

User Manual

Read carefully before use & keep for future reference



Thank you for choosing us for your engraving needs. This 3020 laser engraver is intended for professional use, so please read this manual carefully before operation. It covers the details of correct installation, adjustment, maintenance and—most importantly—safe operation of your new laser engraver.

Please save this manual for future reference.



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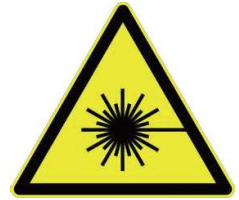
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Safety Instructions

- Users should read this manual carefully before operating the laser engraver. Improper use will void its warranty and risks damage and/or injury.
- Untrained people and minors should **NEVER** operate this machine. Anyone who might be around it unsupervised should be instructed that it is dangerous.
- The machine uses a CLASS 4 LASER, the strongest and most dangerous kind available for public use. Without careful use, this kind of laser might lead to following accidents:

1. The laser will easily burn nearby combustible materials.
2. Some working materials may produce radiation or harmful gasses during processing.
3. Direct exposure to the laser will cause bodily harm.



- As such, the area around the engraver must be equipped with fire-fighting equipment and must be kept free of combustible, flammable, or explosive materials at all times. Sensitive EMI equipment should also be kept far away from the machine.
- The area around the engraver should be kept dry. It should be well ventilated and environmentally controlled to keep the temperature between 5–40°C (40–100°F). The area's humidity should not be allowed to exceed 95%. The area should also be free of airborne pollutants and strong electro-magnetic interference.
- Processed materials should always be checked beforehand to ensure that they can withstand the heat of a class 4 laser and will not produce any emissions either harmful to people nearby or in violation of local laws and regulations.
- The water cooling system is extremely important to the safe operation of your laser engraver. Always make sure the water tank is full of cool distilled water and the pump is running well before using the machine. Do not use ice-cold water. If the water is hotter than about 35°C (95°F), add some ice or refill the tank with cooler water. If you cannot avoid the area around the machine reaching temperatures of 0°C (32°F) or below, add antifreeze to the water in the tank and run it through the machine.
- Operators should always be mindful of its potential danger. NO part of the machine should be opened during normal operation. All covers should be fully closed before work begins and no cover should be opened until work has stopped.
- The operator should never leave during operation. If anything seems to be operating strangely, immediately cut off all power to the machine and contact customer service or a professional repair service. Similarly, after work is finished, the operator should remember to use the cut-off switch and fully power off the machine.



- Because even seemingly matte materials may produce harmful reflected beams, care should always be taken to control the beam path and to keep others from observing the machine during operation.
- Because of its high-voltage and other potentially dangerous components, your laser engraver should only be disassembled or repaired by trained professionals.
- This laser engraver is designed to use 220V/50Hz AC electricity. It should never be used with any other form of power supply or used when the power supply is unsteady or unreliable. Always make sure the machine is well grounded before operating.

The Manufacturer does not take any responsibility or assume any liability because of improper use and the User is obliged to obey all of the above safety guidelines, as well as any applicable local rules or regulations.

Disclaimer

Your engraver may differ somewhat from those shown in this manual due to options, updates etc. Please contact us if your engraver came with an outdated manual or if you have any other questions.



Chapter 1: Overview

1.1 Appearance (Varies slightly by model)

From left to right, the front and top of the laser engraver includes the main bay and the control panel. (See 3.1 for details & variants).



Fig. 1–1. Front & top sides (exterior).

From left to right, the back of the laser engraver includes the connection port for the power cord, the terminal for the engraver's electrical grounding (See 2.4), the exhaust fan (See 2.3), and the water tubes for the cooling system (See 2.2).

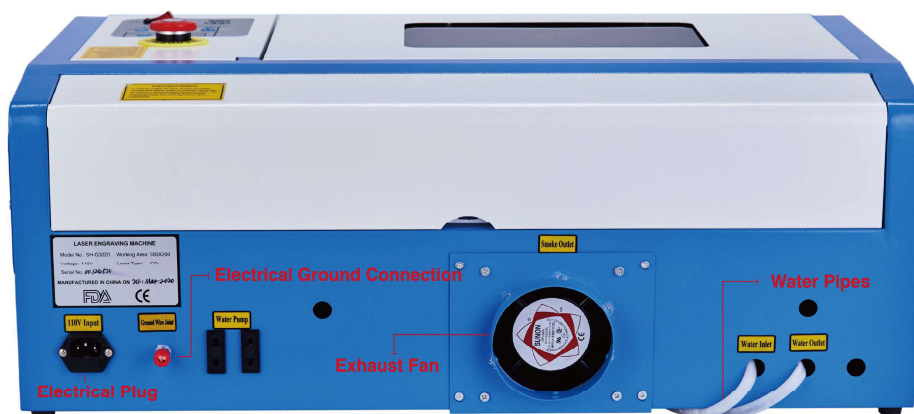


Fig. 1–2. Back side (exterior).

Inside the main bay (Fig. 1–3), there is the optical path of the laser (Fig. 1–6).

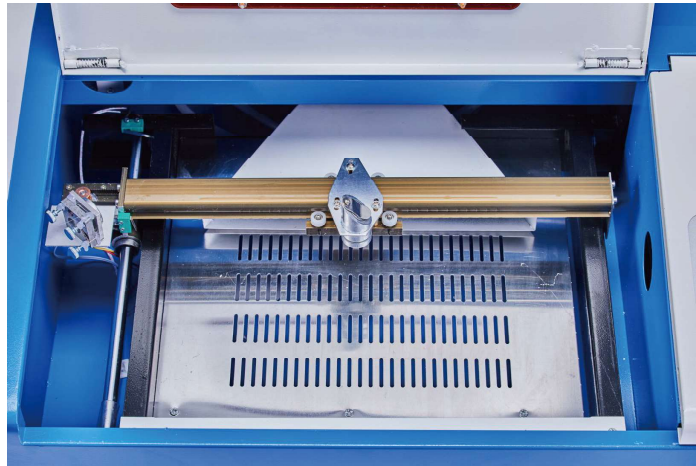


Fig. 1–3. Main bay (interior).

The optical path consists of three reflective mirrors and one focus lens: The 1st mirror (1# in Fig. 1–4) is near the laser tube's discharge outlet in the upper left corner of the machine. The 2nd mirror (2# in Fig. 1 – 5) is to the left of the laser head. The 3rd mirror (3#) is on top of the laser head. The focus lens (4#) is located in the lower part of the laser head.



Fig. 1–4. 1st mirror (detail).

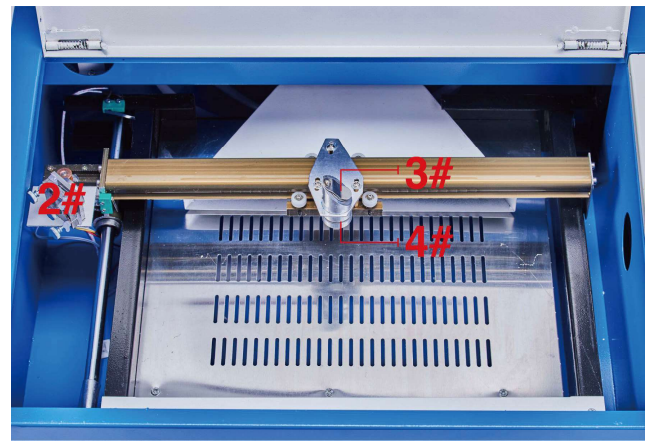


Fig. 1–5. The other mirrors & focus lens.

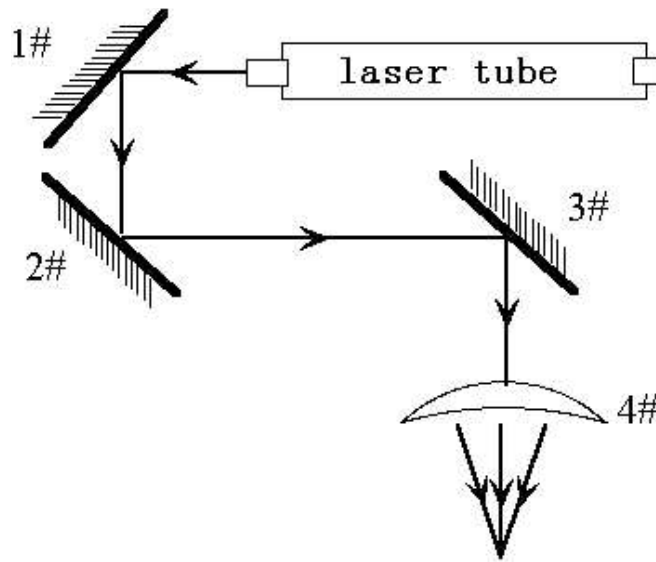


Fig. 1-6. Optical path diagram.

Your 3020 laser engraver works by emitting a powerful laser beam from its laser tube, reflecting that beam off of the three mirrors, focusing its power through the focus lens, and using this focused light to burn designs into materials. The designs can be quite complicated because the laser head travels back and forth along the Y-axis guide rail, which moves back and forth along the X-axis guide rail, following the instructions of the engraving software. The optical path setup ensures that the laser remains well directed at all times but some routine maintenance is necessary (See 4.1) and the optical path will sometimes require realignment (See 4.2).

1.2 Accessories.

In addition to any optional spare parts you ordered, your laser engraver also includes the following accessories:

A water pump (Fig. 1-7) used to maintain a stream of cooling water to the laser.



Fig. 1-7. Water pump.

A collapsible exhaust pipe (Fig. 1–8) used to vent fumes produced by processed materials during the engraving process.



Fig. 1–8. Collapsible exhaust pipe.

A bag containing various other accessories (Fig. 1 – 9), including: the engraver’s power cable, a USB 2.0 cable, and a CD-ROM with software, a software protection dongle, a roll of double-sided tape, a 0.28” acrylic focus tool, silicone sealant, and this manual.



Fig. 1–9. Other items, separated.

Chapter 2: Installation & Initial Adjustments

A complete working system is composed of the laser engraving machine, its exhaust fan & pipe, its water pump & tank, and a USB cable. Users can configure the associated computers, printers, scanners and so on to suit their needs by themselves.

2.1. Set down the laser engraver

Be sure to use a location that meets the criteria in the Safety Instructions (p. 1–2). The location should be stable, level, dry, well-ventilated, and climate controlled. It should be free from children, combustible or explosive materials, and sensitive EMI devices. The power cord should be plugged into a stable, reliable power source. There should be fire-fighting equipment nearby.

2.2. Connect the water pump

The cooling water system is very important to the engraver. When this laser machine works without cooling water, the laser tube explodes from the heat. Fill the water tank, connect the clear pipes from the back of the engraver to the tank, and connect the water pump to your power supply (Fig. 2–1). The water will start running.



Fig. 2–1. The cooling water system.

Again: Check that the water tank is full and the water pump is operating smoothly **every time** before using the engraver. If temperatures hotter than about 35°C (95°F) cannot be avoided, be sure to add some ice or cool water to the tank but do not allow the water itself to become ice-cold. If temperatures of 0°C (32°F) or below cannot be avoided, be sure to add antifreeze and run it through the machine.

2.3. Install the exhaust pipe

Install the exhaust pipe to the fan as shown in Fig. 2 – 2 below. The pipe can be expanded to a full length of about 1.5 metres (5 ft.). The other end of the pipe should be connected to a dedicated purifier or placed out a window.



Fig. 2–2. The exhaust pipe connected to the rear of the engraver.

2.4. Ground the machine

Your laser engraver uses a class 4 laser. As mentioned in the Safety Instructions, this type of laser is high voltage and potentially dangerous, so users **must** securely ground it during use to prevent buildup of static electricity. The safe line-to-ground resistance should be **less than 5Ω**. Fig. 2–3 below shows the location on the back of the engraver where the grounding cable should be connected. Fig. 2 – 4 shows a diagram of the necessary setup.



Fig. 2–3.

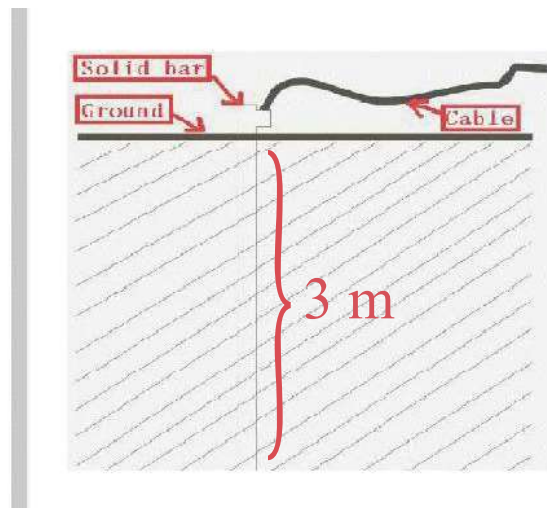


Fig. 2–4.

Warning: Poor grounding will cause equipment failures and creates a serious safety hazard! We do not assume any responsibility or obligation for faults or accidents caused by bad grounding.

Chapter 3: Operation

Users are again advised to familiarize themselves thoroughly with the Safety instructions on pages 1 & 2, these operation guidelines, and the instructions marked “Attention” on the control panels. Operate the laser engraver only in accordance with all of these.

3.1 Control Panel

The control panel is used to operate the machine. Your control panel might look like either A or B.

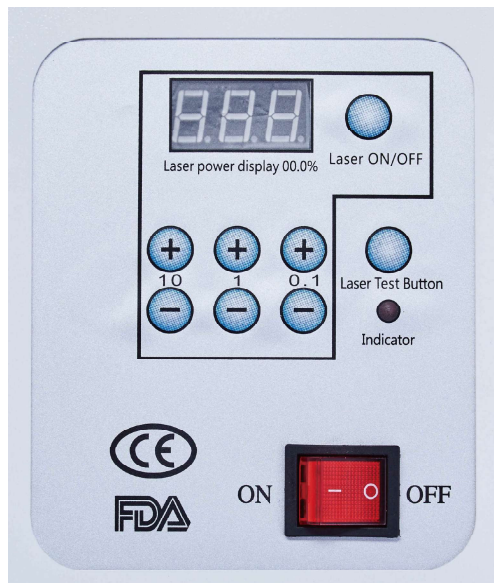


Fig. 3–1. A Type-A control panel.

Type-A Control Panel: This control panel features a digital power display, showing the strength of the laser as a percent of its maximum output. The laser’s power is adjusted by pressing the appropriate buttons.

(1) Control Switch

This switch is the main power switch. The laser head will move to the top left corner when you turn this switch.

(2) Laser Test Switch

When the control switch is on and the cooling water is running, pressing this button will cause the laser to be emitted. The laser indication light will come on.

(3) 10, 1, 0.1 Buttons

These buttons are used to adjust laser's power in increments of 10%, 1%, and % respectively. As expected, + increases the power by the appropriate increment. – decreases the power by the appropriate increment.

(4) Laser Power Display

This displays the current power of the laser as a percent of its maximum intensity. Adjust this setting according to the material being processed. For most materials, an intensity between 20% and 60% is optimal. When aligning the laser beam, you should use a setting lower than 30% for safety reasons.



Fig. 3–2. A Type-B control panel.

Type-B Control Panel: This control panel features an analog power display, showing the strength of the laser as a reading in milliamperes (mA). The laser's power is adjusted by turning the current knob.

(1) On/Off Switch

This switch is the main power switch. When switched to ON, the laser will move to the top left corner.

(2) Laser Switch

This button is the master control for the laser. Press it down to activate the laser.

(3) Test Switch

When the on/off switch and the laser switch are both on, pressing the test switch button will fire the laser. This button will be used when adjusting laser power with the current regulation knob and when aligning the laser beam.

(4) Current Knob

This knob regulates the laser's power, as shown in the current meter beside it. Turning the knob clockwise (right) increases the laser's power. Turning the knob anti-clockwise (left) decreases it.

(5) Current

This is an analog ammeter, displaying the amount of milliamperes in the laser's current. Generally, the meter should read lower than 15mA when the machine is in use. When aligning the mirrors (See 4.2), use a current lower than 10mA for safety reasons.

ATTENTION: Because of the potential danger of the engraver's class 4 laser, this equipment features an automatic cut-off when the water pump is not operating correctly. No laser should be emitted if the machine is not being cooled by flowing water. When you first begin using your laser engraver, you should test this function before beginning any other work. Cut off the flow of water by tying or crushing the two water pipes, being careful not to damage the pipes themselves. Attempt to use the laser. If the laser fires, turn off the machine and do not use it before contacting customer service for repair. If the laser does not fire, release the water pipes and continue setting up your laser engraver.

3.2 Operation Procedure

Step One: Prepare Your Design and Machine

Make or load your design in the engraver software. When you are ready to engrave your material, check to make sure that the engraver is ready as well. Check that the water tank has plenty of cool (but not ice-cold) water. If working with a new material, double check that it can withstand the heat of the laser engraver and that it will not release harmful fumes when processed. Check that the exhaust hose is secured in its window or that its purifier is working properly.

Step Two: Prepare the Material to be Processed

Make sure the material is dry and clean. Fix the material securely in place using the clamp. The top surface of the material should be at the same level as the clamp frame to keep the laser's focus distance correct. This distance is about 5 centimetres (2 in.), as shown in Figs. 3–3 to 6 below.

Note: An incorrect distance will lead to a bad engraving effect.

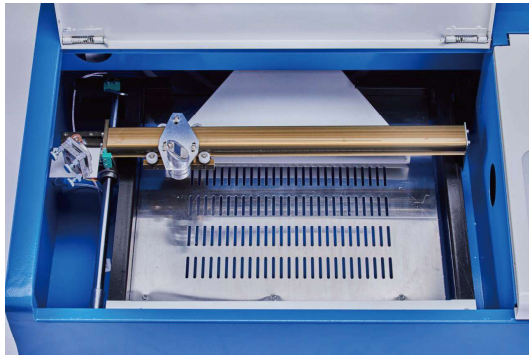


Fig. 3-2-1.

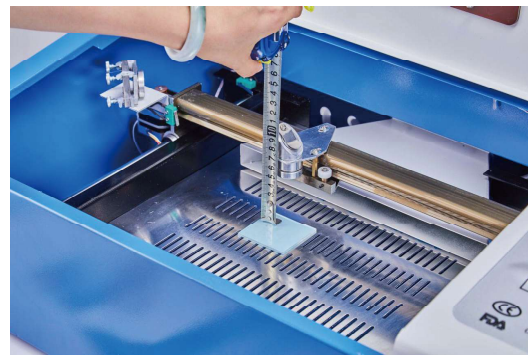


Fig. 3-2-2.

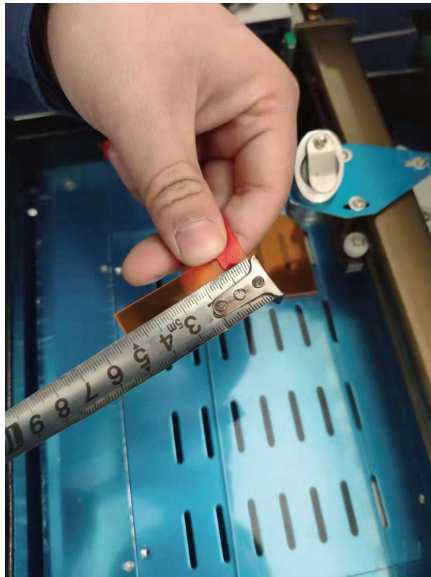


Fig. 3-2-3.

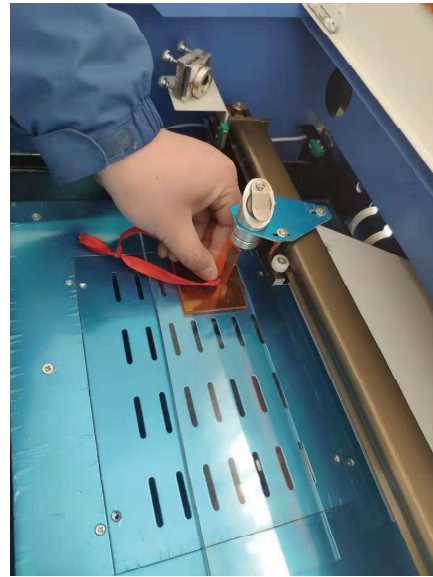
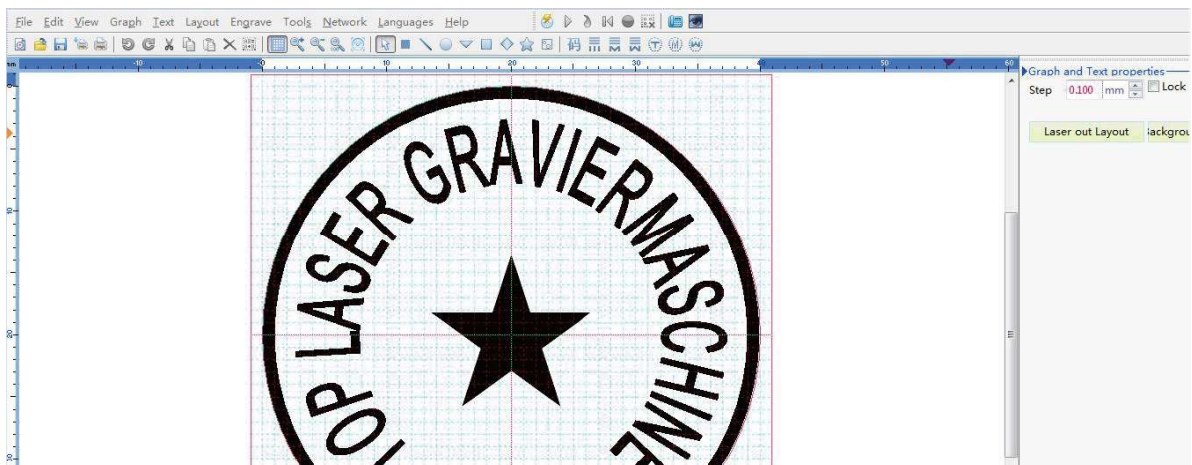


Fig. 3-2-4.

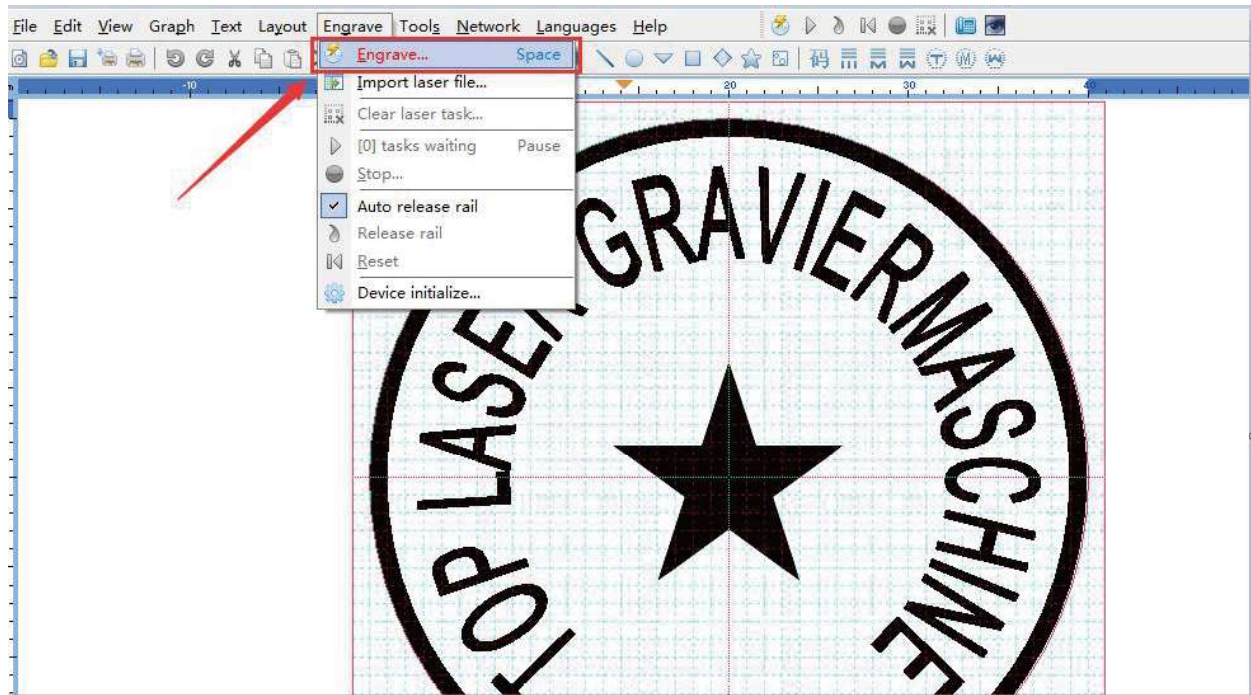
Step Three: Select the Placement of the Engraving

Move the placement of the design in the software to move the laser head to the correct location.

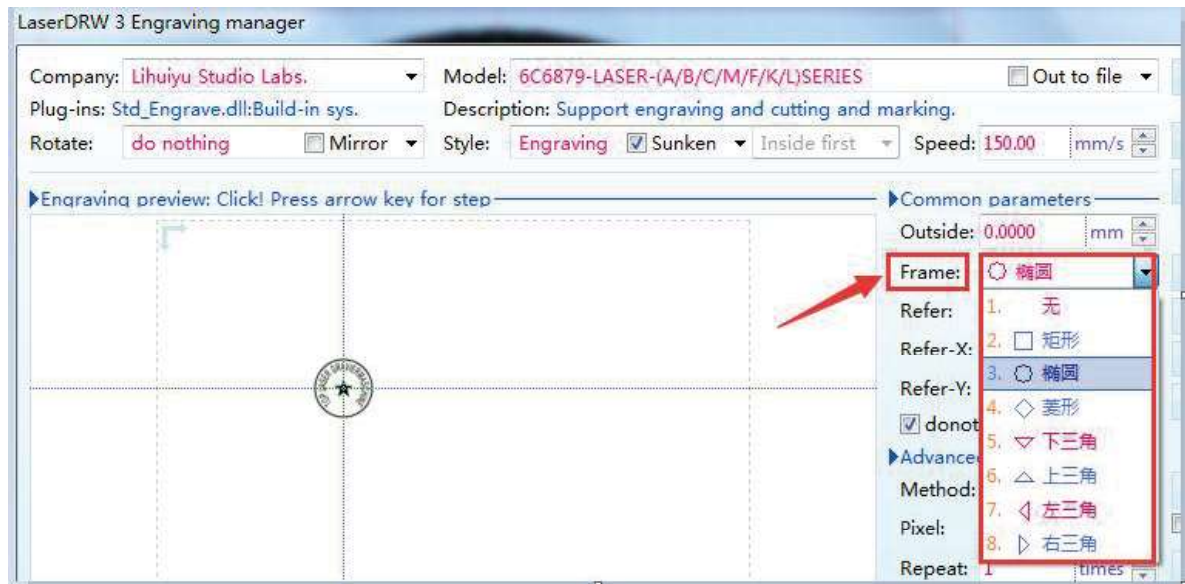
(1) Open LaserDRW.



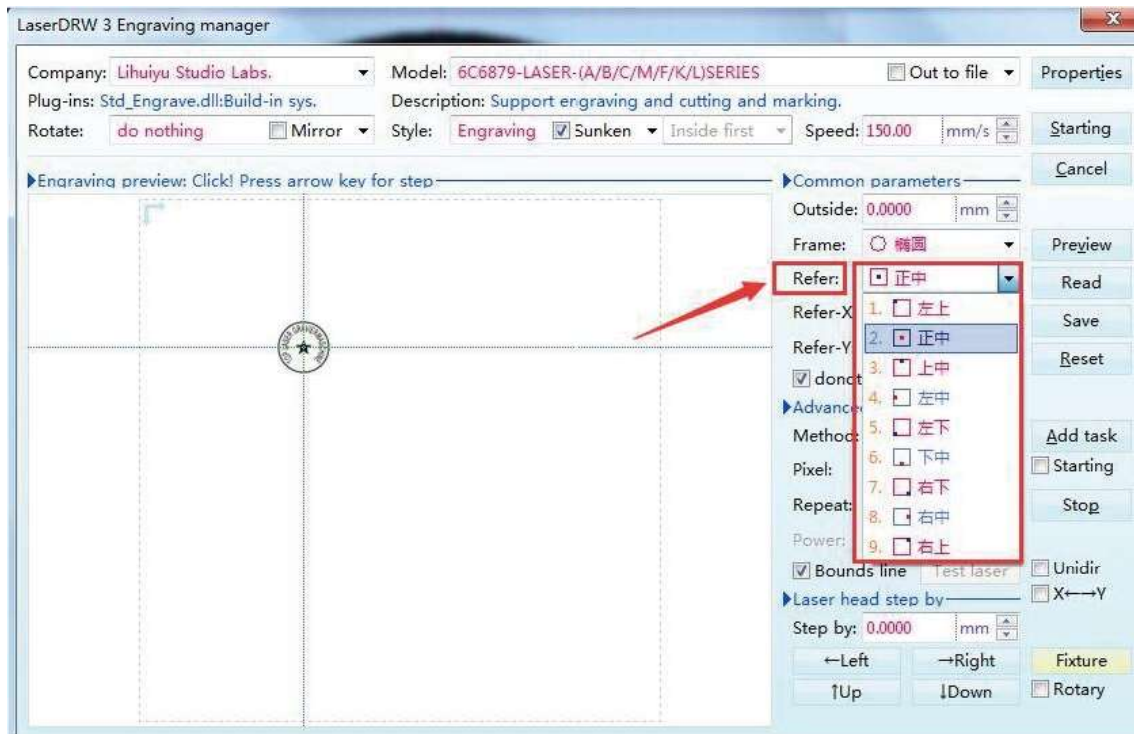
(2) Select ENGRAVE in the ENGRAVE menu.



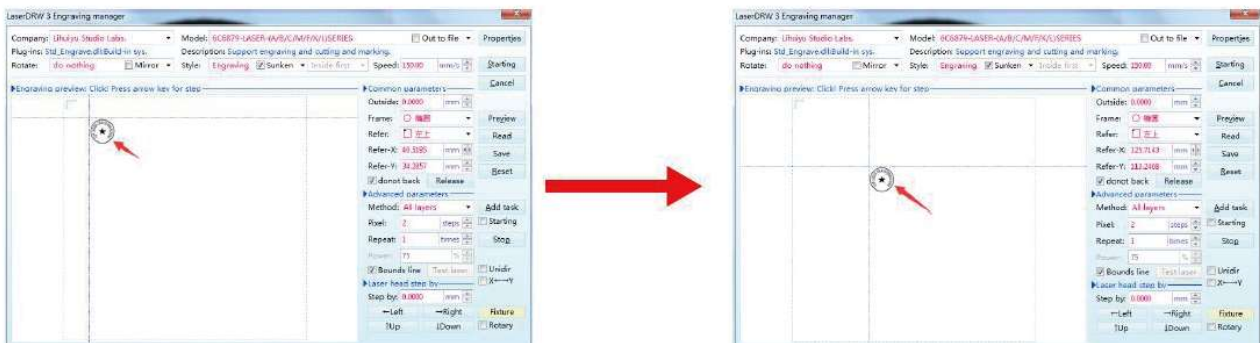
(3) Select the appropriate FRAME for the image.



(4) Use REFER to select the proper alignment of your design with the selected position.



(5) Drag the design to the correct location in the grid to position the laser head correctly over the material.



Step Four: Select a Power Setting

On the machine, select the laser power you wish to use. This will vary according to which kind of material you want to process. For rubber stamps, we suggest a current in the range 12–15mA.

Step Five: Begin Work

Set the engraving speed in the software, and output the job to the machine. It should begin work. (See 4.3 if problems occur.)

Chapter 4: First Time User's Guide

The following is an extra guide on how to connect your machine to your PC and how to create and engrave a simple design using the copy of LaserDRW provided with your machine. For general information and installation instructions, see the separate engraver and software manuals.

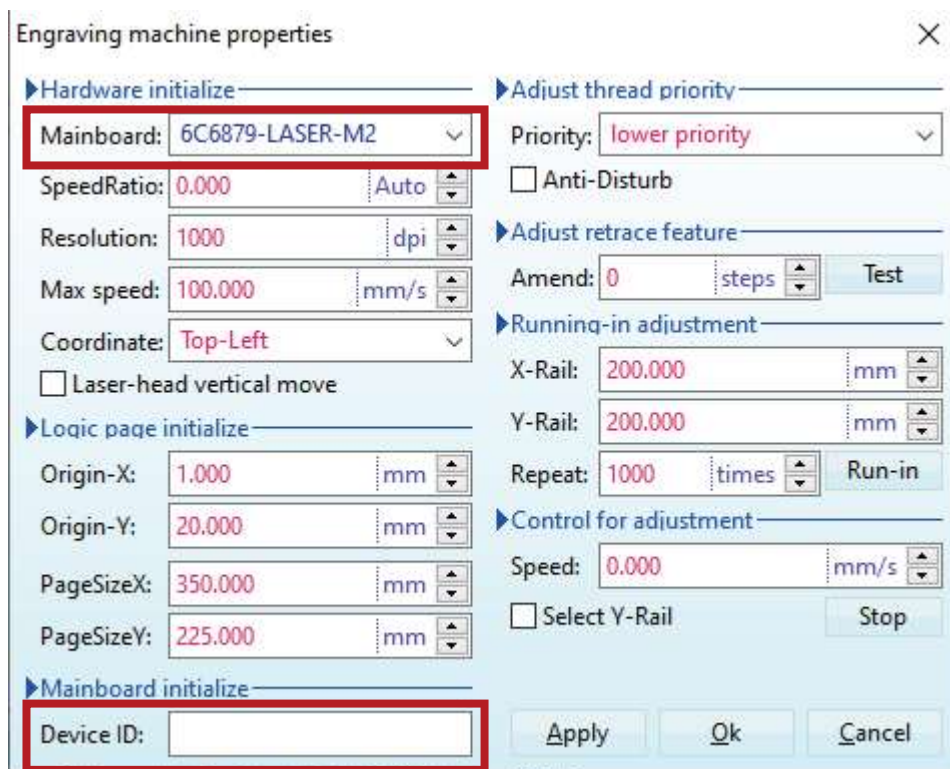
- 1) Before use, make sure your machine is properly grounded and placed in a leveled and safe location. You will also need a proper exhaust setup. We recommend that you attach the venting hose to a filtration system but, if this is not possible, place the hose so that it can vent outside the building. Never operate the machine in a closed room, as the smoke and fumes can irritate your eyes, nose, mouth and lungs.
- 2) Next, connect and set up the provided water pump. Always make sure that the water pump is connected to its power source and circulating water through the tube before you power on the machine. The machine has a safety feature that will disable the laser until it senses an active water-cooling system. Using the laser machine without a water pump or chiller will severely damage the laser tube.
- 3) If you have not already done so, install LaserDRW, the software program provided in the CD in your accessories bag. Once installed, connect the machine to your PC using the provided USB cable. Connect the provided USB as well. Once connected, open LaserDRW.



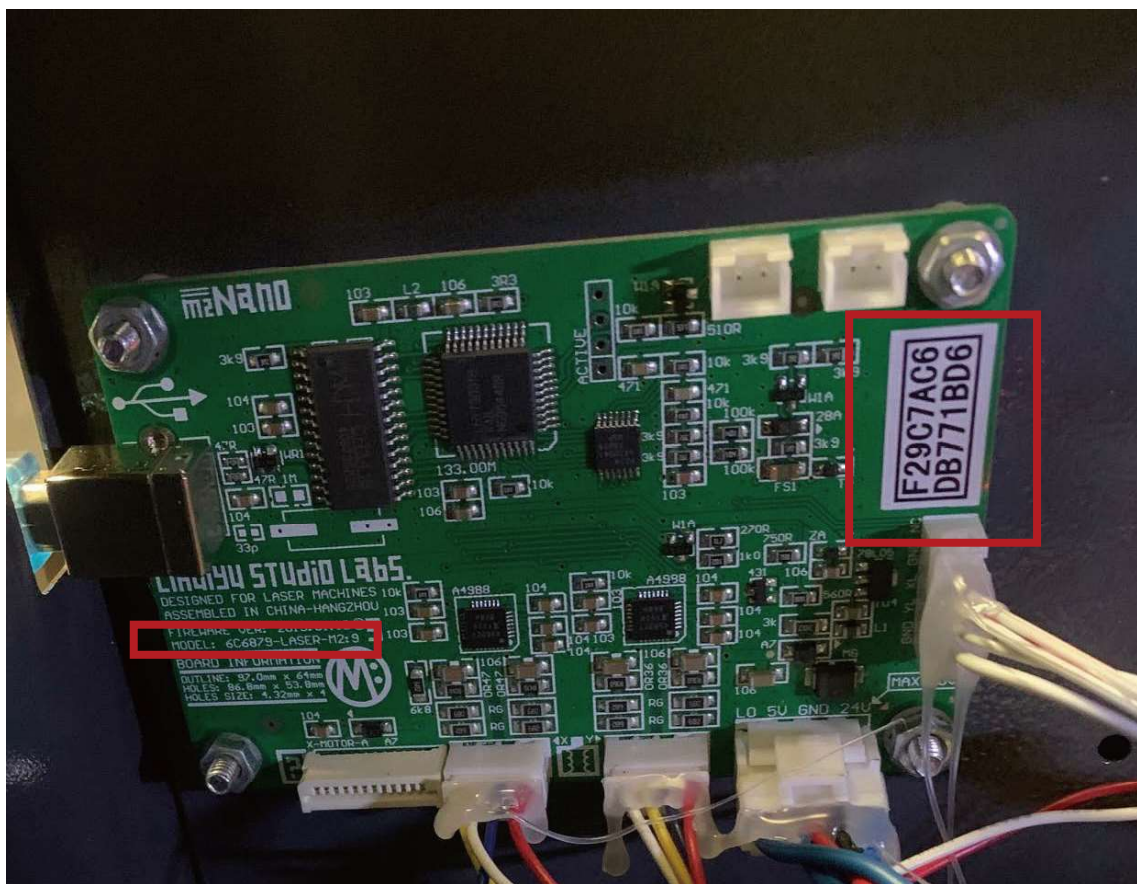
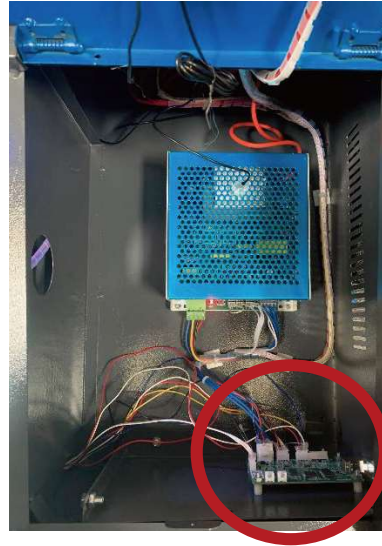
- 4) Once you have LaserDRW open, go to the top toolbar and click on “Engrave”, then “Device initialize.”



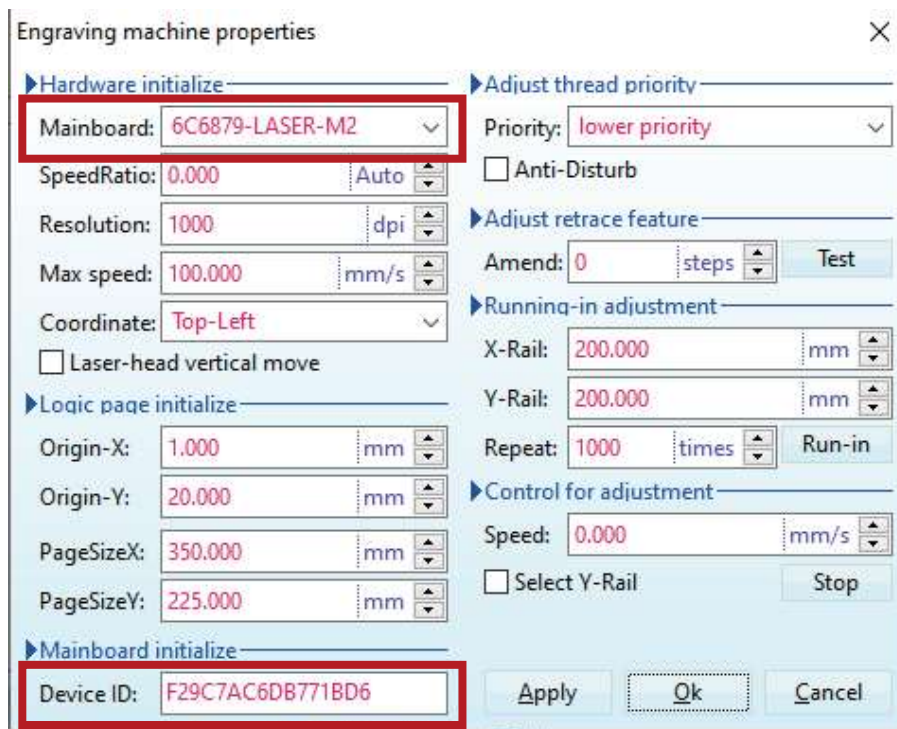
This menu will open:



Make sure that your Mainboard and Device ID match your machine. You can find your machine's Mainboard and Device ID on its motherboard. To access the motherboard, first make sure you have the machine turned off and then unscrew the control lid.

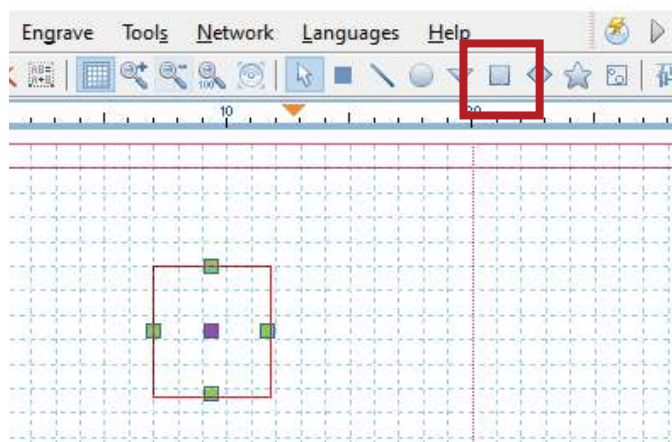


Select your Model Number and type in your Device ID accordingly.

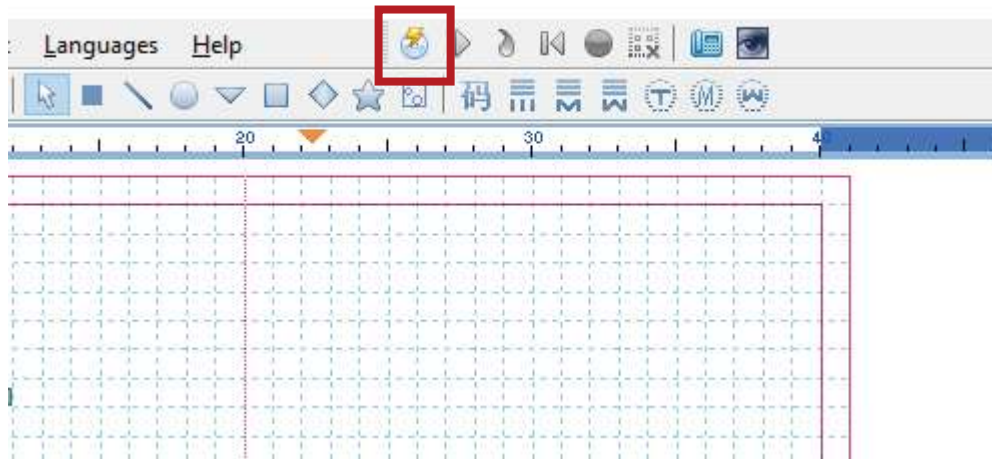


Press “Apply” and then “Ok”. You may be asked to restart the program. If so, close and reopen the program. Close and refasten the cover lid.

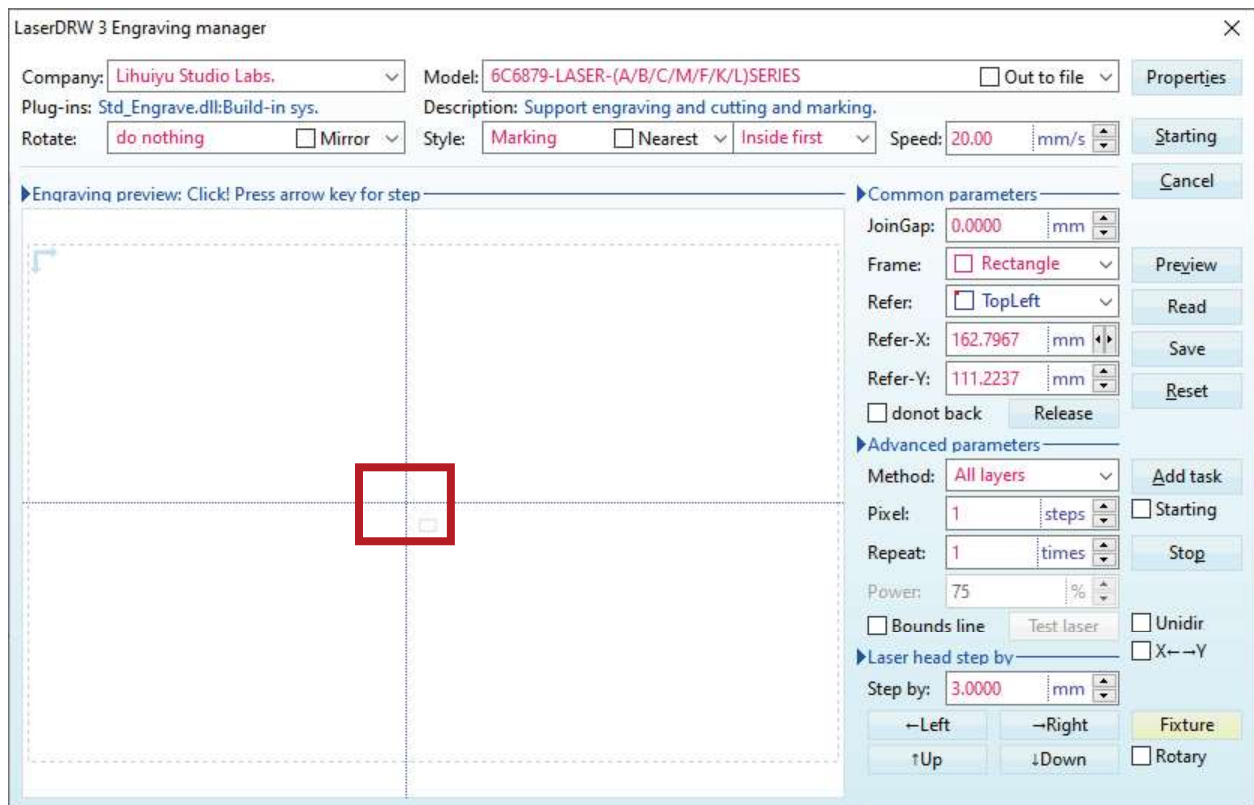
- 5) Turn on your machine. You will now be able to control the machine with your PC.
- 6) To test out connectivity, use the Square Tool to draw a small rectangle. When you click on the square again, it should be outlined in red. This means it will be processed.



- 7) Press “Engrave” on the Menu and you will hear the machine reset to its origin.

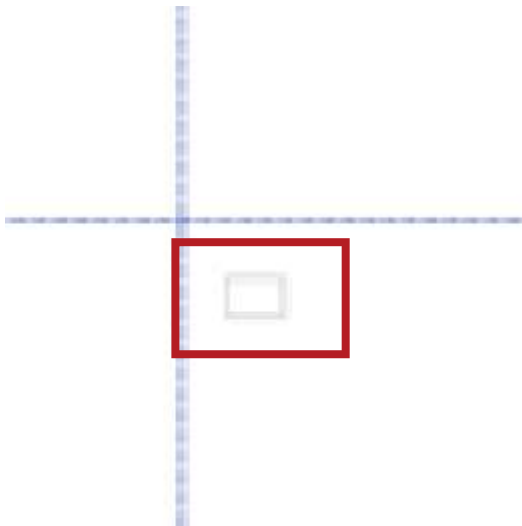
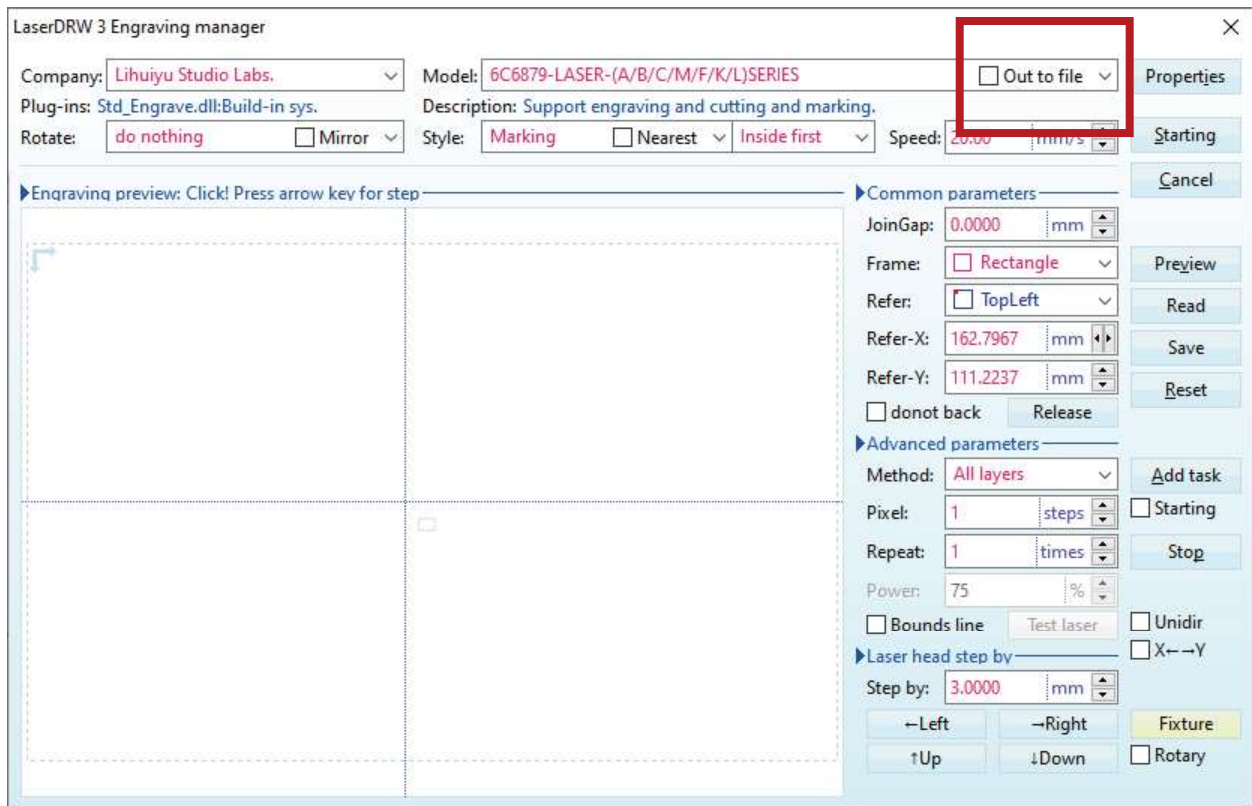


- 8) In the Engraving Manager screen that appears, you can adjust and control the positioning of the laser head and your image by clicking and dragging the origin (the center of the blue cross).



- 7) Press “Engrave” on the Menu and you will hear the machine reset to its origin.

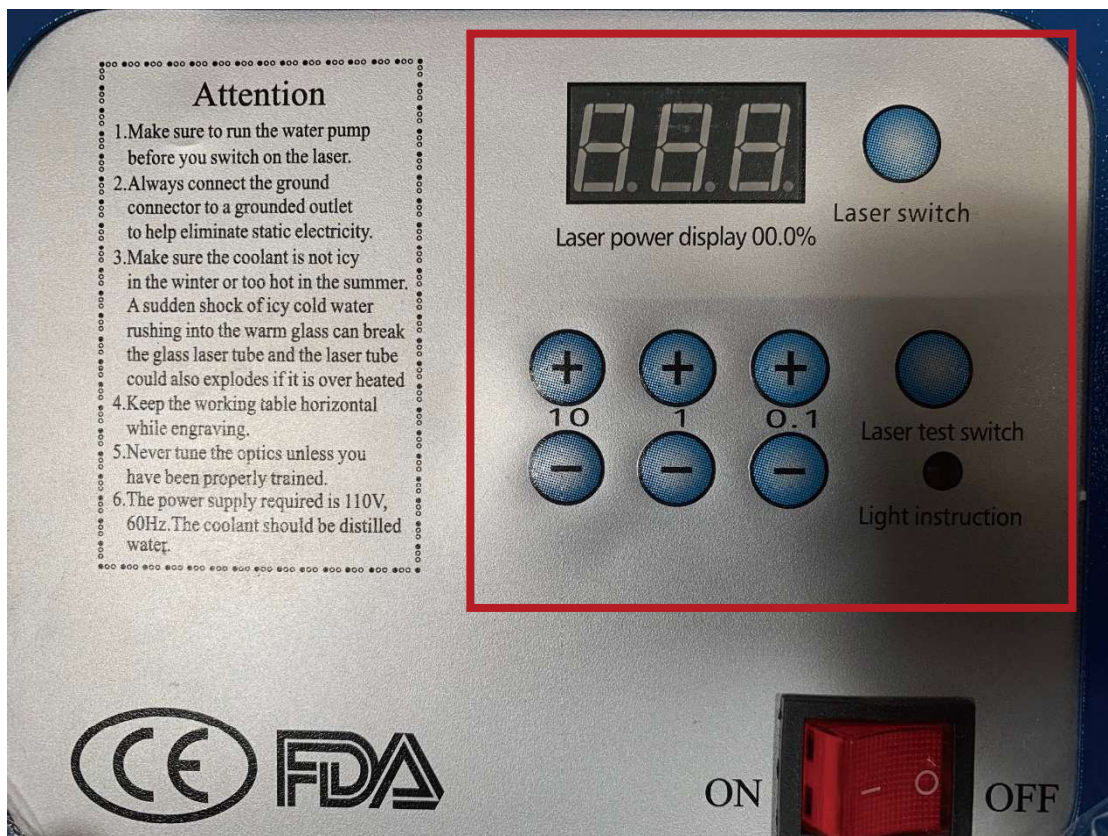
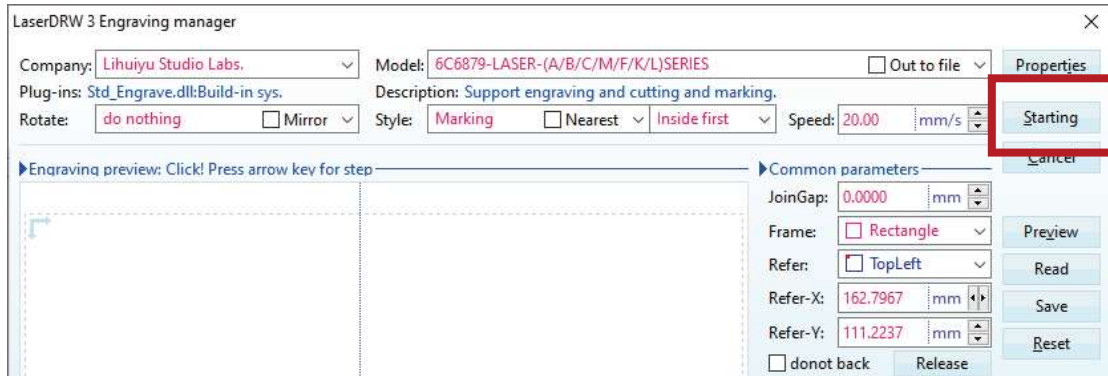
- 9) Before engraving or cutting, you must make sure that the file you want to process is being sent to the machine and not to another location. Make sure you have this box unchecked. (Clicking it saves your file instead of engraving it.)

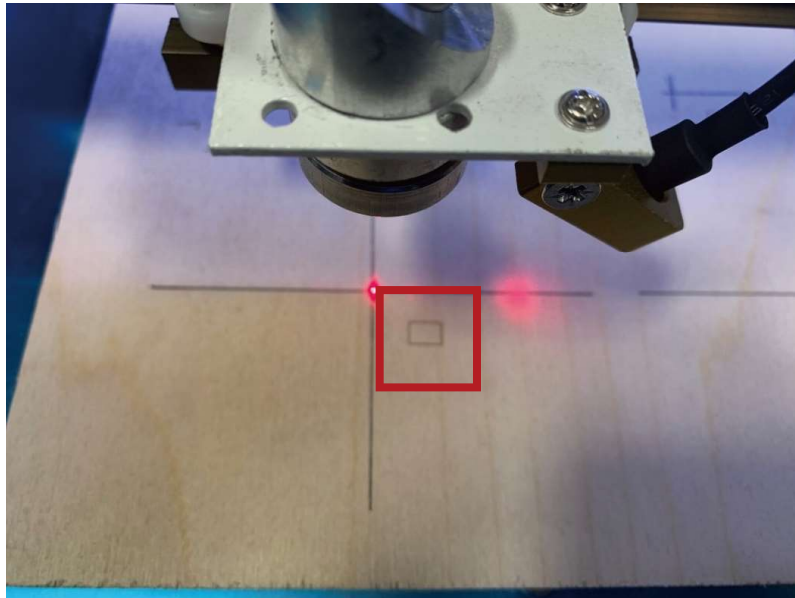


- 10) As you can see, the rectangle is placed below and to the right of the origin at the center of the blue cross. We will refer to this position in a later example.

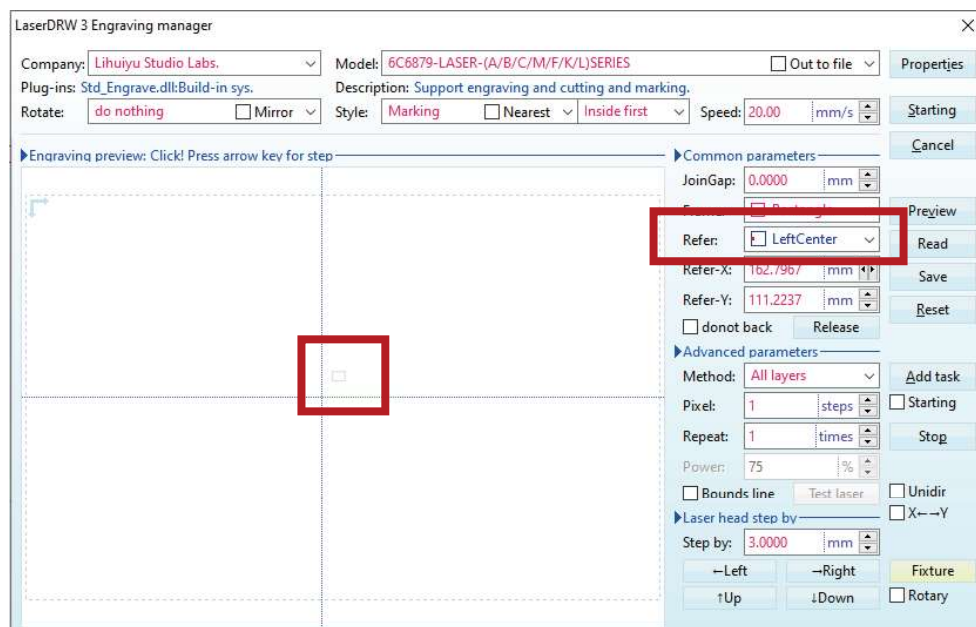
- 7) Press “Engrave” on the Menu and you will hear the machine reset to its origin.

- 11) Place your material on the bed and position the laser head accordingly. Once you are ready press the “Starting” option to begin. Make sure you have selected your desired wattage (power setting) using the control board on the machine.

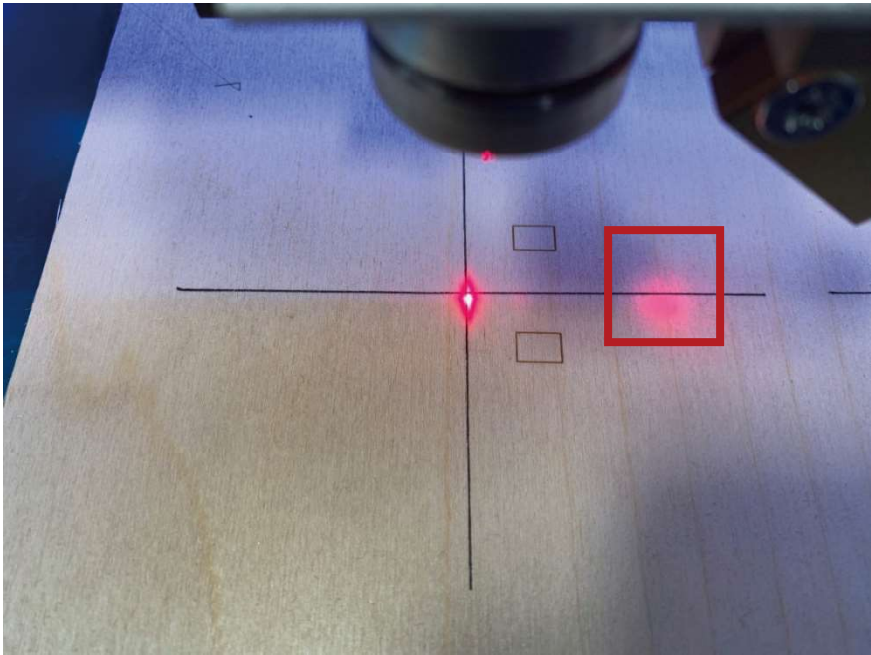




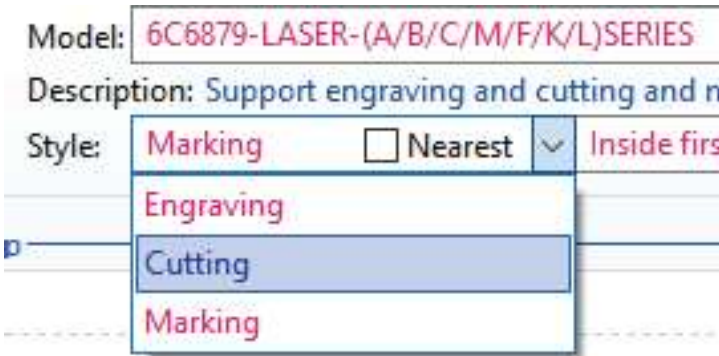
- 12) Some models are equipped with a red laser guide that will mark the position of the laser head, initially located at the origin (the center of the blue cross you see on your computer screen). This example can still be followed through even if your model does not have the extra laser guide. The cross on the wood was drawn to help visualize it. As you can see in the previous picture from the software, the rectangle was placed in the bottom right quadrant. This is where the laser marked it.
- 13) You can adjust the positioning of your object/shape using this option. We will now change the location to the upper right corner.



As you can see the laser now engraves your design in the upper right quadrant, up and to the right of the origin. Keep this feature in mind when you are setting up your material and jobs. Always keep the cover lid closed while processing jobs.



- 14) Refer to the software and engraver manuals for additional options. You can adjust settings and parameters depending on your material and jobs. For example, clicking on “Style” allows you to choose between Engraving, Cutting, and Marking.



Chapter 5: Avoiding Problems

Safe, stable use of your machine is inseparable from its proper operation and normal maintenance. If problems do arise, consult the troubleshooting guide at the end of this chapter. For if that does not resolve your issue, contact us or a specialized repair service. Do not open or attempt to repair this class 4 laser machine without training.

5.1 Regular Maintenance

1. Clean the Mirrors and Lens Daily

As dust from the engraving process easily accumulates on your mirrors and focus lens, resulting in energy loss and damage, they should all be cleaned frequently. Daily cleaning is recommended.

The mirrors may be cleaned in place. Use a cotton swab with an acetone or alcohol cleaning solution. To avoid damage, you must swab the mirror gently. For best results, begin in the center and rotate slowly to the outer edges in a soft circular pattern. Be careful not to damage the surface coating.

To clean the focus lens, remove it from the laser head, clean it in the same way as the mirrors, and then replace it. During replacement, be mindful to keep the concave side down.

2. Replace the Water in the Water Tank Weekly

Again, the water cooling system is very important for your laser engraver. Making sure that its water tank has water that is neither too cold (near 0°C or 32°F) nor too hot (above 35°C or 95°F) should be a daily habit. For best results, change the distilled water in the tank weekly to maintain the quality of the water cooling system.

3. Clean the Water Pump and Water Tank Weekly

You should also clean the water tank itself weekly, which can be done while changing the water. To clean the water tank, turn off the laser engraver if it is on, unplug the pump; disconnect the tank's water inlet pipe, allowing it to drain automatically; open the water tank and remove the pump; clean the pump and tank; replace the pump inside the water tank; reconnect the water inlet pipe; and then replace the tank's distilled water. Plug in the pump again, and allow it to run for 2–3 minutes to restore the water through the laser engraver's cooling system.

4. Clean the Guide Rails Biweekly

For best results, it is recommended that you clean the engraver's guide rails every two weeks. To clean the guide rails, turn off the laser engraver. Move the laser head all the way to the right or left. Wipe with a dry cotton cloth until it is shiny clean. Next, clean and lubricate the Y-axis guide rail and apply a little oil. (Sewing-machine oil is recommended.) Gently move the head slowly along the Y-axis guide rail several times to evenly distribute the lubricant.



5. Inspect the Alignment of the Engraver's Optical Path Periodically

Because the mirrors of your engraver's optical path are fixed but the focus lens can acquire bias during operation, some optical path offset is possible. For best results, repeat the "Optical Path Alignment" (4.2) procedure before every project. Otherwise, use it when optical path offset is noticed during operation.

6. Clean the Exhaust Fan as Needed

After long use, the inside of the fan will accumulate dust and become less effective at removing fumes and dust produced during operation. To clean the exhaust fan, turn off the laser engraver, remove the exhaust pipe, and clean the dust from the exposed fan. At the same time, you should clean the exhaust pipe itself before reconnecting it to the fan. The rate of dust accumulation will vary depending on the materials processed and the air quality of the working environment, but you should always cease work and clean your exhaust fan if you notice it making more noise than usual.

5.2 Optical Path Adjustment

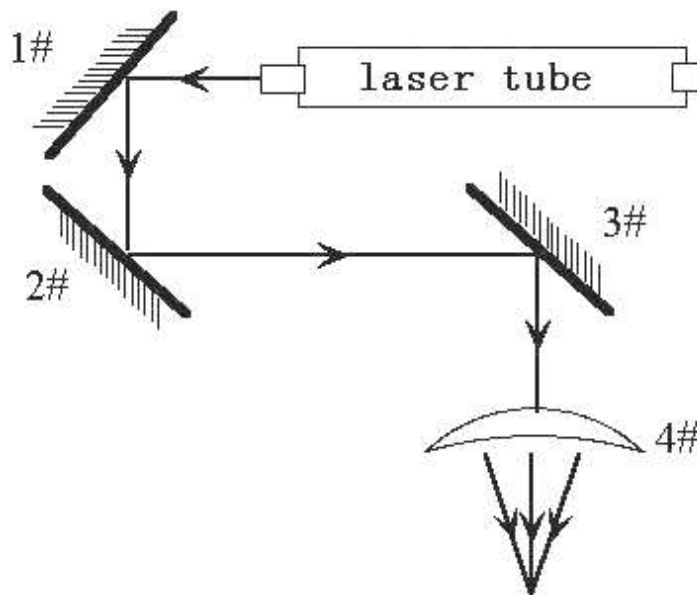


Fig. 4-1. Optical Path Diagram.

When aligning or realigning the optical path of your laser, follow these steps:

(1) Use a low power setting.

We recommend a current of about 6mA.

(2) Test the alignment of the laser tube and first mirror.

Put the double-sided adhesive tape included with your engraver on the first mirror (1#). Push the Test Switch button to activate the laser tube. You should see a spot appear on the tape near the center of the mirror. If it is misaligned, adjust the position of the laser tube to correct this.

(3) Test the alignment of the first and second mirrors when close.

Put the double-sided adhesive tape on second mirror (2#). Move the X-axis beam to Position A (Fig. 4 – 2) near the laser tube. Push the Test Switch button to activate the laser tube and produce a spot on the tape. To avoid being burnt by the laser, please put a carton board in front of the second mirror to get the general position of the laser spot.

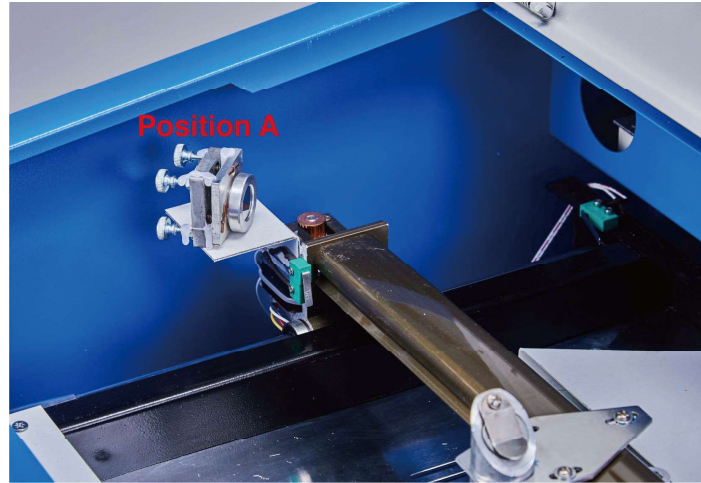


Fig. 4–2. The second laser in Position A, with tape.

If the laser spot is not in the center of the second mirror, you will need to adjust the angle of the first mirror using the knobs behind it (Fig. 4 – 3). First, loosen the screws which restrain the three adjusting knobs. Next, correct the angle horizontally by turning the two top knobs. Correct the angle vertically by adjusting the bottom knob.



Fig. 4–3. The adjustment knobs behind the first mirror.

(4) Test the alignment of the first and second mirrors when distant

When the first and second mirrors are well-aligned in Position A, slowly and gently move the X-axis beam to Position B (Figure 4 – 4) far away from the laser tube. Push the Test Switch button to activate the laser and produce a second spot on the tape on the second mirror.

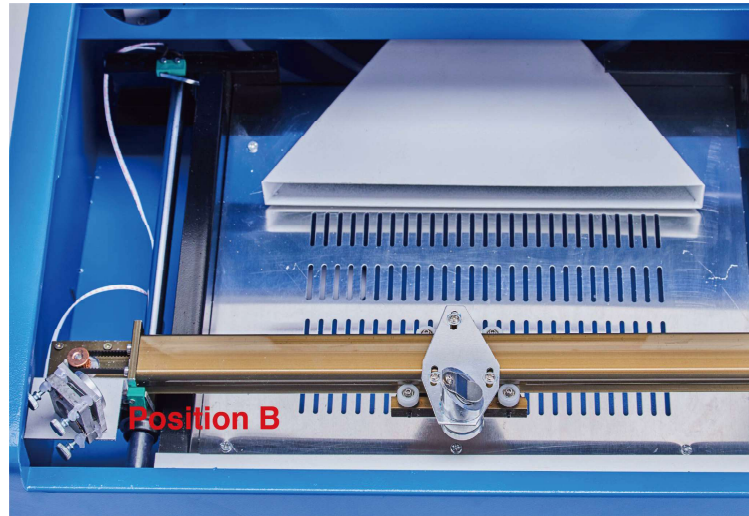


Fig. 4-4. The second laser in Position B, with tape.

(5) Test the alignment of the second and third mirrors when close

Put the double-sided adhesive tape on the third mirror (3#). Move it slowly and gently along the Y-axis guide rail until it is in Position 1 (Fig. 4 – 5) near the second mirror. Push the Test Switch button to get a laser spot on the tape. To avoid being burnt by the laser, please put a carton board in front of the third mirror to get the general position of the laser spot.

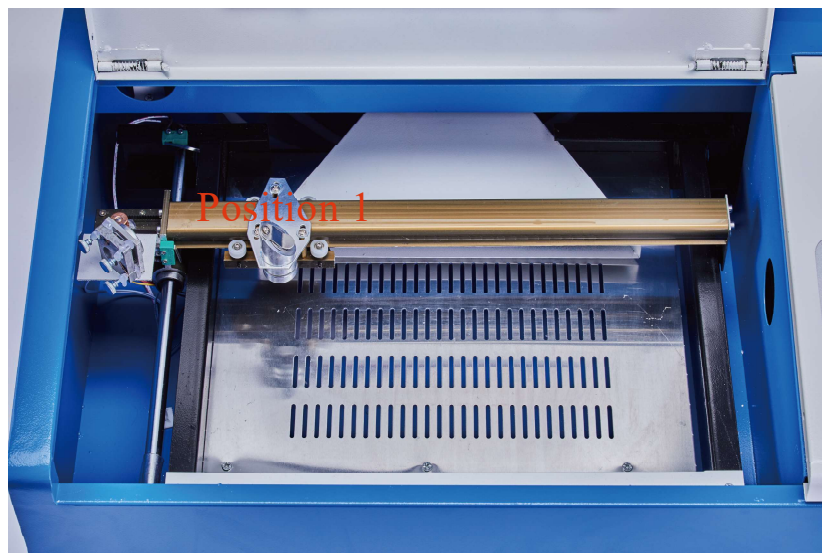


Fig. 4-5. The third mirror in Position 1, with tape.

If the laser spot is not in the center of the third mirror, you will need to adjust the angle of the second mirror using the knobs behind it (Fig. 4–6). These are similar to the knobs behind the first mirror described in Step 3 above and work identically.



Figure 4–6. The knobs behind the second mirror.

(6) Test the alignment of the second and third mirrors when distant

When the second and third mirrors are well-aligned in Position 1, slowly and gently move the third mirror along the Y-axis guide rail until it is in Position 2 (Fig. 4–7) far away from the second mirror. Push the Test Switch button to activate the laser and produce a second spot on the tape on the third mirror.

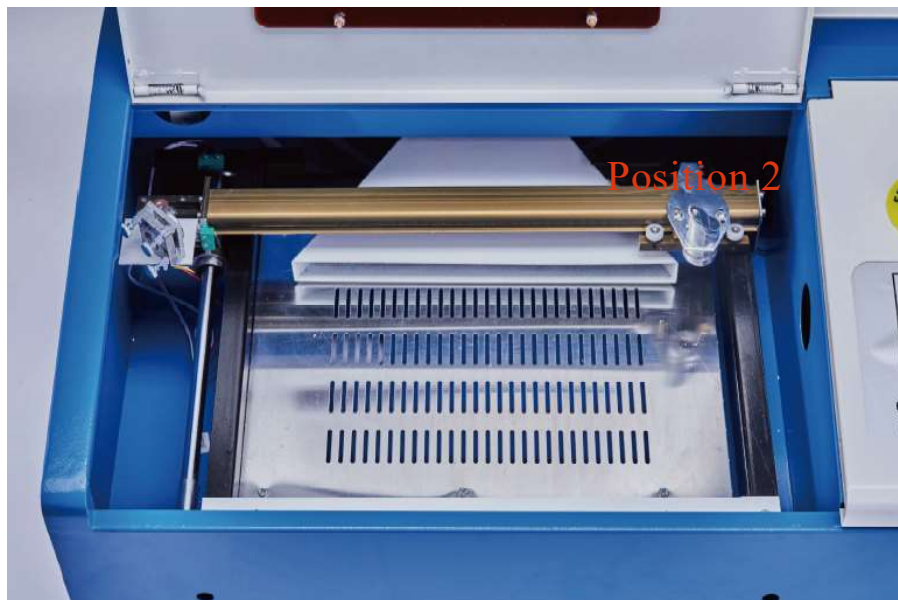


Figure 4–7. The third mirror in Position 2, with tape.

Again, if the first and second spots on the tape are not identically placed, repeat the process of adjusting the second mirror's knobs described in Step 5 above until the two spots overlap.

(7) Test the alignment of the third mirror with the focus lens

Put the double-sided adhesive tape on the hole at the top of the laser head beneath the third mirror. Push the Test Switch button to get a laser spot on the tape. The spot should be near the center of the hole.

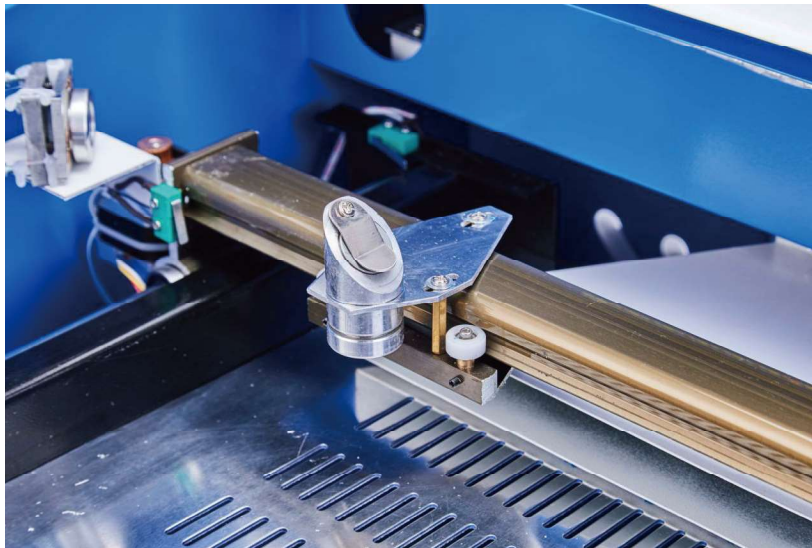


Figure 4-8.

If the spot is vertically off-center, correct the third mirror's alignment by adjusting the laser tube a little up or down (Fig. 4-9). If the spot is horizontally off-center, correct the misalignment by moving the laser tube a little forward or backward (Fig. 4-10).

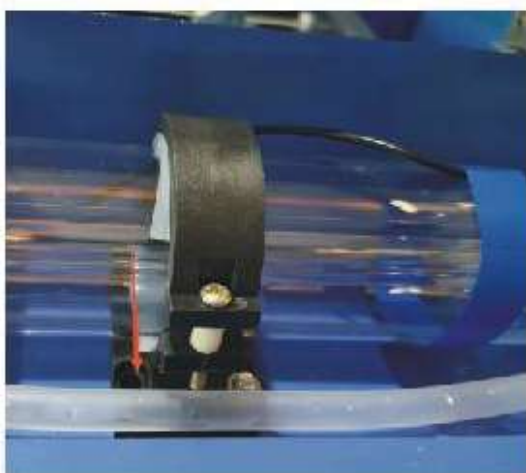


Fig. 4-9.

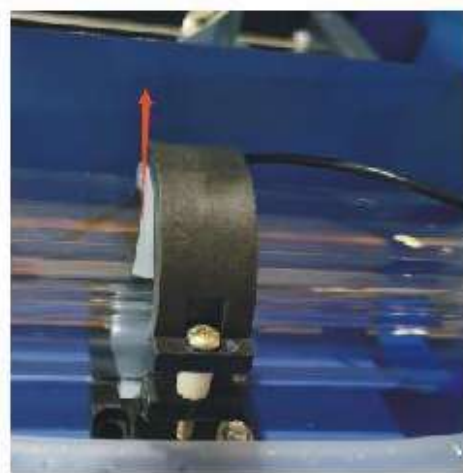


Fig. 4-10.

5.3 Troubleshooting

Nothing happens when the engraver is turned on.

Check the power cord and fuses.

Nonstop laser.

Check the electrical grounding wire and connections.

Light comes on during operation.

Check the water cooling system. If it is not operating smoothly, clean the water tank and pump and replace the distilled water. If the water cooling system is operating smoothly, there may be unstable voltage in the engraver's power supply. Install a regulator or improve the power supply itself.

Test abnormal

Adjust the metal sheet to touch the limit switch

The machine does not begin to work when instructed by the software.

Check that the data cable is well connected to both your computer and the engraver. Check that the engraver is turned on and well grounded. If the necessary from the USB have not been installed, do so and repeat the command.

No laser is emitted during operation.

Check that the water cooling system is working properly and the tank is well supplied with cool (but not icy) distilled water. Check the optical path for bias and, if necessary, perform the optical path adjustment procedure in 4.2.

The laser head moves erratically.

Check that the engraver is well grounded. If it already is and the problem persists, reduce the engraving speed.

Contact Us

Thank you for choosing our laser equipment for your home or shop! For a .pdf copy of the latest version of this manual, use the appropriate app on your smartphone or other device to scan the QR code to the right.

Come join the OMTech community at our official laser group on Facebook or visit the company forums at **omtechlaser.com**! Check our YouTube channel for helpful hints and instructional videos. If you encounter any problem regarding your engraver, do not hesitate to contact customer service with your order number at **help@cs-supportpro.com** or **techsupport@omtechlaser.com**. Our teams will respond within 24 hours to make things right. You can also reach us Monday to Friday at (949) 539-0458 between 8 am and 4:30 pm PST.

Thank you and we hope you will choose us again for all your laser needs!



