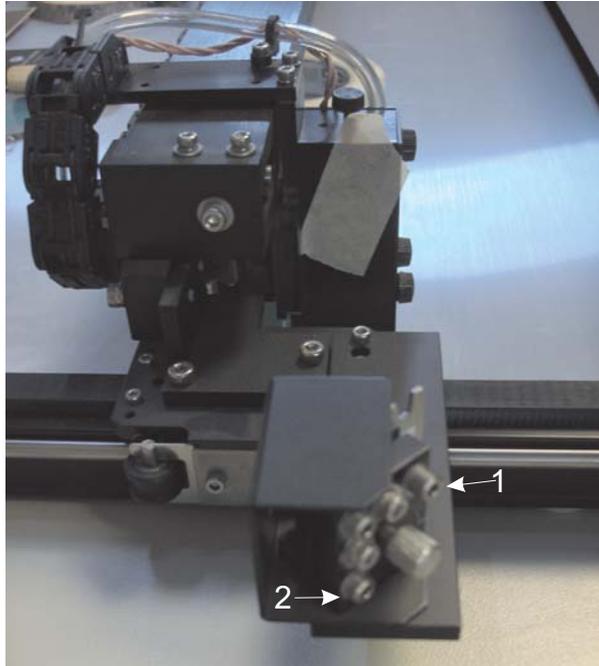
Screw 1 Left and Right
Pivot Screw do not adjust
Screw 2 Up and Down

Lock Screws must be tightened when adjustments completed. Adjustments should be made with lock screws snug, they may need to be loosened slightly if adjustment is made on screws 1 or 2 in a clockwise direction. (Please note tightening up Lock Screws may affect beam alignment adjust alignment as necessary)

Once mirror 2 is adjusted we will now repeat all the steps to check and adjust P3 to P4. *Do not forget to remove tape from back of mirror 3.* Place your tape on the lens carriage in front of Mirror 4. As before P3 burn position will not move. Your goal is to get the dot from P4's firing to line up on top of P3's. The difference here is P4 is so far away the beam gets quite large. The burn mark will take longer to form and the dot is much larger. **Burn in P4 1st to make visibility easier.** Adjust the prism mount of mirror 3 by opening up access panel as seen in picture on following page. Follow the same process as used on mirror 2. Repeat until P3 falls on top of P4.

You are almost done.

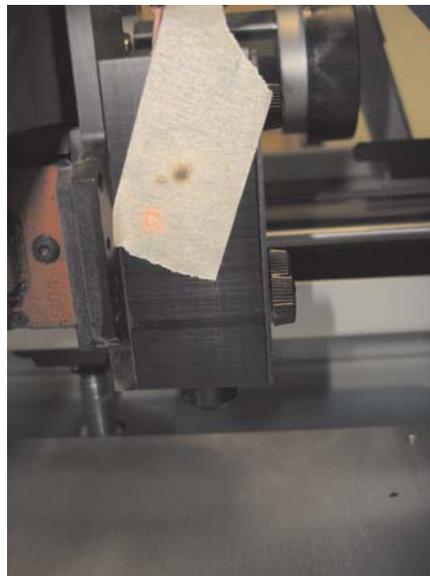
Mirror 3 Prism Mount



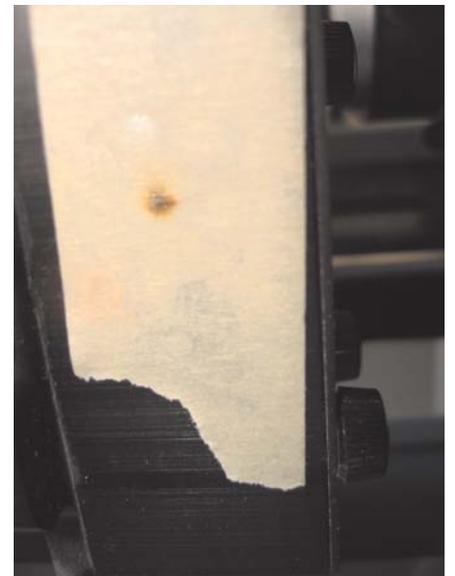
**Screw 1 Left and Right
Pivot Screw - Do not adjust
Screw 2 Up and Down**



Burn Mark From P3



P3 and P4 Burn Mark
Before adjustment



P3 and P4 Burn Mark
After adjustment

Remember to always wear safety glasses while doing any open beam tests.

Remove the lens from the lens holder. Place a piece of tape on the bottom of the Air Nozzle. Make sure you remove the tape from the side of the carriage and fire for 1 second.

Remove the Nozzle from the bottom of the Lens Carriage. The burn mark should be near the center of the impression of the air nozzle opening. Remove Air Nozzle for inspection. Looking through the top of the lens carriage **will not** give you an accurate location.

You will need to adjust mirror 1 to move the beam to the center. Once completed re-check P1-P4 once more. Any adjustments at this point should be quite minor.



No Lens - Tape on Nozzle

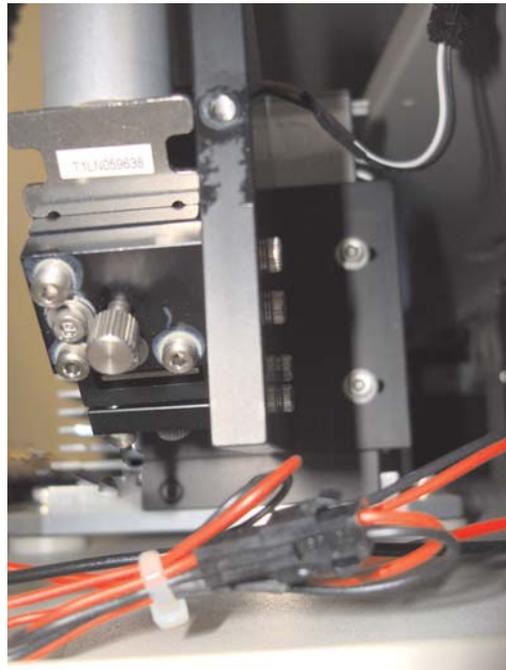


Burn Mark Off Center



Burn Mark in Center of Nozzle After Mirror 1 Adjustment

Mirror 1 as viewed from left side
lower access panel removed.

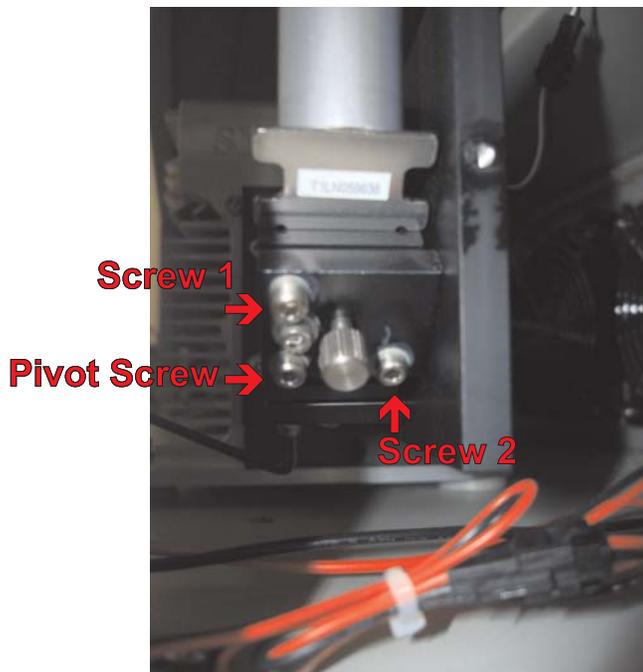


To adjust mirror 1 you need to open up access panel on the left side of the machine. In addition the rear bottom back panel will need to be opened and the black box at the end of the laser needs to be removed. Set the Pipe carefully on top of Mirror 1.

Remember to always wear safety glasses while doing any open beam tests.

Adjust screws 1 and 2 only on any prism mount. One will be front to rear, while the other will be left and right. Mirror 1's prism mount is displayed below. See bottom image to determine how to adjust screws 1 and 2.

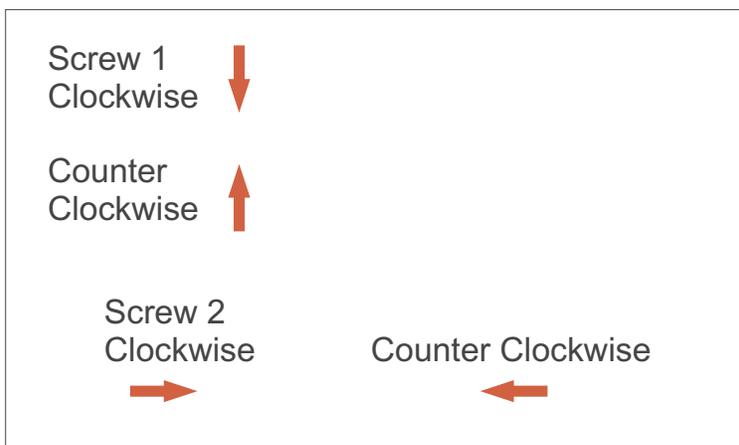
Adjust the prism mount of Mirror 1 to move the burn mark into the center of the Air Nozzle.



Pivot Screw - do not adjust

Lock Screws must be tightened when adjustments completed. Adjustments should be made with lock screws snug, they may need to be loosened slightly if adjustment is made on screws 1 or 2 in a clockwise direction. (Please note tightening up Lock Screws may affect beam alignment adjust alignment as necessary)

Rear of machine

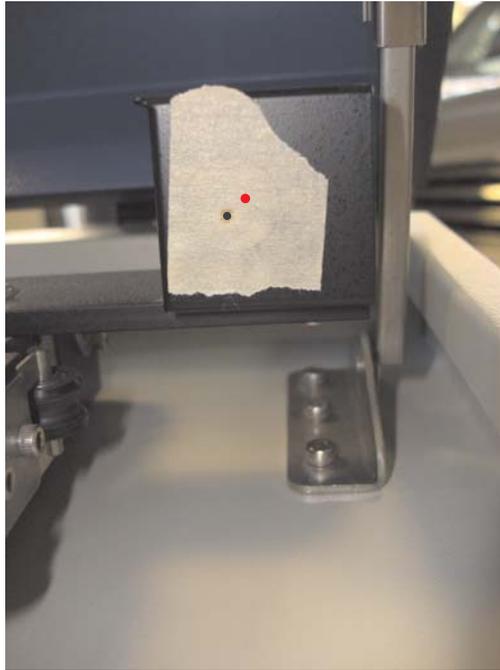


Front of machine

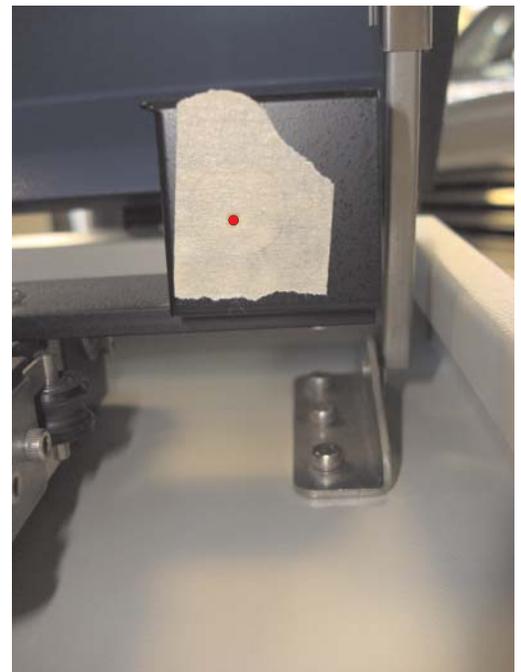
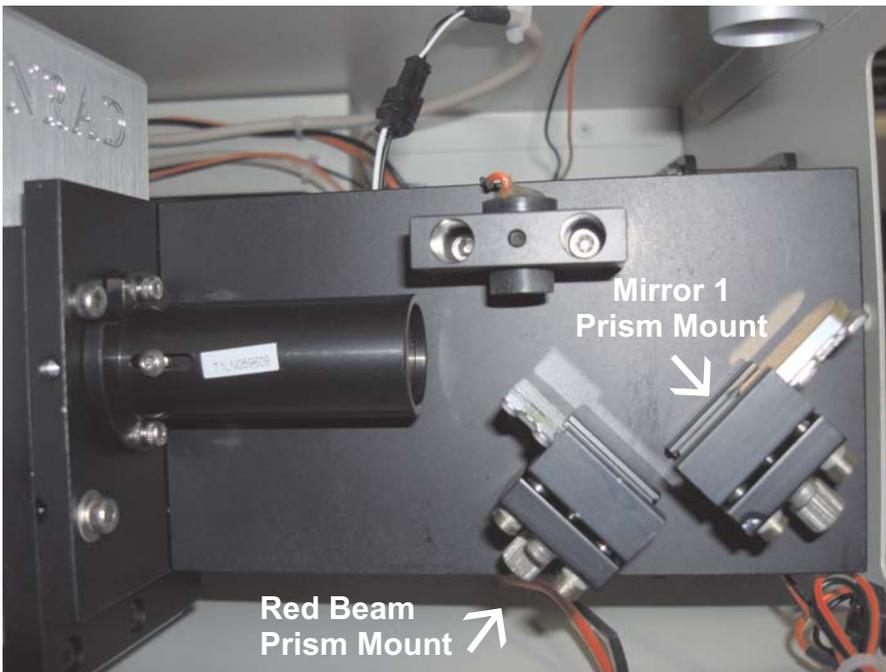
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Red Beam Adjustment

To align the Red Beam adjust the prism mount for mirror 0 so that the red dot hits the burn mark on the tape on the back of Mirror 3 in position P2. You will need to place the tape and make a burn mark in P3 to continue.



Adjust the Red Beam Prism Mount so that the Red Beam hits the Burn Mark after adjusting Mirror 1.



Red Dot on top of burn mark after adjust Mirror 0 Prism Mount

Remember to always wear safety glasses while doing any open beam tests.

Last but not least follow the direction on how to reset origin.

In your software create a .5" rectangle located .5" from the top and .5" from the left of the page.

Vector engrave this rectangle on coated metal or other material.

Using a pair of calipers measure the actual distance from the top of the plate to the top edge of the rectangle. Next measure the distance from the left edge of the material to the left edge of the rectangle. (When measuring use the center of the line width as reference point.)

As an example let's say the top distance was exactly .5". However, the left distance turned out to be .435". This of course is a difference of .065"

Turn off the Spirit Series machine.

Turn it back on while holding down the **Enter** button on the Control Panel.

Release the **Enter** button after the machines display shows **Set Origin Page** at the top of the screen.

After the lens carriage has moved to the upper left-hand corner press the **Enter** button.

Your display will list two sets of numbers. We are only going to work with the left column.

You will see a value for **X** and one for **Y**. (**X** is left to right, while **Y** is front to back movement.)

In our example let's say X value on the display is .004. We need to add .065 to locate origin properly $.004 + .065 = .069$

Press the right arrow until the lens carriage starts to move. Let go and check to see if how far you have moved. The display does not change while moving. Use whatever arrows necessary to properly set the origin on your machine. In our example we want $X = .065$, or as close as we can get.

When you are satisfied with the location press the **Enter** button.

Press the **Start** button. In about 20-40 seconds the machine will initialize and be ready to run.

Run your rectangle job again. If satisfied with location you are done. If the location is still off start at the top of this page and repeat.