

CO2 Laser Alignment

Fusion Edge 12, 24 & 36 – Fusion Pro 24 & 36



Tools Needed:

| | |
|---|--|
| <ul style="list-style-type: none"> • 5/32 allen wrench | <ul style="list-style-type: none"> • Flat Head screwdriver |
| <ul style="list-style-type: none"> • #1 Phillips screwdriver | <ul style="list-style-type: none"> • Alignment target |
| <ul style="list-style-type: none"> • Masking tape | <ul style="list-style-type: none"> • Safety glasses or eyeglasses |

Overview:

This document illustrates the procedures required to align the laser inside of the Fusion Edge engraver. Please read the entire document before proceeding with the alignment. **Safety glasses** or **eyeglasses** are **required** to be worn throughout the entirety of the following procedures.

About the safety messages used in this document

Throughout this document, certain items are labeled Note, Safety Glasses, Caution, Warning or Danger. These terms alert you to precautions that may result in damage to your engraving system or a risk to your personal safety. Read and follow them carefully.



This SAFETY ALERT SYMBOL is used to draw your attention to issues which could involve potential personal injury



WARNING ELECTRICAL HAZARD: This symbol indicates a potentially hazardous electrical situation which if not avoided, could result in death or serious injury.



LASER RADIATION HAZARD: This symbol indicates a possible laser radiation hazard which if not avoided by taking proper safety precautions can result in injury, permanent eye damage, or damage to the engraving system



SAFETY GLASSES indicate a direct hazardous situation which may result in eye injury or permanent loss of vision if safety glasses are not worn

NOTE

A 'Note' is not necessarily safety related but indicates a recommendation or special point of information that could assist in understanding the use or care of a feature item.

When to align the laser:

The Laser Alignment Procedure can be performed if any of the following apply to you.

- You are experiencing a general Loss of Power.
- You are experiencing 'Fading' in one of the corners of the table.
- You are losing power in certain positions on the table.
- You have replaced the X-Axis Rail.
- You have replaced a Laser Tube.
- You have replaced a Mirror.
- The engraver has been moved or transported.

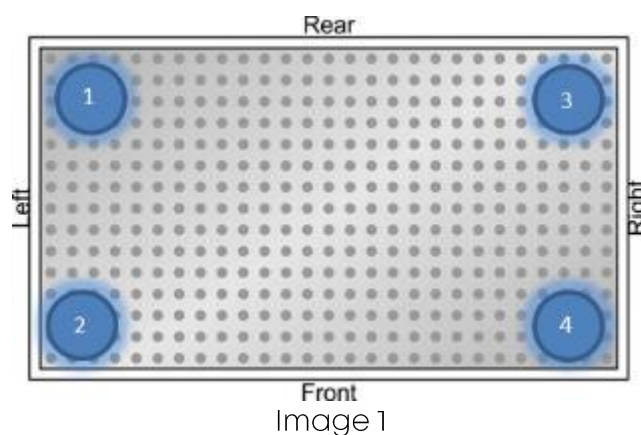
Before you start:

Direction

Many of the instructions provided in this procedure will have a direction given, such as left-hand side or right-hand side. Unless otherwise stated, these are all provided as though you were facing the machine from the front.

Table Positions

For the following procedures, the table will be broken into four (4) positions, image 1. Each position is identified by its relative distance to the laser source and corresponds with the mirror to adjust for that position.



Mirrors

Three of the four adjustment mirrors used for alignment are on the left side of the engraver. The mirror numbers correspond directly with the positions on in the bed; for example, if the lens carriage is in Position #1 than you will only adjust Mirror #1. The final adjustable mirror is located on the carriage. The alignment process for the carriage mirror will be addressed last.

Moving the lens carriage


The Fusion Edge has an Alignment mode that may be accessed from the settings menu. To access the Menu, tap the  icon.



Image 2

Long press the word “Settings”.



Image 3

Next press Alignment to access the Alignment menu.



Image 4

Alignment Menu

The Alignment menu has 5 buttons that will move the carriage to their corresponding locations when pressed. It also has a button labeled "Activate" that will allow you to fire the laser for the purpose of alignment. We will use these commands to align the laser in each corner of the engraver to ensure that there is even power throughout the table.

Note:  In Alignment mode, all Interlocked access doors must be closed for the laser to fire.

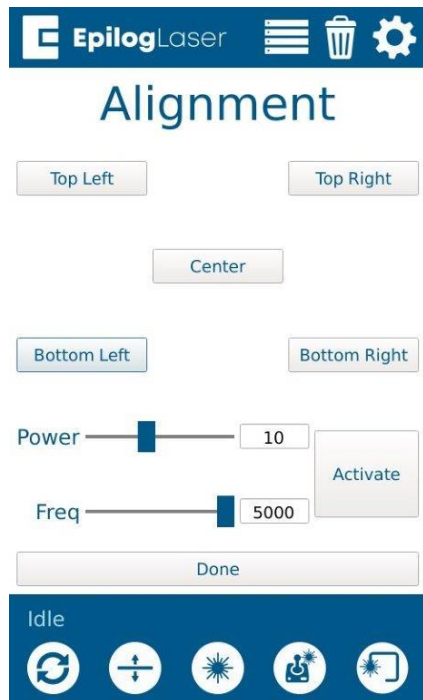


Image 5

Procedure 1: Aligning the Laser and the Red Dot Pointer

Note: If you are performing the alignment because you have replaced Mirror 3 or the X-axis rail, please move to Procedure 2. For all other alignments, this procedure must be completed. It is crucial that you align the red dot pointer and CO2 laser before adjusting the mirrors for each corner.

Note: This step is necessary to ensure that the Red Dot and the CO2 lasers are following the exact same path through the engraver.

If the Red dot pointer and the CO2 laser are not aligned to each other before starting Procedure 2, the alignment procedure will fail.



1. With the 5/32" Allen wrench, remove the 4 button head cap screws that secure the left rear corner panel, shown in image 6, to the engraver.



Image 6

2. Once the panel is removed, this is what you will see. The Red Dot Pointer mount is marked in image 7 below.

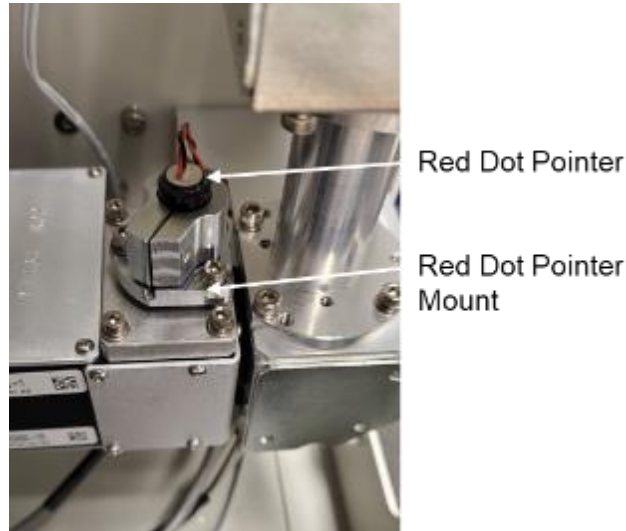


Image 7

3. Locate the alignment target and place it into the left side of the lens carriage. It should fit into the lens carriage optic as show below in image 8.



Image 8

- Place a square of masking tape over the alignment target, as shown in image 9. This will allow us to see the burn made by the CO2 laser.

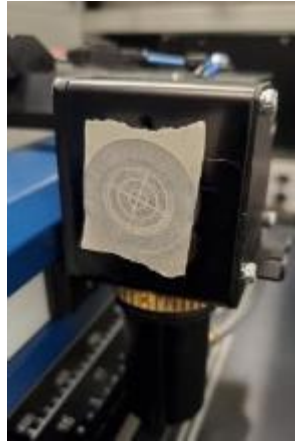


Image 9

- With the target covered, press the “Bottom Right” button of the alignment menu to move the carriage to Position 4.



Image 10

- Pressing this button will move the lens carriage to the location shown by the blue circle in image 11.

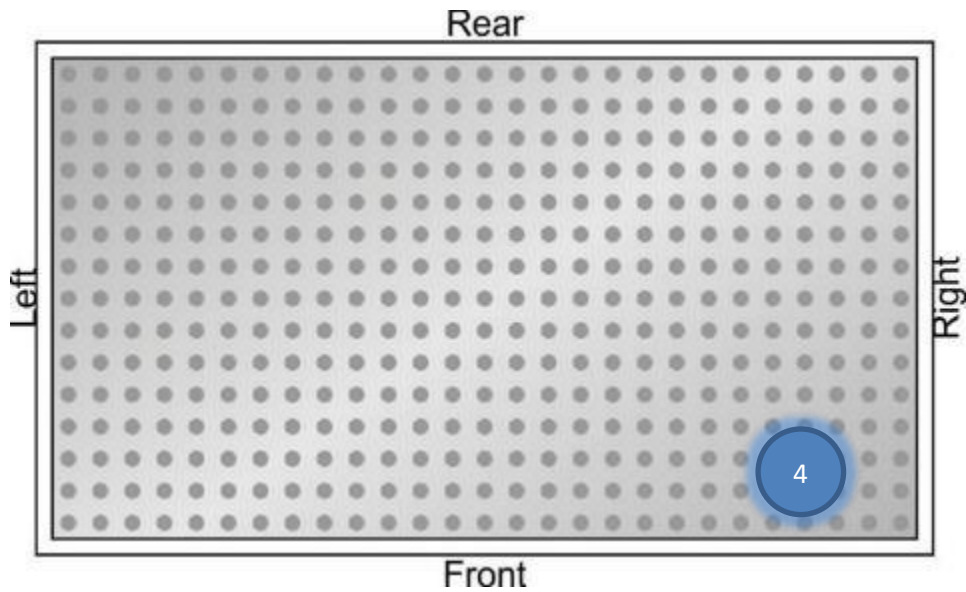


Image 11

- Press the "Activate" button to fire the laser. Please note, that the top door must be closed for the laser to fire when pressing the "Activate" button.
-



Image 12

Note: When pressing the “Activate” button to fire the laser, use short brief taps of the button. The smaller and lighter you can make the burn mark on the tape, the easier it will be to get the pointer well centered in the burn mark.

Note: If you are unable to produce a burn mark on the tape, try setting the power to 15-20% and ensure that the lid is closed.

9. Below you can see the burn left on the tape by the laser in image 13 below.

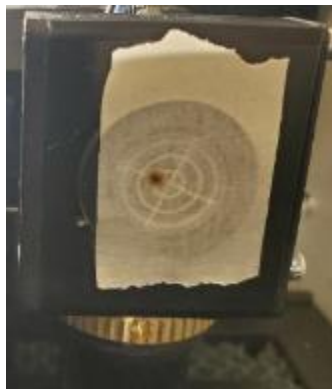


Image 13

10. Now that there is a burn mark on the masking tape, press the  icon on the engraver's display, shown in image 14, to activate the Red Dot Pointer.

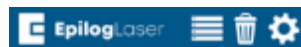


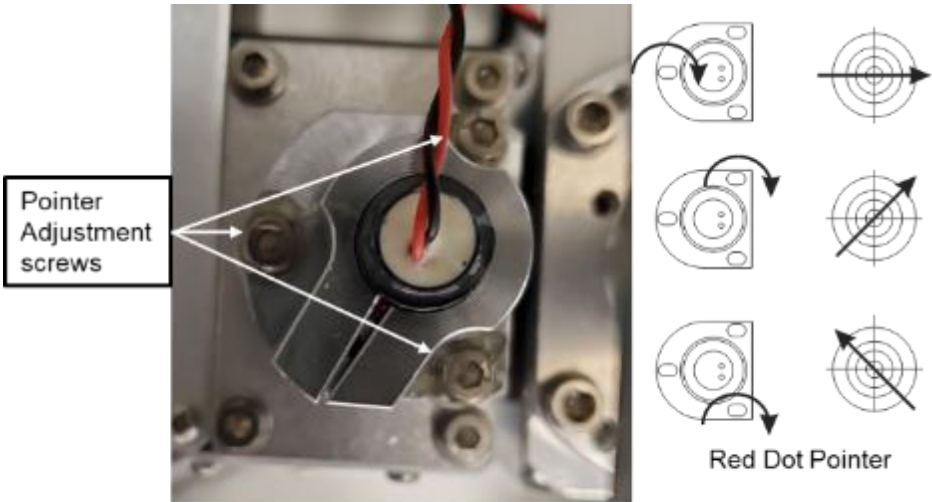
Image 14

11. The pointer should appear on the tape covering the Alignment Target as shown below in image 15.



Image 15

12. Use the three adjustment screws on the Red Dot Pointer Mount, to move the Red Dot Pointer to the burn mark on the tape. The Red Dot Pointer will move across the alignment target according to the diagram below in image 16.



Note that the screws on the pointer housing match those in the diagram to the right.

Image 16

Note: Take your time with this part of the process. Ensuring that the Laser and the Red Dot are well aligned will make the remainder of this procedure more effective.

This concludes Aligning the Red Dot pointer to the laser.

Procedure 2: Aligning the laser in each corner



- 1. With the engraver and the Red Dot Pointer turned on, move to the left-hand side of the machine, and remove 8 button head cap screws that secure the left-hand panel to the machine. These are shown in image 17 below.



Image 17

- 2. At your engraver's touchscreen. Navigate to the Alignment menu in Settings and tap "Top Left", image 18, to move the carriage to position 1, image 19.

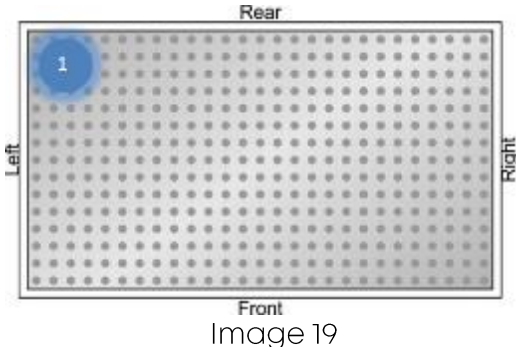


Image 18

Quick Tip!

The key to a good alignment is repetition and patience.

For the best results take your time to dial it in.



3. Locate Mirror #1 under the bottom mirror access panel. Mirror #1 is shown in image 20 below.

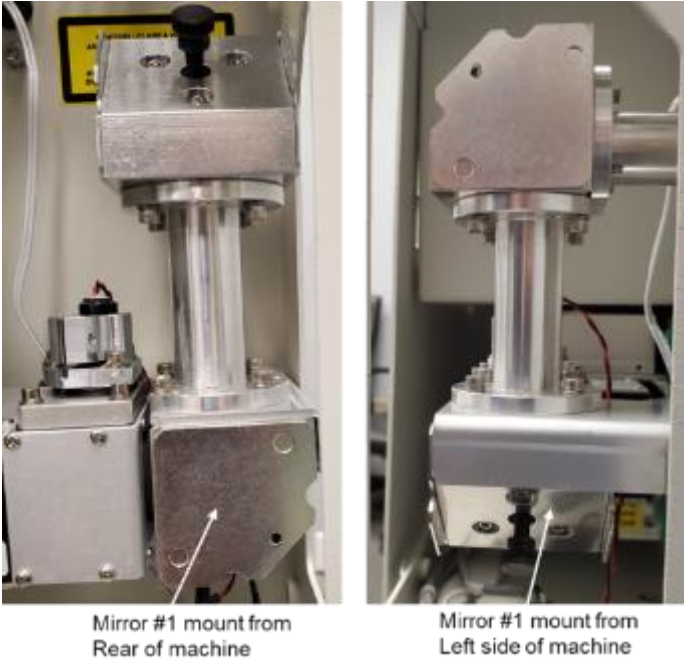


Image 20

- 4. Using a 3/32" Allen wrench, adjust the screws on Mirror #1 so that the Red Dot Pointer is in the center of the alignment target while the carriage is in Position 1.

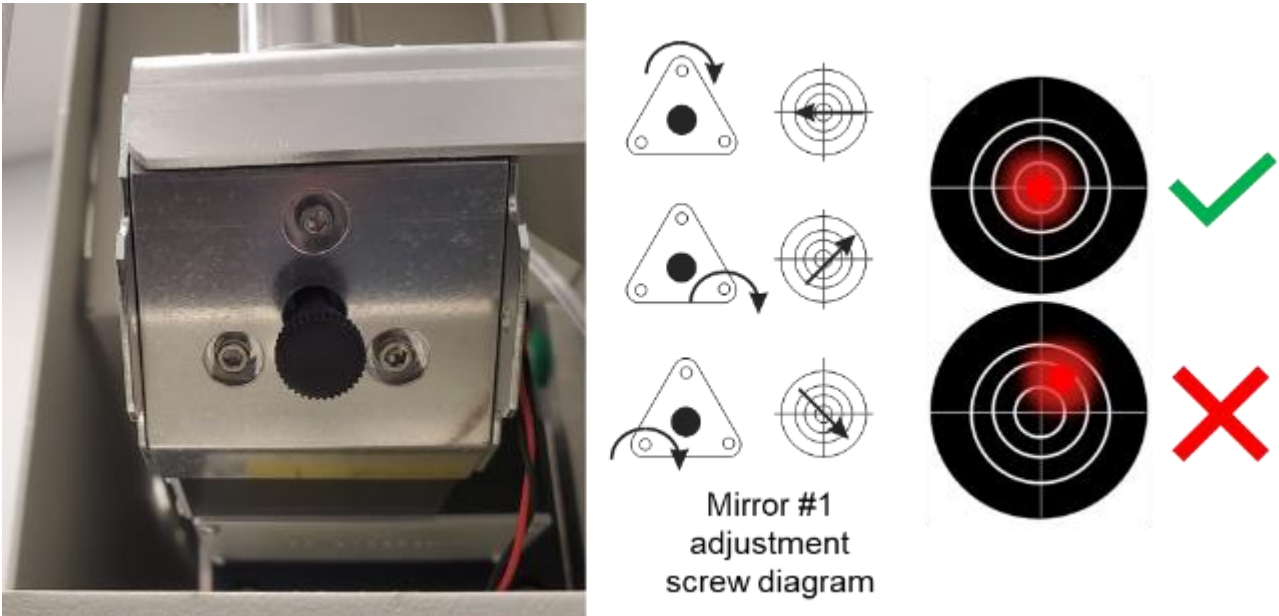


Image 21

- 5. If you are having difficulty seeing the red dot pointer as it is very close to the upper right-hand corner, you can free the bellows from the X-axis assembly by gently pulling on the top of the bellows where it connects to the X-axis assembly as shown in image 22.



Grasp the top of the bellows and gently pull to separate the two halves of the hook and loop fastener.

Image 22

- 6. Once red dot pointer has been centered in the first corner, tap "Bottom Left" on the touchscreen to move the carriage to Position 2.



Image 23

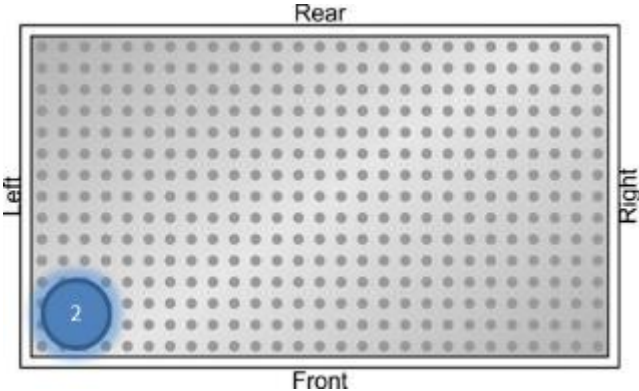


Image 24

7. Locate Mirror #2, image 25, behind the mirror access panel.

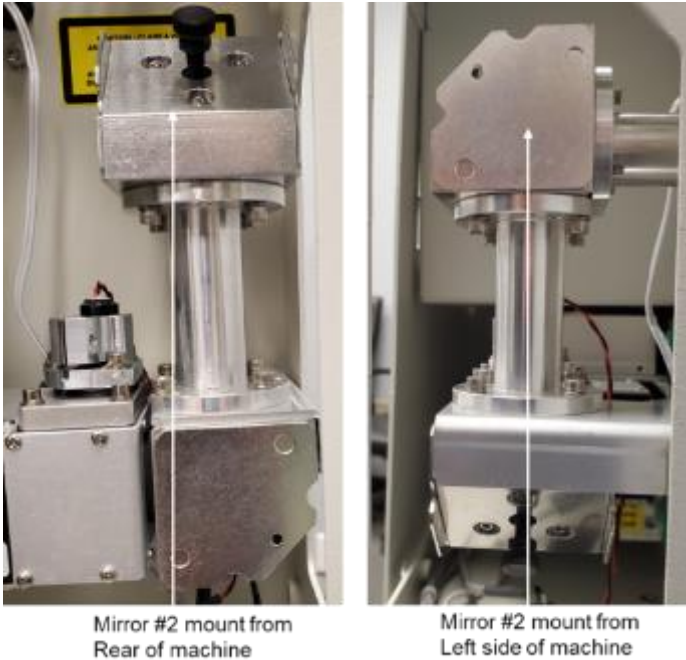


Image 25

8. Using the 3/32" Allen wrench, adjust the screws on Mirror #2 so that the Red Dot Pointer is in the center of the alignment target in Position 2.

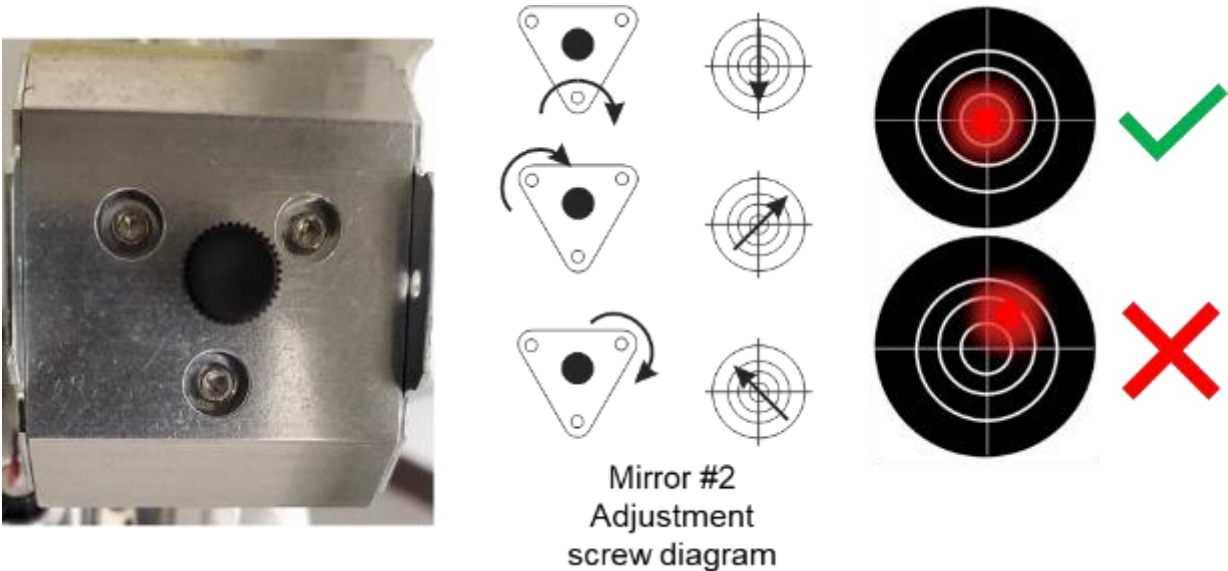


Image 26

- Once complete return to [Procedure 2, Step 4] and re-adjust Mirror 1 until it is aligned again in Position 1. Once you are done, move back to Position 2 and adjust Mirror 2 as outlined in [Procedure 2, Step 8].

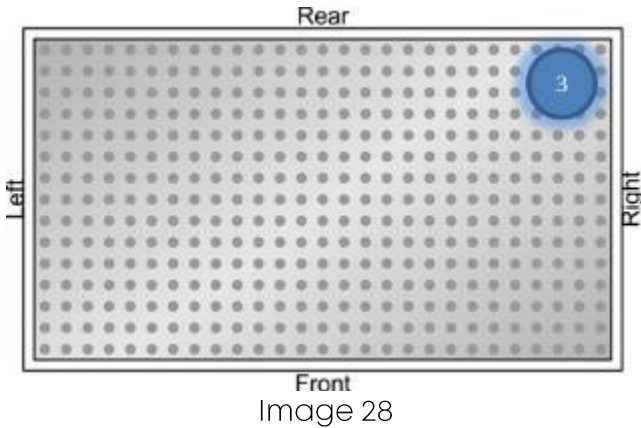
Note: You may have to go back and forth between positions 1 and 2 multiple times before the Red Dot is centered in both corners. Each time you re-adjust the mirrors, the Red Dot should move closer and closer to the center of the target and will drift apart less when moving back and forth between positions 1 and 2.

Align mirror 3

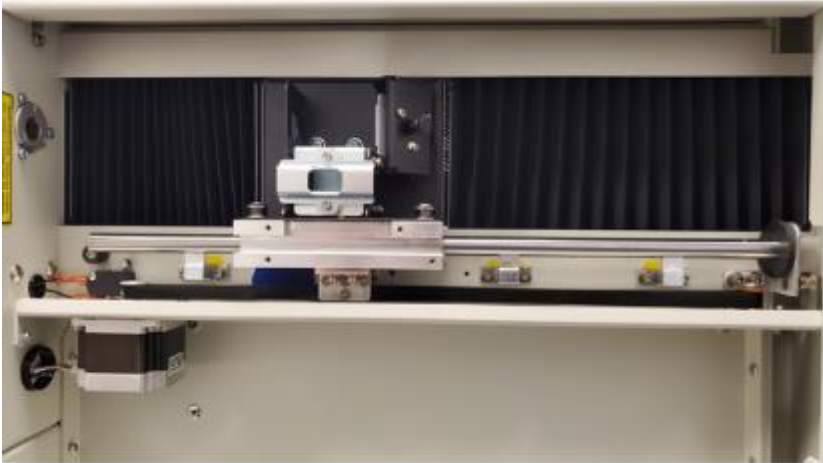
- Once Positions 1 and 2 have both been centered and no longer drift apart, you can adjust mirror #3. Using your touch screen display, tap “Top Right” to move the carriage to Position 3.



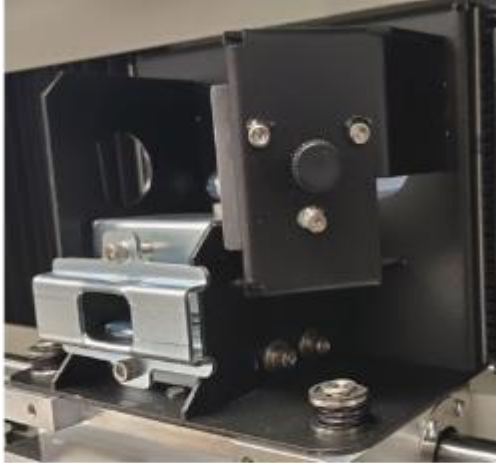
Image 27



11. Mirror #3 is located on the far left-hand side of the X axis rail. Its location and a close-up of #3 mirror mount are shown in image 29 below.



Mirror #3 location



Close up of Mirror #3

Image 29

- Using the 3/32" Allen wrench, adjust the screws on Mirror #3 so that the Red Dot Pointer is in the center of the alignment target.

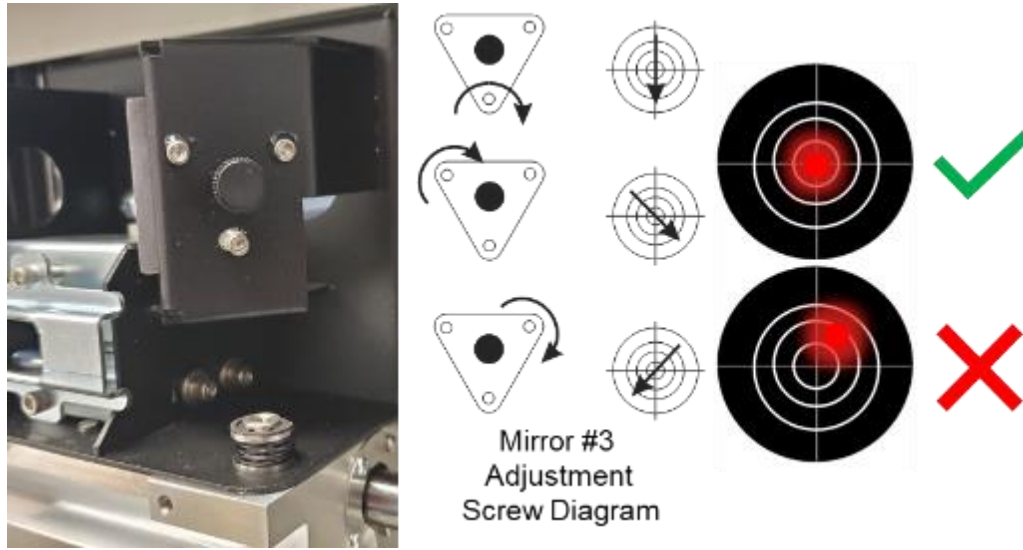


Image 30

- Once complete return to [Procedure 2, Step 2] and then [Procedure 2, Step 3]. Continue to align Mirrors #1, #2 and #3 until you can move between the 3 positions without the Red Dot leaving the Center of the Alignment Target.
- Once you are confident that you are aligned between Positions #1, #2 and #3, jog the lens carriage to Position #4.
- Using the touch screen display, press the “bottom right” button on the display.



Image 31

16. If all the mirrors are aligned correctly, the red dot pointer should appear within the center ring on the alignment target.



Image 32

17. If so, you may remove the alignment target, replace the panels that were removed earlier and run a test engraving file. If not; please return to [Procedure 2, Step 2] and continue alignment.

Procedure 3: Perpendicular Alignment



1. Ensure that the engraver is on and that the Red Dot Pointer is active as shown in the previous steps.

2. Press the  button on your touch screen to bring up the Focus menu.



3. Use the joystick to move the table until the Manual Focus Gauge touches the table. You will want to bring the table up until the Focus Gauge is just touching the top of the table surface as shown in image 33 below.

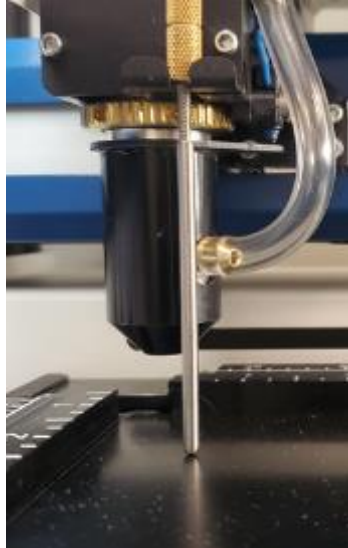


Image 33

4. Position the target with the Red Dot in the center of the bullseye, as shown in image 34.

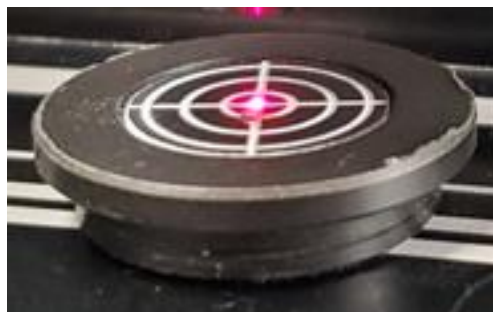


Image 34

- Using the joystick on the engraver's display, lower the bed until "Current Focus" reads roughly "3.000"



Image 35

- Check the location of the Red Dot Pointer and see if it has moved off center of the alignment target.



Image 36

- Use the adjustment screws on the Carriage Mirror to move the Red Dot Pointer back onto the center of the target.

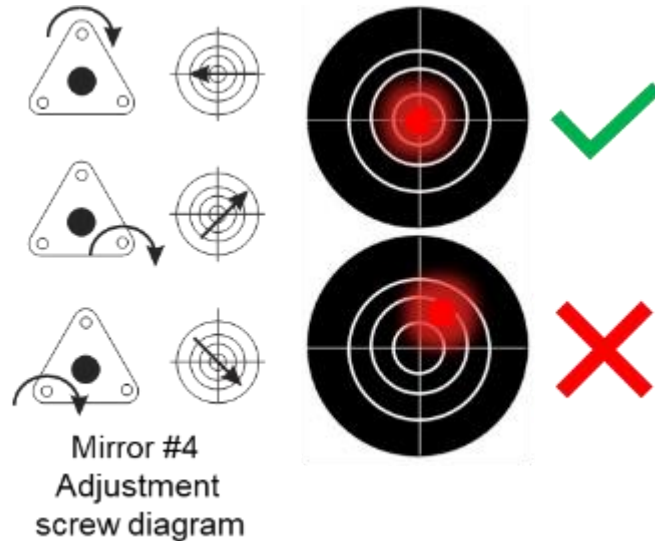


Image 37

Note: In some cases it is necessary to “Center” the mirror above the focal lens. To do this, tighten each adjustment screw located above the focal lens one full turn and then move to the next adjustment screw. It does not matter which order these are tightened in, as long as they are tightened uniformly. Repeat this step until all three screws are tight. Now, loosen each screw 1 full turn and move to the next screw. Repeat this step 2 more times for each screw, until each screw has been loosened a total of 3 turns.

- Using the Joystick, bring the table back up until the focus gauge is touching the bed again.
- If the red dot has moved, repeat [Procedure 3, Step 4] through [Procedure 3, Step 8] until you can rise and lower the table without the Red Dot moving on the Alignment Target.

Alignment Verification:

Obtain a piece of scrap material that is large enough to engrave 4 small boxes on. Preferably, this will be a piece of material you have used in the past and are familiar with the settings needed to produce quality engraving. This piece of material does not need to be the size of your table. We will move the piece from one corner to the next after each test engraving is complete.

1. Create a new page that matches your engravers bed size in your art program of choice.
2. Create 4 small black filled boxes and place them in each of the 4 corners of the page.
3. Place your test material in the upper left-hand corner of the engravers bed.
4. Manually focus your machine to eliminate focus as being a factor. Once the focus is set in the upper left-hand corner. Once this process is started, do not change the tables location.
5. Select the box in the upper left-hand corner and engrave it using the settings you have used previously.
6. Select the box in the lower left-hand corner, move your material and run a test engraving there.
7. Repeat this process until all 4 boxes are engraved into your piece of scrap material.
8. Visually inspect each of the boxes for the following:
 - Consistency of mark: There should be uniform discoloration of each of the boxes.
 - Uniformity of depth. If engraved into wood or plastic, metal does not work for this test, each corner should be uniform in depth in each of the boxes you engraved.
9. Other indicators of a good alignment:
 - Ability to use the same settings for your material in each corner of the table. There is no reason you should have to increase the power or decrease the speed to achieve similar results in each corner of your machine.

Conclusion

This concludes the alignment procedure.