

USB-G570-60W Cabinet Laser Engraver User Manual



Read Carefully Before Use
Keep for Future Reference

PREFACE

Thank you for choosing our laser equipment.

Your CO2 laser engraving machine is intended for personal and professional use. It houses a **CLASS 4 LASER** and can be extremely dangerous. Please use it safely and responsibly.

Read this manual carefully before operation. It covers the details of correct installation, adjustment, maintenance, and—most importantly—safe operation of your new laser. It is intended to be used in conjunction with your engraving software manual, as the software typically does not only provide image design but also serves as an alternative interface for the laser settings and machine controls. You and any other users of this device should thoroughly understand **BOTH** manuals before attempting to operate the laser.

Keep both manuals for future reference and provide them to **ANYONE** who will install, operate, maintain, or repair this machine. Both manuals should be included if this device is given or sold to a third party.

If you have any questions after reading these manuals, please contact us, and our support department will address your concerns as soon as possible.

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1. Introduction

1.1 General Information

This manual is the designated user guide for the installation, setup, safe operation, and maintenance of your cabinet laser engraver. It is divided into six chapters covering general information, safety instructions, installation steps, operation instructions, maintenance procedures, and contact information.

ALL personnel involved in the installation, setup, operation, maintenance, and repair of this machine should read and understand this manual, particularly its safety instructions. Some components are extremely high voltage and/or produce powerful laser radiation. Substandard performance and longevity, property damage, and personal injury may result from not knowing and following these instructions.

Your laser engraver works by emitting a powerful laser beam from a glass tube filled with insulating carbon dioxide (CO₂), reflecting that beam off three mirrors and through a focus lens, and using this focused light to etch designs into certain substrates. The first mirror is fixed near the end of the laser tube, the second mirror travels along the machine's Y axis, and the third mirror is attached to the laser head that travels along the X-axis. Because some dust from the engraving process settles on the mirrors, they require frequent cleaning. Because they move during operation, they also require periodic readjustment using their attached positioning screws to maintain the proper laser path. A water cooling system—typically a pump or chiller—must be used with this engraver to dissipate the heat produced by the laser tube. Similarly, an exhaust system—typically either an external vent or a dedicated air purifier—must be used to remove the dust and gasses produced by the engraving process.

With typical use, the included 60W laser tube has an average lifespan around 1300 to 1500 working hours under recommended settings. However, constantly running your laser above 70% of its maximum rated power can significantly shorten its service life. It is recommended to use settings from 10–70% of the maximum rated power to enjoy optimal performance and longevity.

Note that this is a high-voltage device and, as a safety precaution, it is recommended to only touch its components with one hand at a time during use.

Note that the active laser is invisible to the human eye. This device should never be used while any cover is open to avoid potentially permanent injury.

Note also that the cooling water system and exhaust system are both absolutely essential to the safe use of this device. Never operate the engraver without both of these systems operating properly. Water should always be kept clean and around room temperature, and the exhaust system should always comply with all applicable laws and regulations for workplace and environmental air quality.

1.2 Symbol Guide

The following symbols are used on this machine's labeling or in this manual:



These items present a risk of serious property damage or personal injury.



These items address similarly serious concerns with regard to the laser beam.



These items address similarly serious concerns with regard to electrical components.



Protective eyewear should be worn by anyone around this machine during operation.



This product is sold in conformity with applicable EU regulations.



This product contains electrical components that should not be disposed of with regular garbage.

1.3 Designated Use

This machine is intended for use engraving signs and other consumer products on applicable substrates. This laser can process a wide variety of materials including wood, cork, paper, cardboard, most plastics, glass, cloth, leather, and stone. It can also be used with some specially coated metals. Use of this system for non-designated purposes or materials is not permitted.

The system must be operated, maintained, and repaired by personnel familiar with the field of use and the dangers of the machine and the material being engraved, including its reflectivity, conductivity, and potential for creating harmful or combustible fumes, etc.

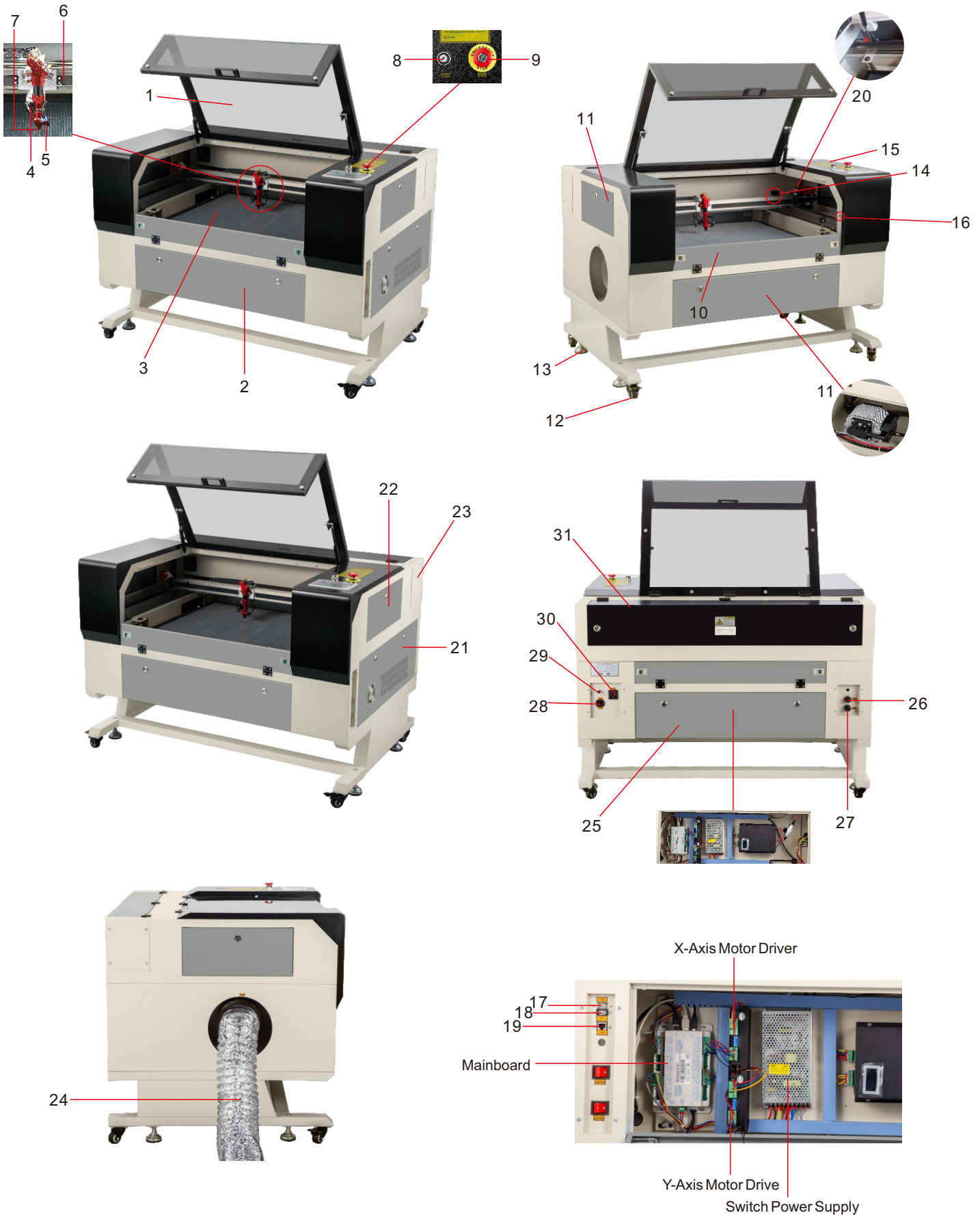
Laser beams are dangerous. The manufacturer and/or seller bear(s) no responsibility and assume(s) no liability for any improper use of this device or for any damage or injury arising from such use. The operator is obliged to use this cabinet laser engraver only in accordance with its designated use, the other instructions in its manuals, and all applicable local and national laws and regulations.

1.4 Technical Specifications

Model		USB-G570-60W
Laser Type		Class 4
Laser Tube	Diameter	1.968 in. (50 mm)
	Length	39.37 in. (1000 mm)
Focal Lens	Diameter	0.78 in. (20 mm)
	Thickness	0.08 in. (2 mm)
	Focal Length	2 in. (50.8 mm)
Mirror	Diameter	0.98 in. (25 mm)
	Thickness	0.12 in. (3 mm)
Input Power		110V/60Hz
Power Consumption		650W
Rated Power		60W
Expected Service Life of Laser Tube		1500 – 2000 hours (under recommended settings)
Laser Wavelength		10640 nm
Laser Frequency		28.3 kHz
Processing Area		20 x 28 in (500 x 700 mm)
Max. Engraving Speed		23.6 ips (600 mm/s)
Max. Cutting Speed		15.7 ips (400 mm/s) (actual speed depends on material)
Min. Engraving Depth		0.00039 in. (0.01 mm)

Max. Engraving Depth	0.39 in. (10 mm)
Max. Resolution	4500 dpi (2540 dpi recommended max)
Min. Letter Size	0.039×0.039 in. (1×1 mm)
Required Operating Environment	<70% Humidity 40–75°F (5–25°C)
Provided Operating Software	RDWorks
Supported Operating Software	CorelLaser, LightBurn
Supported Image Formats	.ai, .bmp, .dxf, .gif, .hpgl, .jpeg, .pdf, .plt, .png, .rd, .svg, .tiff, .tga
Graphic Operating Modes	Raster, Vector, Combined
Certification	CE, FDA
Net Weight	320 lb. (145 kg)
Product Dimensions	47.2 x 38.2 x 36.2 in (120 x 97 x 92 cm)

1.5 Components



1: Viewing Window

The sepia-tinted acrylic window is shielded to protect you and others from the laser and its reflection, allowing monitoring of the engraving process. However, you should never stare continuously at the laser during operation, even through the window.

2: Front Access Door

This door provides access to the waste hopper for easy cleanup after each project.

3: Honeycomb Work Table (optional)

According to your material needs, you can use the honeycomb work table by placing it over the aluminum knife working table/aluminum work plate.

4: Laser Head

The laser heads hold the 3rd mirror, the focus lens, the red dot guidance, and the air assist outlet.

5: Air-Assist

This device blows pressurized air to kill sparks and blow away gas and debris as you engrave.

6: Leading Chain

This hose supplies air to the Air-Assist compressor and contains the red dot pointer cable.

7: Red Dot Pointer

This device helps you see the exact position of the invisible engraving laser.

8: Laser Switch

This enables power to the laser tube. Always turn it on when the machine is running.

9: Emergency Stop

This button immediately cuts all power to the laser tube in the event of an emergency.

10: Waste drawer

Used to store waste generated during operation. Please clear the drawer frequently to keep it clean.

11: Upper Left Access Door

Open this door to clean the second reflective mirror.

12: Base Feet

Support legs provide added unit stability.

13: Wheels

These wheels make it easy to push the machine and change its position. When the machine is moved to the intended position, please make sure the two front wheels are fixed by pressing down the brake pads of the two Omni wheels.

14: X-Limit Switch

Instructs the motor to automatically return the laser head to its origin position after each operation is complete.

15: Cautionary Notes

Please read these carefully before running the machine.

16: Cover Protection

If the cover opens when the machine is operating, the machine will stop working.

17: USB Port

This port allows you to load and save designs and parameters directly onto the engraver.

18: USB Line Port

This port connects to your control computer and its engraving software using any of its USB ports.

19: Ethernet Port

This port connects to your control computer and its software either directly or via the internet.

20: Y-Limit Switch

Instructs the motor to automatically return the laser head to its origin position after each operation is complete.

21: Right Access Door

This door provides access to the mainboard, motor drivers, and power supplies.

22: Upper Right Access Door

Open this door to connect the socket of the rotation axis (the rotation axis is optional).

23: Preformed hole of the laser tube

Used to change for a laser tube with larger power.

24: Exhaust Port

Connect the exhaust duct and any external ventilation devices here.

25: Back door

Open the door and you can see the exhaust device and the electric lift motor. If there is any waste inside, please clean it frequently.

26: Water Inlet

Connect the water-in hoses of the water pump or water chiller here.

27: Water Outlet

Connect the water-out hoses of the water pump or water chiller here.

28: Power Supply Socket

Connect the main power and the extended power according to the label information.

You will also find a fuse compartment with a spare fuse.

29: Ground Line

Connect the ground cable to the machine here.

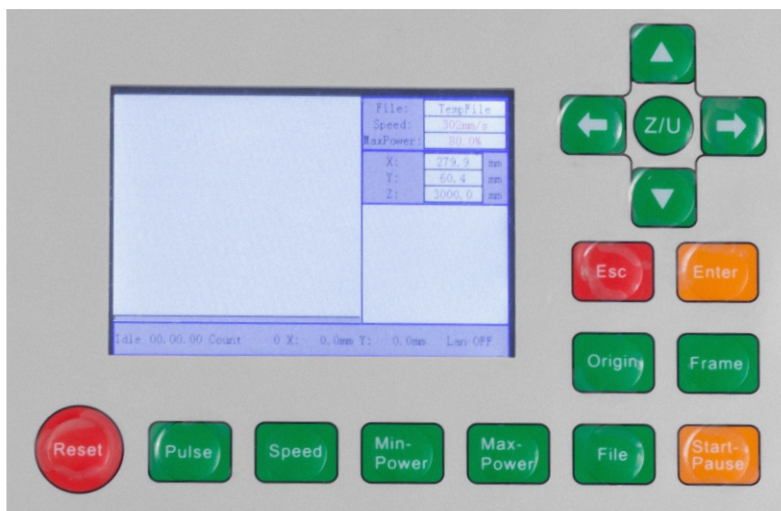
30: Water Pump Power Socket

If you cannot access an external outlet, use this socket to power the water pump only. Do not plug in any other electronics here (We recommend using an external wall outlet to power your water pump, as the use of this power socket creates further electrical stress on your machine).

31: Laser Tube Cover

This protective cover houses the laser tubes and the primary laser reflection mirror.

Control Console





Returns the machine to the saved default parameters.



Sets the starting point for the laser head.



Manually fires the laser.



Traces the outline of the current design for sizing.



Opens the file control menu.



Sets the speed of the current running layer or of the direction keys' movement.



Sets the maximum laser power of the current running layer or sets the power of the laser.



Sets the minimum laser power of the current running layer.



Starts or pauses the work.



Moves the X axis or the left/right cursor.



Moves the Y axis or the up/down cursor.



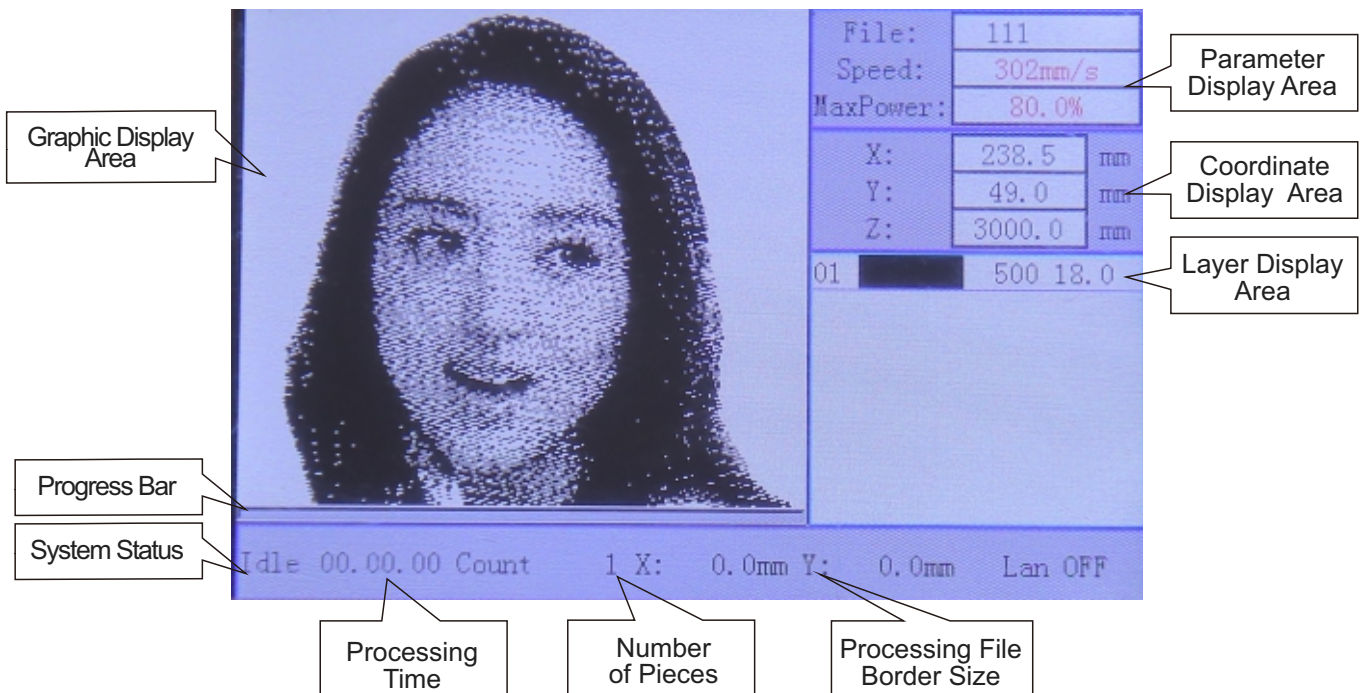
Opens the function menu.



Stops work or exits from a submenu.



Enters a command or confirms your selection.



Graphic Display Area: shows the whole file's track and the running track.

Parameter Display Area: displays the running file's file number, speed, max power, etc.

Coordinate Display Area: displays the current coordinates of the laser head.

Layer Display Area: displays the layer parameters of current or previewed files.

Parameters from

left to right are layer number, color, speed, and maximum power.

System Status: displays the current status of the machine: Idle, Running, Paused, or Finished. The processing time is shown on the right side.

Processing Progress Bar: displays the progress of the current file.

Number of Pieces: shows the count of completed runs of the current file.

Frame Size of Processing: displays the dimension of the current file.

When the system is idle or the work is finished, all the buttons are used. Users can process the file, set the parameters, preview their file, etc. When the work is running or paused, some buttons will not work (e.g., Origin and Frame).

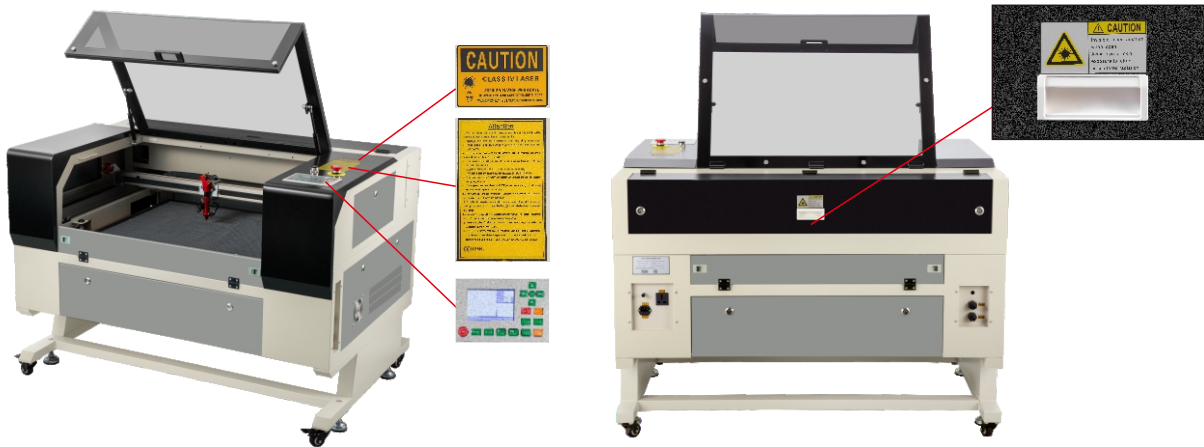
2. Safety Information

2.1 Disclaimer

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

2.2 General Safety Instructions

•Your device should come with instruction labels in the following locations:



If any of these labels are missing, illegible, or becomes damaged, they must be replaced.

- Use this laser engraving device only in accordance with all applicable local and national laws and regulations.
- Use this device only in accordance with this instruction manual and the manual for the engraving software included with it. Only allow this device to be installed, operated, maintained, repaired, etc. by others who have also read and understood both manuals. Ensure that this manual and the software manual are both included with this device if it is ever given or sold to a third party.
- DO NOT** operate a 60W model continuously for more than 3½ hours, an 80W model for more than 4½ hours, or a 100W model for more than 5½ hours. Stop for at least 30 minutes between uses.
- DO NOT** leave this device unattended during operation. Observe the device throughout operation and, if anything seems to be operating strangely, immediately cut off ALL power to the machine and contact either our customer service or your dedicated repair service. Similarly, ensure the device is FULLY turned off (including by means of the emergency stop switch) after each use.



•**DO NOT** allow minors, untrained personnel, or personnel suffering from physical or mental impairment that would affect their ability to follow this manual and the software manual to install, operate, maintain, or repair this device.

•Any untrained personnel who might be near the device while it is in operation **MUST** be informed that it is dangerous and fully instructed on how to avoid injury during its use.

•Always keep a fire extinguisher, water hose, or other flame retardant system nearby in case of accidents. Ensure that the local fire department's phone number is clearly displayed nearby. In the case of a fire, cut electrical power before dousing the flame. Familiarize yourself with the correct range for your extinguisher before use. Take care not to use the extinguisher too close to the flame, as its high pressure can produce blowback.

2.3 Laser Safety Instructions

This machine uses an invisible **CLASS 4 LASER**, the strongest and most dangerous class of laser available for public use. Used without care, it can cause serious property damage and personal injury including but not limited to the following:

- The laser will easily burn nearby combustible materials



- Some working materials may produce radiation or harmful gasses during processing

- Direct exposure to the laser will cause bodily harm including serious burns and irreparable eye damage

As such,

- NEVER** leave any part of the cabinet open during operation except (when needed) the pass-through doors. Never interfere with the laser beam, do not place any part of your body in any part of the laser path during operation, and never attempt to view the laser directly. When using the pass-through doors or otherwise risking exposure to the laser beam, take measures to protect yourself from potentially reflected laser beams including the use of personal protective equipment such as protective eyewear specially designed to filter the specific wavelength of your engraver's laser with an optical density (OD) of 5+.

- DO NOT** stare or allow others to stare continuously at the laser beam during operation even when the cover is closed and/or wearing protective eyewear.

- ONLY** use this engraver if its automatic shut-offs are working properly. When you first get this engraver and if you subsequently notice any problems, test them (see below) before undertaking any other work. Do not continue use if the shutoffs do not occur. Turn off the device and contact customer service or your repair service. Never disable these shutoffs.

- DO NOT** ever under **ANY** circumstance use this laser engraver if the water cooling system is not working properly. Always activate the water cooling system and visually confirm that water is flowing through the laser tube before turning on the laser power. If using the provided water pump, ensure that it is placed in a tank full of cool or tepid distilled water. Do not use ice water or water above 75°F (24°C). The optimum cooling water temperature is between 60-70°F

(15-21°C). Replace heated water or add sealed bottles of frozen water to cool it, while never allowing the system to run without water or allowing the water to become colder than 50°F (10°C). Immediately stop use if the water cooling system malfunctions.

- **DO NOT** leave potentially combustible, flammable, explosive, or corrosive materials nearby where they could be exposed to the direct or reflected laser beam.
- **DO NOT** use or leave sensitive EMI equipment nearby. Ensure the area around the laser is free of strong electromagnetic interference during any use.
- **ONLY** use this machine for working the materials described in the Material Safety section of this manual. The laser settings and engraving process must be properly adjusted for specific materials.
- Ensure the area is kept free of other airborne pollutants, as these might pose a similar risk of reflection, combustion, etc.
- **DO NOT** modify or disassemble the laser and do not use the laser if it has been modified or disassembled by anyone except trained and skilled professionals. Do not modify or disable this device's provided safety features. Dangerous radiation exposure and other injuries may result from the use of adjusted, modified, or otherwise incompatible equipment.

2.4 Electrical Safety Instructions

- **ONLY** use this device with a compatible and stable power supply with less than 5% fluctuation in its voltage.
- **DO NOT** connect other devices to the same fuse, as the laser system will require its full amperage. Do not use standard extension cords or power strips. Use only surge protectors rated over 2000J.
- **ONLY** turn on the power to this device when it is well-grounded, either via a firm connection to a 3-prong outlet or via a dedicated grounding cable firmly connected to the proper slot on the cabinet. Do not use an ungrounded 3 to 2 prong adapter. The device's grounding should be checked regularly for any damage to the line or loose connections.
- The area around this laser engraving device should be kept dry, well ventilated, and environmentally controlled to keep the ambient temperature between 40–75°F (5–25°C). The ambient humidity should not exceed 70%.
- Do not handle the water pump or the water in which it is submerged while the pump is attached to its power supply. Place it in water before connecting it to power and disconnect it from power before removing it.
- Adjustment, maintenance, and repair of the electrical components of this device must be made **ONLY** by trained and skilled professionals to avoid fires and other malfunctions, including potential radiation exposure from damage to the laser components. Because specialized techniques are required for testing the electrical components of this marking system, it is recommended such testing only be done by the manufacturer, seller, or repair service.



- Unless otherwise specified, ONLY undertake adjustment, maintenance, and repair of the device when it is turned off and disconnected from its power supply.

2.5 Material Safety

- Users of this laser engraving machine are responsible for confirming that materials to be processed can withstand the heat of a class 4 laser and will not produce any emissions or byproducts either harmful to people nearby or in violation of local or national laws or regulations. In particular, do not use this device to process polyvinyl chloride (PVC), Teflon, or other halogen-containing materials under any circumstances.
- Users of this laser engraver are responsible for ensuring that every person present during operation has sufficient PPE to avoid injury from the emissions and byproducts of the materials being processed. In addition to the protective laser eyewear described above, this may require goggles, masks or respirators, gloves, and other protective outer clothing.
- DO NOT ever under any circumstances use this laser engraver if the exhaust system is not working properly. Always ensure that the exhaust fan can remove the dust and gas produced by the engraving process in accordance with all applicable local and national laws and regulations. Immediately stop use if the exhaust fan or vent pipe malfunctions.
- Users must exercise special caution when working with conductive materials as the buildup of their dust and ambient particles may damage electrical components, cause short circuits, or produce other effects, including reflected laser radiation.

This machine can be safely used with the following materials:

Plastics

- Acrylonitrile Butadiene Styrene (ABS)
- Nylon (Polyamide, PA, etc.)
- Polyethylene (PE)
- High-Density Polyethylene (HDPE, PEHD, etc.)
- Biaxially-Oriented Polyethylene Terephthalate (BoPET, Mylar, Polyester, etc.)
- Polyethylene Terephthalate Glycol (PETG, PET-G, etc.)
- Polyimide (PI, Kapton, etc.)
- Polymethyl Methacrylate (PMMA, Acrylic, Plexiglass, Lucite, etc.)
- Polyoxymethylene (POM, Acetal, Delrin, etc.)
- Polypropylene (PP, etc.)
- Styrene

Other

- Cardboard
- Ceramics, including Dishes, Tile, etc.
- Glass
- Leather
- Paper & Paperboard

- Rubber
- Stone, including Marble, Granite, etc.
- Textiles, including Cotton, Suede, Felt, Hemp, etc.
- Wood, including Cork, MDF, Plywood, Balsa, Birch, Cherry, Oak, Poplar, etc.

See §4.3 for the recommended parameters for the most commonly engraved materials. This machine **CANNOT** be used with the following materials or with any materials which include them:

- Artificial Leather containing Hexavalent Chromium (Cr[VI]), due to its toxic fumes
- Astatine, due to its toxic fumes
- Beryllium Oxide, due to its toxic fumes
- Bromine, due to its toxic fumes
- Chlorine, including Polyvinyl Butyral (PVB) and Polyvinyl Chloride (PVC, Vinyl, Cintra, etc.), due to its toxic fumes
- Fluorine, including Polytetrafluoroethylene (Teflon, PTFE, etc.), due to its toxic fumes
- Iodine, due to its toxic fumes
- Metals, due to their conductivity and reflectivity
- Phenolic Resins, including various forms of Epoxy, due to their toxic fumes
- Polycarbonate (PC, Lexan, etc.), due to its toxic fumes

For all other materials, if you are unsure about its safety or laserability with this device, seek out its material safety data sheet (MSDS). Pay special attention to information about safety, toxicity, corrosiveness, reflectivity, and reaction(s) to high heat. Alternatively, contact our support department for further guidance.

3. Installation

3.1 Overview

A complete working system consists of the laser engraving cabinet, its vent, a water tank (not included) with a pump (included), all applicable connection cables, and the laser and access keys. The cabinet can use designs provided by the enclosed engraving software by direct or internet connection with your computer; it can also engrave designs loaded directly from a flash drive. Users can configure other additional accessories that are not included (such as an industrial water chiller, fume extractor, or rotary axis) to suit their needs.



Use only the hardware, wiring, and power sources that came with or are compatible with this device. Installing equipment that your device is not designed to work with can lead to poor performance, shortened service time, increased maintenance costs, property damage, and personal injury.

Please note the specific requirements of your system's installation. Every customer must understand these notes before installation to execute a proper setup and achieve safe laser performance. If you have any installation questions or problems, contact our technicians and customer support team.

Any auxiliary equipment must be adjusted to the base machine. Queries may be directed to the dealer or manufacturer of such equipment.

3.2 Location Selection

Prior to assembling your laser engraver, select an appropriate location for its use. Be sure that it meets all of the requirements discussed in the Safety Information above. The location should be stable, level, dry, and climate-controlled to ensure an ambient temperature of 40–75°F (5–25°C) and an ambient humidity of under 70%. In particular, the temperature and humidity together should not be close to the dew point. It is also advisable to use a windowless room or to use blinds and/or curtains to avoid exposure to the potential additional heat of direct sunlight. The location should be free of dust and other airborne pollutants and well ventilated enough to process any fumes produced by the engraving process in accordance with all applicable laws and regulations.

Depending on the materials to be processed, this may require the construction of a dedicated ventilation system. It should be away from children, combustible, flammable, explosive, or corrosive materials, and sensitive EMI devices. The power cord should be plugged into a compatible and stable power source via a grounded 3-prong outlet. No other item should be drawing current from the same fuse. There should be fire-fighting equipment nearby, and the local fire department's phone number should be clearly displayed.

It is highly recommended to have an extra work table nearby in order to avoid placing objects on or directly adjacent to the machine, which could become a fire or laser hazard.

3.3 Unpacking Your Engraver

Your engraving machine arrives in a wooden crate with its accessories (including this manual) packaged inside the laser bay. You should have placed the crate in a spacious flat area for unpacking, ideally where you plan to operate the machine permanently. If you have not already done so, finish removing the crate from around your engraver. Once unpacked, the machine can be rolled into place.

Step 1. Fix it in place by pressing down on the brake pads on the two front wheels.

Step 2. Retrieve the access keys from the main bay in the front of the machine. Use them to unlock the laser bay in the rear and take out the accessories pack. Check that you have received all of the following: a power cord, a ground wire, USB and Ethernet cables, a USB flash drive with engraving software included, a water pump and water piping, an exhaust pipe with a hose clamp, a set of hex wrenches, a tube of silicone sealant, an acrylic focusing tool, a key, and this manual.

Step 3. Carefully remove the rest of the foam packaging material from around the laser tube, the viewing window, and the rest of the machine. The laser tube is a highly fragile object and should be handled delicately as little as possible.



Step 4. Inside the main bay, remove the nylon cable ties from the X-axis and the honeycomb table.



Step 5. You may keep the packaging in case of future return but, if you dispose of it or any accessories, be sure to do so in compliance with applicable waste disposal regulations.

3.4 Electrical Grounding

This device employs a class 4 laser. As discussed in the Safety Information above, it is high voltage and potentially dangerous, so users must securely ground it to avoid the buildup of static electricity. Using a standard 3-prong outlet will provide sufficient grounding. If you do not have access to a 3-prong outlet, you **MUST** use the grounding cable and ensure its proper connection. The far end of the cable should be securely connected to a metal rod driven at least 8 feet (3m) deep into soil located at least 5 feet (1.5 m) from the machine. The resistance along the line should be no greater than 5Ω.



Poor grounding **WILL** cause equipment failure and create a serious electrical shock hazard. The manufacturer and/or seller bear(s) no responsibility and assume(s) no liability for any damage, accidents, or injuries caused by bad grounding connections.

3.5 Water Cooling Installation



The provided water pump is essential to your engraver's performance and longevity. When this laser works without a properly maintained cooling system, its glass tube **WILL** explode from excess heat.



NEVER touch or adjust your engraver's water supply while the pump is connected to its power supply.

To install your pump, fill a dedicated tank with several gallons of distilled water. Using deionized or tap water will gradually degrade the quality of your engraver and may even cause dangerous mineral buildup in the cooling system. **NEVER** use antifreeze for the same reason.

Connect the two hoses that came with your engraver to the water inlet (marked "Water IN") and water outlet (marked "Water OUT") on the back of your engraver. Attach the other end of the inlet tube directly to your pump and completely submerge the pump in your water tank. Place the outlet tube into the tank in such a way that the returning water flows into the tank without splashing or other problems.



Connect the water pump to its power supply. For best results, use a power outlet on a separate fuse from the engraver itself. If no such outlet is available, the pump can also be plugged into a dedicated socket located on the side of the engraving cabinet. Once the pump is plugged in, water should begin to run through your machine and back into your tank. **ALWAYS** obtain visual confirmation that the water is flowing through the laser tube before starting your laser.

NEVER allow the water in the tank to become too hot to cool the laser. Install a thermal alarm or periodically check the water's temperature during prolonged use, ensuring it stays between 60-70°F (15-21°C). If the water begins to rise above 75°F (24°C) or drop below 50°F (10°C), replace it with new water. Either replace it in stages or turn off the laser during this process: never allow the laser to operate without a constant flow of cooling water. It is also possible to add sealed bottles of frozen water to your tank to keep the water cool but never allow the water to become ice cold itself, as this could shatter the heated glass CO₂ tube as well.

As an alternative to manually adjusting the water in your tank, you may also use an industrial water chiller (sold separately) to supply temperature-controlled water to your machine. We recommend the CW-5200 6L INDUSTRIAL WATER CHILLER FOR 50W-150W CO₂ LASER ENGRAVER MACHINES (not included). Follow its separate manual and plug it into a separate fuse from the engraver itself.



Outdoor Locations/Freezing Temperatures: We do not recommend using coolant or antifreeze in place of cooling water, as it can leave behind corrosive residues and solidify inside your hoses and laser tube, causing laser tube damage.

3.6 Exhaust System Setup

Install the provided exhaust pipe directly to the fan. The pipe can be expanded to a full length of about 5 feet (1.5 m).



The other end should be connected to a dedicated purifier or (if the fumes are not hazardous and meet local and national air safety standards) placed out a window. **NEVER** operate the laser if the vent is not purifying or removing the fumes produced by the target material. Research materials before use and never operate the laser on any (such as PVC, Teflon, and other halogen-containing substances) that can produce corrosive, hazardous, or even deadly fumes.

3.7 Main Power Connection

Confirm that the labeling beside the connection socket on the machine matches your power supply. Connect one end of the main cable to the connection socket and the other end to a grounded outlet. Under **NO** circumstances should you switch on the device if the voltages do not correspond.



Fluctuation along the line should be less than 5%. If this is exceeded, the fuses will blow. They are located in the connection socket and are accessible from the exterior. Similarly, do not connect this device to standard extension cords or power strips. Connect it directly to a grounded outlet or use a surge protector rated over 2000J.

3.8 Control Computer Setup

See the software manual for details on the requirements for the control computer. The control computer can be connected using the provided USB cable (via the port marked "PC"), using the provided Ethernet cable ("LAN"), or using the internet if the engraver has been connected to it using the Ethernet cable. If the control computer is directly connected to the engraver, it should not be placed more than 15 feet (4.5 m) away in order to avoid possible interference to the signal on its line. Familiarize yourself with the software's image design features and laser control settings before using it to operate the laser.

3.9 Initial Testing

Emergency Shutoff

Because of the danger posed by class 4 lasers, this engraver includes a large and easy-to-reach emergency stop button near the control panel. Press it down to stop the laser tube instantly.



When your engraver arrives, its e-stop is already pressed and must be pulled up to allow the laser to function. You should test that it works properly before conducting **ANY** other work with your machine. Start the water cooling system, place a piece of laserable scrap material on the workbed, close the cover, and press **PULSE** to fire the laser. Hit the emergency stop button and observe whether the laser stops instantly. If the laser continues to fire, the emergency stop is not working and must be replaced before the engraver can be used. Turn off the machine and contact customer service.

Cover Shutoff

Because of the danger posed by class 4 lasers, this engraver also shuts off the laser automatically when the protective cover is raised during operation.



After ensuring that the emergency stop button works, you should also test that the cover shutoff works properly before conducting any other work on your machine. Start the water cooling system, place a piece of laserable scrap material on the workbed, close the cover, and press PULSE to fire the laser. Release the button. Taking care not to expose yourself to seeing or being hit by any possible reflected laser light, open the cover as little as possible and attempt to fire the laser again. If the laser fires, the automatic shutoff is not working and must be repaired before the engraver can be used. Turn off the machine and contact customer service.

Water Shutoff

Because of the danger posed by an uncooled laser tube, this engraver also shuts off the laser automatically when the water cooling system malfunctions.

After ensuring that the emergency stop button and cover protection both work, you should also test that the water shutoff works properly before conducting any other work on your machine. Start the water cooling system, place a piece of laserable scrap material on the workbed, close the cover, and press PULSE to fire the laser. Release the button. Cut off the flow of water by crimping or tying the two hoses. (Take care not to damage the hoses themselves in this procedure.) Attempt to fire the laser again. If the laser fires, the automatic shutoff is not working and must be repaired before the engraver can be used. Turn off the machine and contact customer service. If the laser does not fire, the automatic shutoff is working fine; simply release the two hoses to begin circulating water again and continue setting up your engraver.

Laser Path Calibration

Although our factory calibrates your entire system during assembly, it is possible for the laser tube, the focus lens, and/or one or more of the mirrors to be jostled out of alignment during shipment. As such, it is recommended that you perform an optical alignment test as part of setting up your machine.

Air Assist

Your air-assist should arrive pre-installed and correctly wired. Simply check that it is correctly configured and connected as shown. If any tubing or wiring needs to be reconnected, shut off all power to the machine (including by pressing the emergency stop) before adjusting anything.



3.10 Security Setup

For your own safety and that of passersby, this engraver can be locked shut using the provided key. It is recommended that you use it to lock the machine between sessions, preventing any unauthorized operation of the machine.

4. Operation

4.1 Overview



Operate this laser marking machine only in accordance with all the instructions provided in this manual. Failure to follow the proper guidelines detailed here can result in property damage and personal injury.

This section will address only some of the options and features provided by the operation software. Before beginning to use the machine, make sure that you have read this entire manual (particularly the Safety Information above), the separate software manual, and any and all warnings provided on the machine itself.

4.1 General Instructions

Step 1. Create your design that you'd like to engrave. You can do this directly in your engraving software or use any other graphics program, saving or converting the file to a format compatible with the engraver. See the full list of acceptable file types in the Technical Specifications section above.

Step 2. Check that your water cooling system is in proper working order. Visually confirm cooling water flow through the laser tube either by opening the top rear door to look at the laser tube itself or

by observing that water is entering the machine and returning to the tank through the outlet tube. If the laser tube is examined directly, remember to close its access door before continuing. Add more distilled water to the cooling water tank if necessary.

Step 3. Turn on your fume extractor or ventilation system, if any. (The engraver's own exhaust fan will turn on with the machine.)

Step 4. Pull up the emergency stop button and turn on the engraver's control panel using its switch on the side of the cabinet. Load your chosen design directly from a USB flash disk or through your computer's connection with the engraver.

Step 5. Open the engraver's cover and adjust the workbed if necessary. The honeycomb bed is recommended for most applications. The bed can be raised or lowered using the control panel or the manual adjustment knob to accommodate different widths of different materials.

Step 6. Place a sample piece of your material on the workbed. The standard location is in the top left corner of the workbed. This can be changed by moving either your design or the location of the engraver's origin using either the control panel or your engraving software.



DO NOT insert anything onto the workbed through the pass-through doors other than the material while the laser is active. Pay special attention to the fumes and dust that may be released through these doors. Be sure that your ventilation system is strong enough to pull in all by-products or wear the necessary PPE to ensure the health of users and passers by.

Step 7. Focus the laser by using the control panel's autofocus feature or by placing the acrylic focus tool on top of the material and carefully raising the workbed. The laser head should barely touch the top of the acrylic tool without applying any pressure, ensuring the engraving distance is correct. (Again, never attempt to focus the laser either way without some material on the workbed.) Close the cover.

Step 8. Customize your design's contrast and engraving depth by adjusting the parameters in your engraving software or directly through the control panel. If your engraving instructions detail the power setting in milliamperes, use the following conversion chart to find the appropriate power setting:

Power	10	20	30	40	50	65-75	80	90	100
Current	3mA	6 mA	10 mA	12 mA	15 mA	18 mA	23 mA	25 mA	28 mA

The threshold for the lowest setting is 10%. The laser will not fire at any setting lower than this. It is **NOT** recommended to use the laser tube at full capacity, especially for extended periods. The recommended maximum power setting is 70%, as prolonged use above that amount will shorten your laser's service life. To increase engraving depth, increase the amount of energy per unit area by increasing the laser's power or the number of loops or by slowing down the speed parameter. Engraving too deep, however, reduces image quality, especially for coated materials.

When working with new materials, remember that you should always start on the low end of likely settings. If the effect is not yet strong enough, you can always rerun the design loop several times or rerun it with more powerful settings until you create the effect that you want.

Resolution should usually be set to 500 dots per inch. Reducing your image resolution can be helpful in some cases, reducing flaming and increasing the energy of the pulse in a way that improves the quality of the resultant image in some materials, such as some plastics.

Step 9. Turn on the laser tube using its separate switch on the side of the cabinet. To reduce the risk of electric shock, once the laser tube is on, try to touch the engraver with only one hand at a time.

Step 10. Press **START-PAUSE** to engrave your design. Again, do not stare continuously at the laser, even through the protective acrylic window. Watch for possible issues like sparks or fires, however, and be prepared to quickly extinguish a fire if necessary.

Step 11. Once the laser has stopped, examine the quality of your first run and adjust the laser parameters on the control panel or in your software as necessary to create the desired effect.

Step 12. When you have finished engraving, close your engraving software and then turn off your machine in the following order: laser power supply, control panel, any ventilation device, the water cooling system, and the emergency power button.

Step 13. Fully clean the workbed and empty the waste bin.

Step 14. For best results, lock and disconnect your laser engraver from its power supply between uses. Unplug it or turn off its intermediary surge protector.

4.3 Instructions for Specific Materials

The following instructions are suggestions to help speed safe work with a range of materials. The user should research the specific safety and engraving requirements of their specific material to avoid the risk of fire, hazardous dust, corrosive and poisonous fumes, and other potential problems. Once the product is known to be safe or appropriate protective equipment has been set up, it can help engrave a test matrix of small boxes produced at various speed and power settings to discover the ideal settings for your design. Alternatively, start with low power and fast speed settings and rerun your design as many times as needed, using progressively greater laser intensity.

These are the average settings to start off with and are focused on using low power settings to conserve laser tube life. Run sample tests first. Depending on your desired finish and look, you will have to adjust the settings accordingly.

Remember the power/speed ratio correlation: the more you increase the speed, the less power is focused on the area. For example, if you want a darker engraving, you don't always have to increase power; you can slow down the speed. The same applies to cutting — if your settings didn't produce an adequate cut, reduce the speed. If you want to increase speed, you will also have to slightly increase power. **This power/speed ratio correlation is the fundamental basis of engraving and cutting.**

To achieve maximum laser tube lifetime, we don't recommend surpassing 70% max power for any project. If your machine is well-tuned and the software settings are correct, you can achieve the desired cuts or engraving quality with no more than 50-60% max power. Constantly running your machine above 70% max power or above 20 amps will shorten the lifespan of your laser tube.

Average Engraving Settings of Various Materials

Wattage	Parameter Settings	Clear Acrylic	Wood	Glass	Leather	Faux Leather	Tile/Stone
50W-55W	Speed	275 mm/s	150 mm/s	175 mm/s	350 mm/s	375 mm/s	125 mm/s
	Power	22 %	21 %	19 %	19 %	18 %	20 %
60W	Speed	300 mm/s	180 mm/s	200 mm/s	375 mm/s	400 mm/s	145 mm/s
	Power	20 %	20 %	19 %	17 %	16 %	19 %
80W	Speed	325 mm/s	200 mm/s	225 mm/s	400 mm/s	425 mm/s	145 mm/s
	Power	18 %	19 %	18 %	16 %	15 %	18 %

Ceramics

When engraving on ceramics, generally use moderate to high power. Using more loops rather than higher power and lower speed can help avoid cracking the material during work. Be mindful of the health risk posed by dust generated from ceramic engraving, especially for repetitive industrial applications. Depending on the material and the amount of work, a fan or even full ventilation system may be required to address the problem. Similarly, operators and others in the work area may need to use breathing PPE such as masks and respirators.

Glass

When engraving glass, generally use high power and low speed. As with ceramics, it can be helpful to run more loops at lower settings to avoid cracks. Care must be taken when engraving fiberglass and carbon fiber to avoid combinations of settings that produce a laser intensity great enough to damage the structural integrity of its component fibers, producing blurry marking. PPE should be worn to avoid exposure of the eyes, nose, mouth, and skin to the dust produced by working with either material, especially for repetitive industrial applications. Clothing worn while working with fiberglass should be washed separately afterward.

Leather

When engraving leather products, generally use low to moderate power at high speed. Be especially attentive to the possibility of fire, as well as the dust produced in repetitive applications.

Average Cutting Settings for Leather of Various Thicknesses

Wattage	Parameter Settings	1/16 in	1/8 in	1/4 in	1/2 in
50w	Speed	20 mm/s	12 mm/s	3 mm/s	N/A
	Power	23 %	30 %	32 %	
55w	Speed	20 mm/s	12 mm/s	3 mm/s	N/A
	Power	23 %	30 %	32 %	
60w	Speed	20 mm/s	13 mm/s	4 mm/s	N/A
	Power	20 %	28 %	35 %	
80w	Speed	25 mm/s	18 mm/s	6 mm/s	4 mm/s

	Power	18 %	28 %	32 %	40 %
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Metal

CO₂ laser engravers should not be used for marking, engraving, or cutting metal. They are best suited for working coatings applied to a metal base, and care must be taken not to attempt work on the underlying metal itself. A variety of coatings specialized for CO₂ engraving are available, and the user should follow the instructions provided as the parameters vary from product to product and metal to metal. Generally, work on aluminum coatings should be done more quickly at lower power, and work on steel coatings can be done more slowly at higher power.

Paper and Cardboard

When engraving various paper products, generally use low to moderate power and fast speed. Test samples from each batch as only small parameter differences can separate effects that are too light from those that burn through the substrate. As with leather, be especially attentive to the possibility of fire, as well as the dust produced in repetitive applications.

Description		Cutting Thickness of Paperboard				
		0.3mm	0.5mm	1mm	1.5mm	2mm
60W	Power	8 mA	10 mA	12 mA	15 mA	15 mA
	Speed	300mm/s	300mm/s	200mm/s	200mm/s	160mm/s
80W	Power	8 mA	10 mA	13 mA	18 mA	16 mA
	Speed	400mm/s	400mm/s	300mm/s	300mm/s	200mm/s
100W	Power	6 mA	8 mA	12 mA	12 mA	16 mA
	Speed	120mm/s	120mm/s	130mm/s	130mm/s	100mm/s

Plastics

Plastics for engraving are available in many different colors and thicknesses and with many different coatings and surfaces. The majority of available plastics can be well engraved and cut with the laser. Plastics with a microporous surface seem to give the best result because less surface material needs to be removed. When engraving plastics, generally use low power and high-speed settings. Marking and engraving with too much power or at too low a speed can concentrate too much energy at the point of contact, causing the plastic to melt. Among other problems, this may produce poor engraving quality, noxious fumes, and even fires. High-resolution engraving can cause the same problem, so medium to low-resolution designs should be preferred for most plastics.

Average Cutting Settings for Plexiglass Acrylic of Various Thicknesses

Wattage	Parameter Settings	1/16 in	1/8 in	1/4in	1/2in	3/4in	1in
50w	Speed	20 mm/s	9 mm/s	4 mm/s	2 mm/s	N/A	N/A
	Power	20 %	25 %	45 %	50 %		
55w	Speed	20 mm/s	11 mm/s	4 mm/s	2 mm/s	N/A	N/A
	Power	20 %	25 %	44 %	49 %		

60w	Speed	20 mm/s	11 mm/s	5 mm/s	3 mm/s	2 mm/s	N/A
	Power	20 %	25 %	37 %	48 %	58 %	
80w	Speed	25 mm/s	12 mm/s	6 mm/s	4 mm/s	3 mm/s	1 mm/s
	Power	18 %	25 %	35 %	45 %	55 %	60 %

Rubber

The various compositions and densities of rubber cause slightly varying engraving depth. Testing various settings on sample pieces of your specific rubber is highly recommended for the best results. When engraving rubber, generally use a consistently high power setting and create your effects by varying the laser's speed. Microporous rubber materials require a significantly higher speed than standard rubber. Engraving any kind of rubber produces a considerable amount of dust and gas. Depending on the amount of work, breathing PPE and/or a full ventilation system may be required to address the problem.

Description		Cutting Thickness of Rubber		
		3mm	5mm	10mm
60W	Power	23mA	23mA	
	Speed	12mm/s	4mm/s	
80W	Power	23mA	23mA	
	Speed	15mm/s	8mm/s	
100W	Power	28mA	28mA	
	Speed	30mm/s	30mm/s	

Stone

When engraving various kinds of stone, generally use moderate power and moderate to fast speed. As with ceramics and glass, be mindful of the dust created (especially for repetitive industrial applications) and take similar measures to ensure the safety of users and others in the work area.

Textiles

When engraving textiles like cloth and fleece, generally use low power and fast speed. As with leather, be especially attentive to the possibility of fire and dust.

Description		Cutting Thickness of Cloth	
		0.3mm	0.5mm
60W	Power	10mA	12mA
	Speed	50mm/s	40mm/s
80W	Power	8mA	10mA
	Speed	70mm/s	60mm/s
100W	Power	6mA	8mA
	Speed	150mm/s	140mm/s

Wood

As with rubber, there is a huge variety of woods and testing your specific material is essential to get the best results. In general, wood with consistent grain and coloring engraves more evenly. Knotted wood produces uneven effects, while resinous wood produces greater edge contrast. Some softwoods like balsa, cork, and pine engrave well (albeit with low contrast) at low or moderate power settings and high speed. Others like fir suffer from uneven fibers that usually produce a poor effect no matter what you do. Hardwoods like cherry and oak engrave well at high power settings and low speed. Manufactured wood products can vary from brand to brand, mostly based on their glue composition and abundance. **MDF** works well but creates dark edges when cut.

In addition to the risk of fire with any wood product, extra care must be taken with the fumes from the glue used in plywood and other manufactured woods. Some are too dangerous to work with at all, while others require careful ventilation and the use of breathing PPE for repetitive industrial applications. Wood toxicity should also be examined, as the dust from some natural woods including oleander and yew can also cause nausea and cardiac problems in high enough amounts.

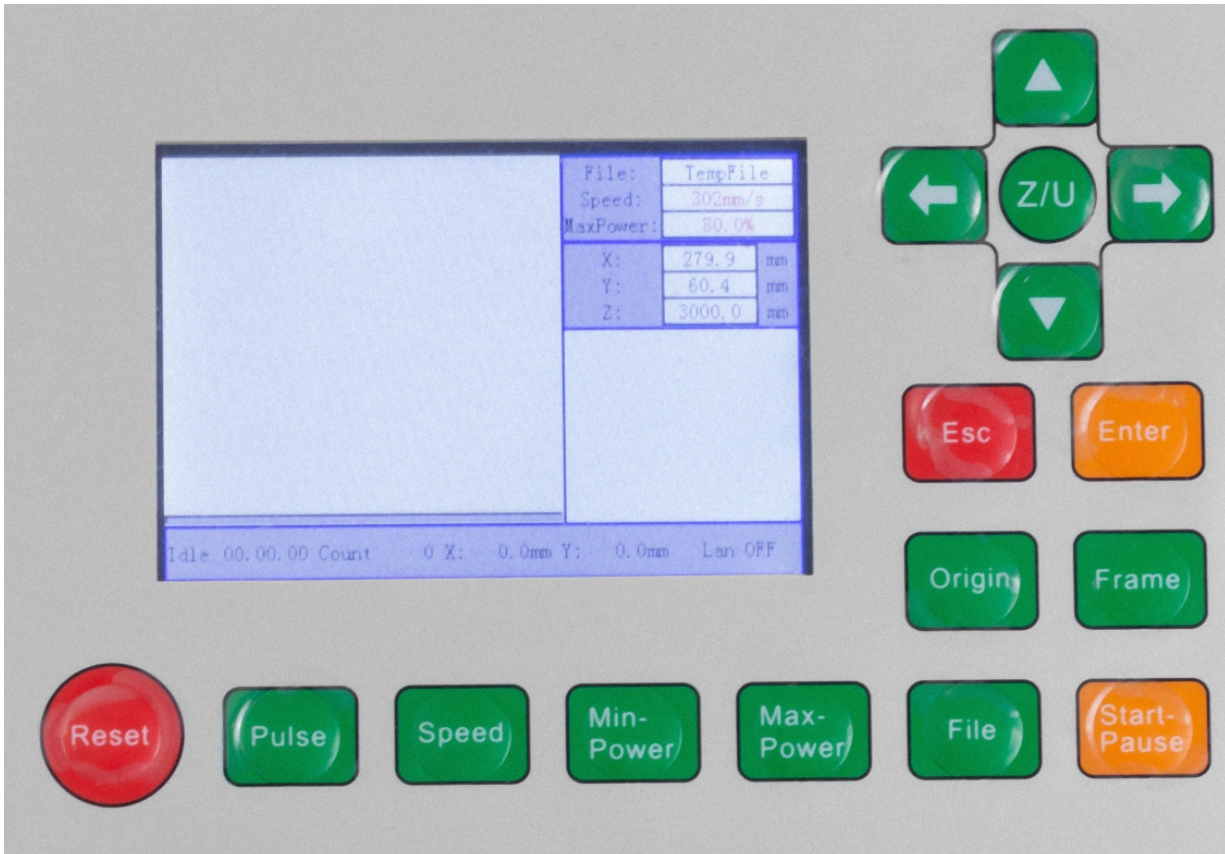
Average Cutting Settings for Baltic Birch Plywood of Various Thicknesses

Wattage	Parameter Settings	1/16 in	1/8 in	1/4in	1/2in	3/4in	1in
50w	Speed	15 mm/s	10 mm/s	5 mm/s	3 mm/s	N/A	N/A
	Power	20 %	26 %	37 %	47 %		
55w	Speed	17 mm/s	12 mm/s	5 mm/s	3 mm/s	N/A	N/A
	Power	20 %	25 %	35 %	46 %		
60w	Speed	16 mm/s	12 mm/s	6 mm/s	4 mm/s	2 mm/s	N/A
	Power	20 %	25 %	32 %	45 %	50 %	
80w	Speed	25 mm/s	12 mm/s	7 mm/s	5 mm/s	4 mm/s	3 mm/s
	Power	20 %	25 %	30 %	35 %	43 %	47 %

4.4 Control Console Instructions

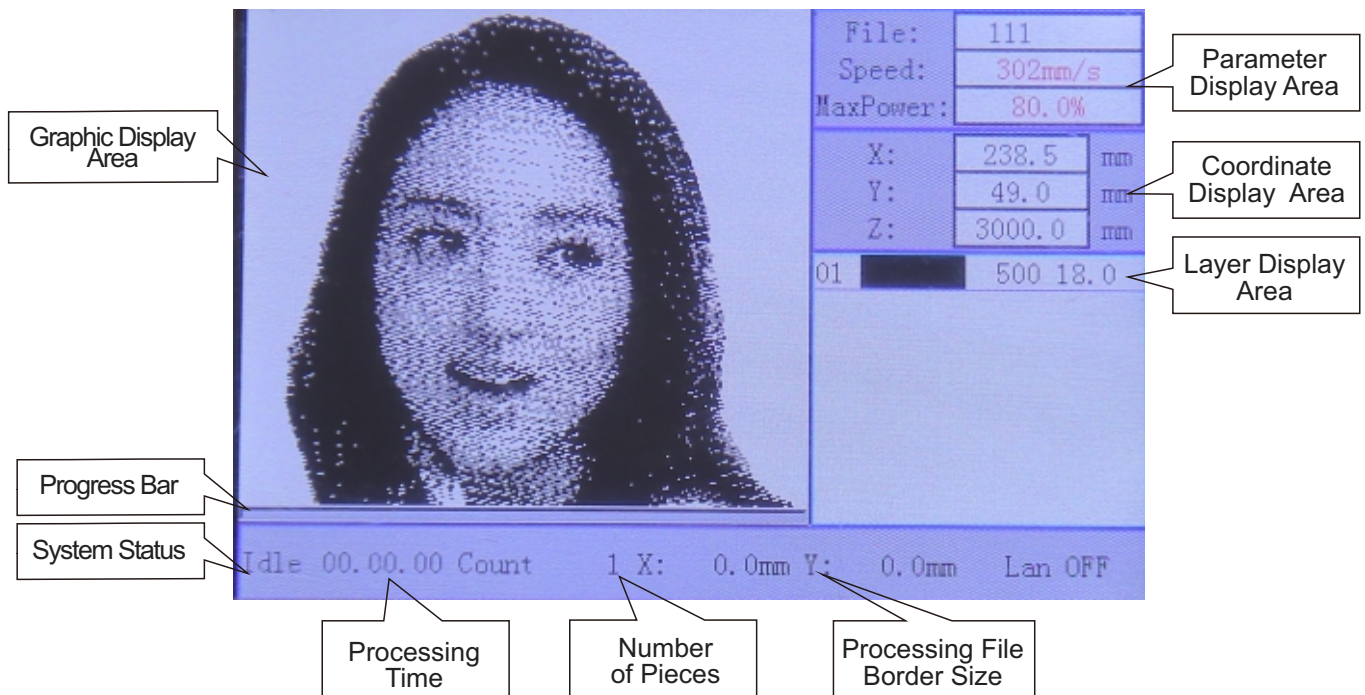
4.4.1 Overview

You can control your engraver directly from the built-in control panel, through a direct connection with your computer, or over the internet. For details on operating your engraving software, see its separate manual. The built-in control panel can operate the laser manually or engrave designs loaded onto flash drives and external hard drives connected to the USB port on the right side of the cabinet.



For manual operation, the arrow keys can be used to move the laser head along the X and Y-axis guide rails and the **PULSE** button can be used to fire the laser. The laser head can be set to tab over a set distance each time the arrow buttons are pressed by hitting **Z/U** and adjusting the parameters under “**Power Set+.**” The laser can be set to fire for a fixed period by pressing **Z/U** and adjusting the parameters under “**Power Set+.**” All of the buttons and menus should be labeled in English. If they are not, press **Z/U** and go to the top button in the right column to change the console's language settings.

To load a design from a FAT16 or FAT32 formatted flash disk or external hard drive, press **Z/U**, select “File”, then “Udisk+” and then “Copy to Memory”. Select the design in the File menu and then select “Run”. Various parameters can be adjusted using the console's menus and submenus, including setting multiple origin points to engrave the design on your material four times in single session.



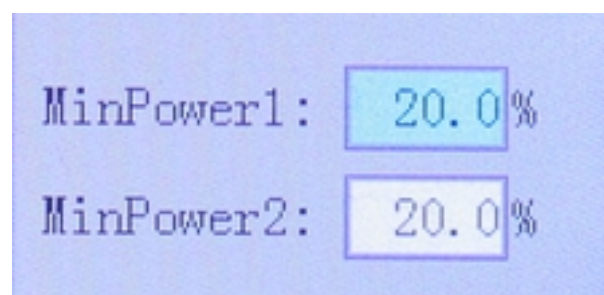
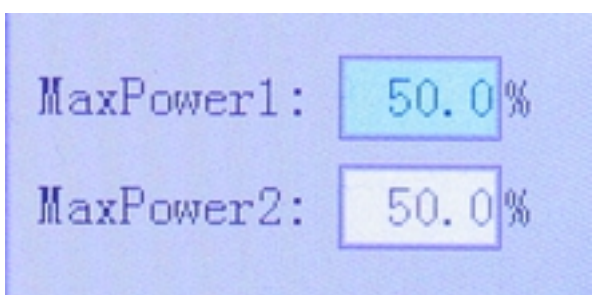
When running a design from the control console, this will be the main display. The design should appear in the top left corner and its name and the current speed and power settings on the top right. The position of the laser head relative to the workbed appears as the X (horizontal) and Y (vertical) coordinates. The Z coordinate shows the elevation of the workbed itself. Below them are the layers with notes about their separate speeds in mm/s and their maximum power as a % of your machine's rated power. The batch count on the lower left keeps track of the number of times the current design has been engraved in a single session. Like the button says, press **START/PAUSE** to start engraving your loaded pattern and to pause engraving when needed.



If there is ever an emergency situation such as a fire, do not use the control panel to pause or stop the engraving. Hit the emergency stop button immediately.

4.4.2 Setting the Laser Power

When you press Ent in the main interface, the cursor box will initially select the “Speed” parameter, as shown in the figure below:



Push the ▲ and ▼ keys to change between the parameters. Select the “Power” parameter, as shown below:

File:	TempFile	
Speed:	300mm/s	
MaxPower:	50.0%	
X:	0.0	mm
Y:	0.0	mm
Z:	3000.0	mm

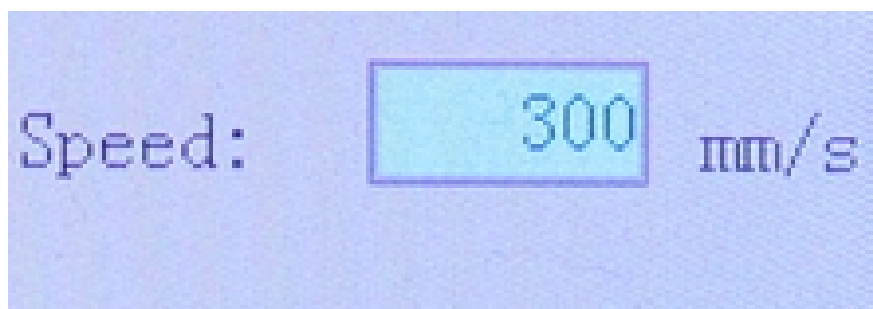
Press Ent while the red cursor is on “Power” and the following interface pops up:

MinPower(%)-1	30.0
MaxPower(%)-1	40.0

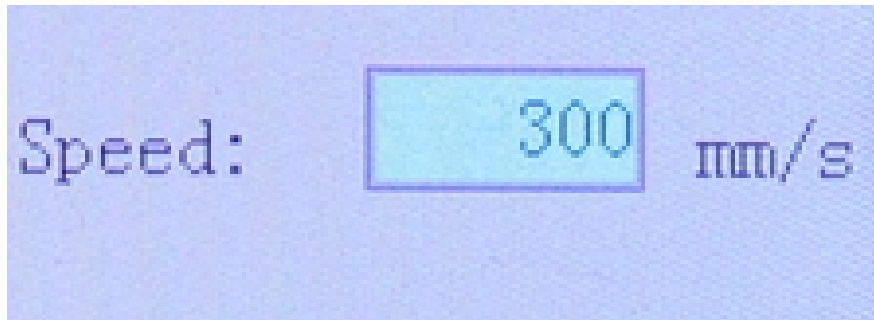
Push the ▲ and ▼ keys to change the parameter value. Press Ent to save the change. Press Esc to invalidate the change and return to the main interface.

4.4.3 Setting the Laser Speed

When you press Ent in the main interface, the cursor box will initially select the “Speed” parameter, as shown in the figure below:



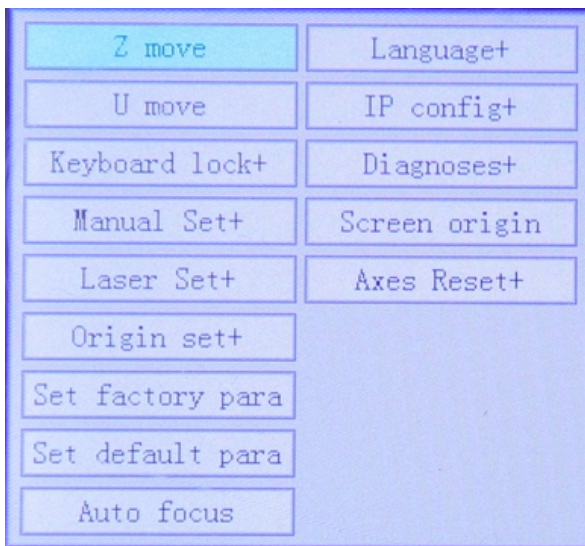
Press Ent key again and the following interface pops up



Push the ▲ and ▼ keys to change the parameter value. Press Ent to save the change. Press Esc to invalidate the change and return to the main interface.

4.4.4 Function Z/U

Press **Z/U** on the main interface to enter the Menu interface:



Push the ▲ and ▼ keys to select items, and then press ENTER to enter the corresponding sub-menu

4.4.5 Adjusting the Z Axis

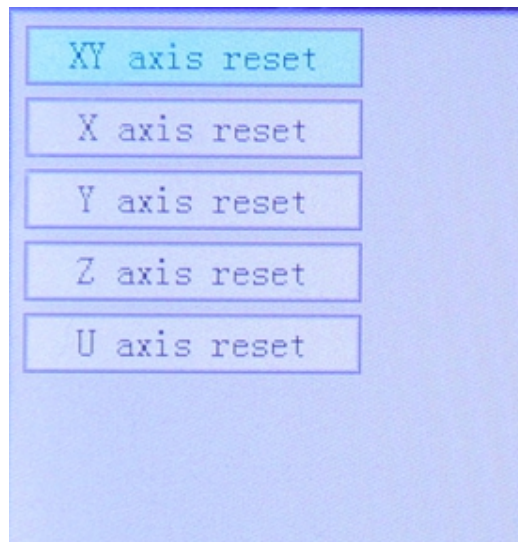
When Z Move is selected, push □ or □ to control the movement of the Z axis.

4.4.6 Adjusting the U Axis

When U Move is selected, push □ or □ to control the movement of the U axis.

4.4.7 Resetting the Axes

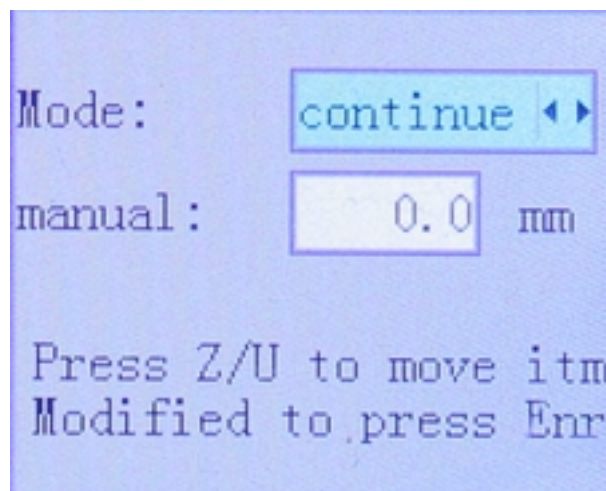
When Axis Reset+ is selected, push Ent and the display will show:



Push ▲ or ▼ to select an item. Press **Ent** to start the resetting of the selected axis, and the message “Resetting Is Underway” will show on the screen. Upon completion, the message will automatically disappear and the system will return to the main interface.

4.4.8 Adjusting the Laser Movement Mode

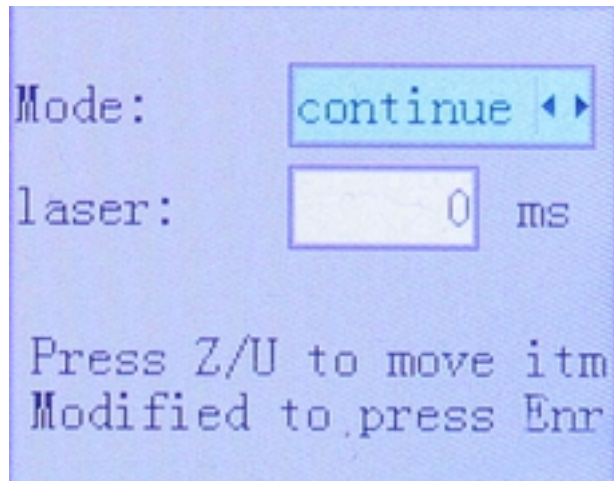
When Manual Set is selected, press **Ent** and the following will be displayed:



When the Move Mode is “continuous”, the Manual jog parameter has no effect. When used to manually move the laser head, the direction keys move it continuously until released. When the Move Mode is “jog”, each time the direction key is pressed the laser head will move precisely the distance saved in this parameter. Adjust it up or down with the direction and Ent keys. When you finish your adjustments, save them by selecting Write with the Ent key or hit Esc to leave without saving your changes. Read can load saved parameters.

4.4.9 Adjusting the Laser Settings

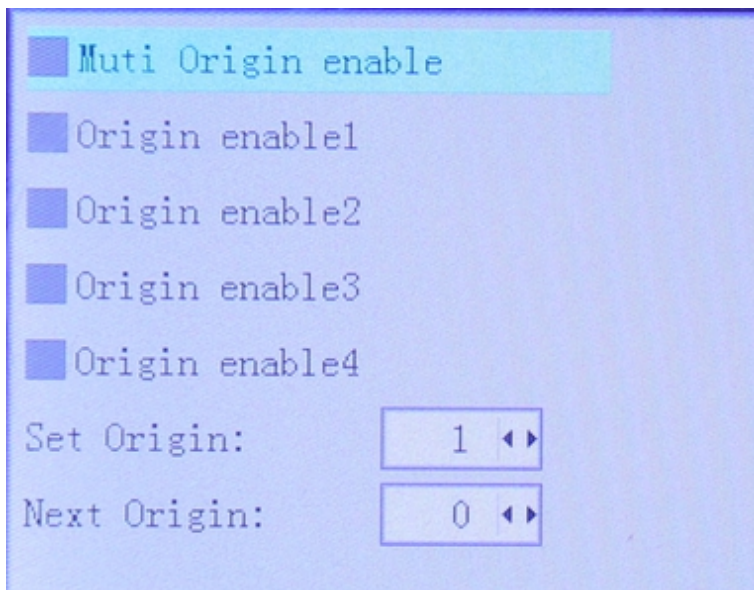
When Laser Set is selected, press Ent and the display will show:



The operation method is the same as the previous setting. When Continue is selected, press PULSE to fire the laser, and release the key to finish firing. When you finish your adjustments, save them by selecting Write with the **Ent** key or hit **Esc** to leave without saving your changes. Read can load saved parameters.

4.4.10 Setting the Origin Points

When pressing the box is on Origin Set, press **Ent**, and the following dialogue box will pop up:



Press **FN** to select an item. When Multi Origin Enable is selected, press **Enter** to enable or disable the item. When enabled, the small box will be red and, when disabled, the small box will be grey. When selecting Set Origin or Next Origin, push or to select the value. When changing the parameters of Set Origin, remember to press **Enter** to validate the change. Parameters will be saved automatically when the interface is closed.

Details of each item are shown below:

- **Multiple Origins Enable:** Yes or No can be selected. If you select no, the system will use single-origin settings. You can press **Origin** and set the origin. If you select Yes, the system will

use the multiple-origin settings, and **Origin** on the keyboard becomes invalid. In this case, the parameter of each origin must be set in the menu as follows.

•**Set Origin 1/2/3/4:** After the multiple-origin setting is enabled, put the cursor on Set as Origin 1/2/3/4. Press Enter on the keyboard and the system will take the coordinates as the corresponding ones of the origin 1/2/3/4.

•**Origin Enable 1/2/3/4:** After the multiple-origin setting is enabled, the four origins can also be individually disabled and enabled.

Once multiple-origin logic is selected, if the number of the next origin is 1 and four origins are enabled, when the memory file function is started (via the keyboard or PC) or the processing file is uploaded into the PC and this file selects "Take the Original Origin as the Origin", the work will use different origins each time it starts. The rotation order of origins is 1→2→3→4→1→2... If the processing file is uploaded to the PC and this file selects "Take the Current Origin as the Origin", the system will always use the current origin.

4.4.11 Setting Default Parameters

When Set Fact. Para., the current parameters of the machine will be stored as its defaults. They can then be retrieved by using the Restore Default Parameters command. It is recommended that you save your machine's actual factory default settings, so they can be easily restored when need be.

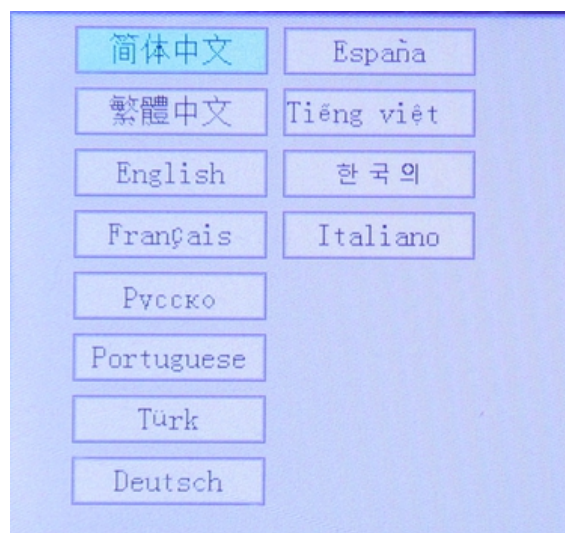
If a password is enabled, push or and ▲ or ▼ to select a password and press ENTER to save it.

4.4.12 Restoring Default Parameters

When Def. Fact. Parameters is selected, the system will replace all current parameters with the saved default factory parameters. The operation method is the same as setting the default parameters.

4.4.13 Setting the Interface Language

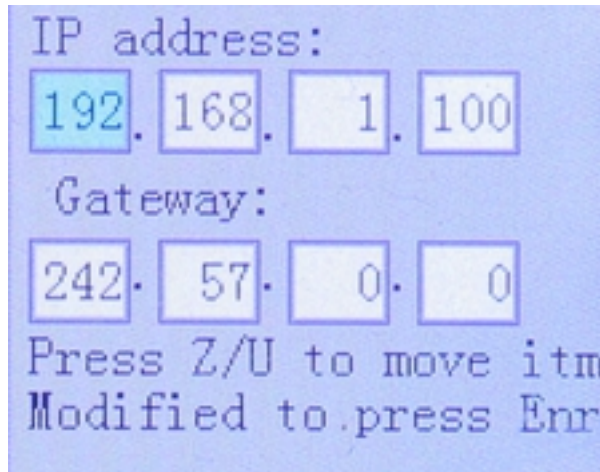
When Language is selected, press Ent and the display will show:



The operation method is the same as those described above. Press Ent when the desired language is selected and then return to the main interface.

4.4.14 Setting the Machine's IP Address

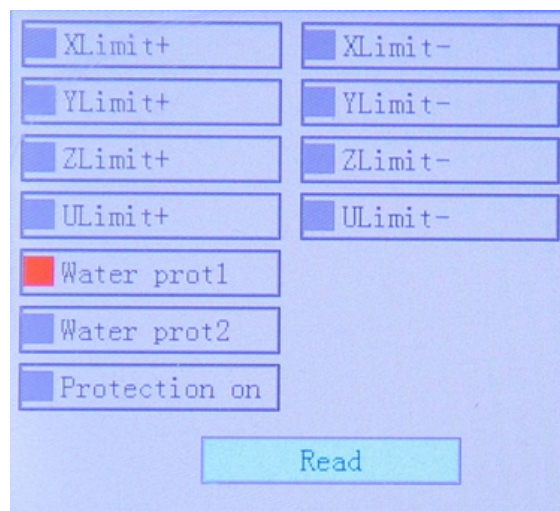
When IP Setup is selected, press ENTER and the display will show:



Push or and or and Ent keys to change the parameters. When you finish your adjustments, save them by selecting Write with the Ent key or hit Esc to leave without saving your changes. Read can load saved parameters.

4.4.15 Diagnostic Tools

When the Diagnoses is selected, the following dialogue box will pop up:



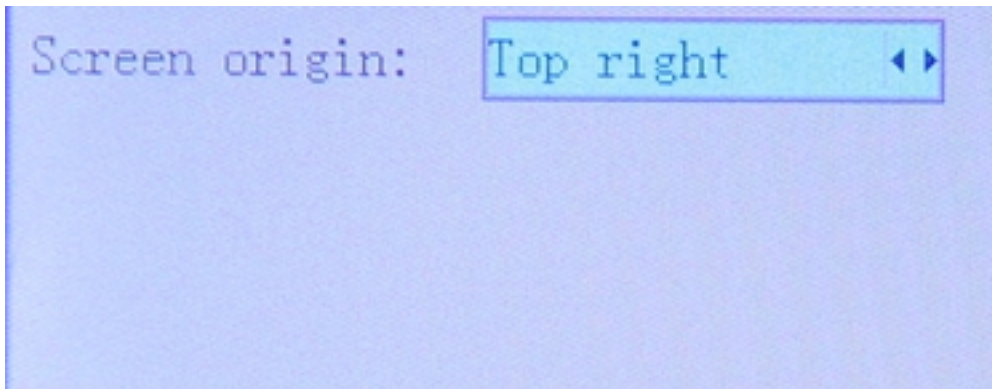
This interface displays the system's hardware I/O port information: trigger normal

INPUT: Reads the system's hardware information. When the hardware signal is triggered, the small box to the left of the corresponding entry will be displayed in red. Otherwise, it will be displayed in gray.

OUTPUT: Select an output with the cursor. Press **Ent** to switch the output state or **Esc** to return to the main menu without any changes.

4.4.16 Setting the Screen Reference

When Screen Origin is selected, the following dialogue box will pop up:



This interface shows the position of the origin. Different origin positions can generate different reflections of the graph over the X/Y axis. The operation method is the same as described above.

4.4.17 Adjusting Engraving Layers

When the system is idle or the work is finished, press Enter to enter the layer parameter section. Push ▲ or ▼ to select the intended layer. Press Enter to check the selected layer's parameters as shown below:

Layer	Mode	Output	Hide
BMP	Laser Scan	Yes	No

Color	
Speed(mm/s)	500.00
MinPower(%)-1	30.0
MaxPower(%)-1	40.0
Priority	1

The red cursor will be on "Layer" by default. Push the ◀ and ▶ keys to select the intended layer. Move the cursor to Write and press **Ent** to save the parameter change or **Esc** to exit without saving. The operation method is the same as that of the max/min power setting.

4.4.18 Adjusting Movement Parameters

In the Para Setting submenu, select Movement Parameters to display the following interface.

<input type="checkbox"/> Cut parameters	
Idle speed(mm/s)	200.000
Idle Acc(mm/s ²)	3000.000
Start speed(mm/s)	20.000
Min Acc(mm/s ²)	400.000
Max Acc(mm/s ²)	3000.000
Idle Delay(ms)	0.000
Acc factor(0%-200%)	100
GO Acc factor(0%-200%)	100
Speed factor(0%-200%)	100
Key setting	

Select and adjust the parameters by pushing the arrows. When you finish your adjustments, move the cursor to Write and press **Ent** to save the parameter change or **Esc** to exit without saving. Read can load saved parameters.

4.4.19 Setting the Frame Parameters

In the Para Setting submenu, select Frame Setting to display the following interface:

<input type="checkbox"/> Go Scale para	
Go scale mode	Close laser
Go scale blank(mm)	100

Select and adjust the parameters by pushing the arrows. When you finish your adjustments, move the cursor to Write and press **Ent** to save the parameter change or **Esc** to exit without saving. Read can load saved parameters. Start cutting frame will cut the frame according to the current parameters.

4.4.20 Setting the Blow Parameters

In the Para Setting submenu, select Blow Setting to display the following interface:

Auxi.air mode:	<input type="text" value="Blow When laser"/>	
Open auxi.air delay:	<input type="text" value="10.0"/>	ms
Close auxi.air delay:	<input type="text" value="10.0"/>	ms
<input type="button" value="Read"/> <input type="button" value="Write"/>		

Select and adjust the parameters by pushing the arrows. When you finish your adjustments, move the cursor to Write and press **Ent** to save the parameter change or **Esc** to exit without saving. Read can load saved parameters.

4.4.21 Adjusting Reset Speeds

In the Para Setting submenu, select Speed Setting to display the following interface:

XY Reset speed:	<input type="text" value="300"/>	mm/s
U Reset speed:	<input type="text" value="200"/>	mm/s
U work speed:	<input type="text" value="100"/>	mm/s
Manual fast:	<input type="text" value="100"/>	mm/s
Manual slow:	<input type="text" value="10"/>	mm/s
<input type="button" value="Read"/> <input type="button" value="Write"/>		

Select and adjust the parameters by pushing the arrows. When you finish your adjustments, move the cursor to Write and press **Ent** to save the parameter change or **Esc** to exit without saving. Read can load saved parameters.

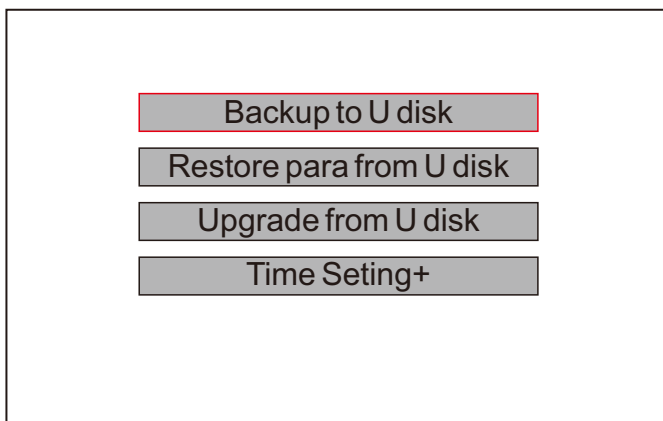
4.4.22 Adjusting the Machine's Configuration

In the Para Setting submenu, select Machine Config to display the following interface:

Push the ▲ and ▼ keys to select items. When the blue cursor is on the intended item, press Ent to enter the corresponding interface.

4.4.25 Backing Up & Restoring Parameters

In the main menu, select Controller Setup to display the following screen:



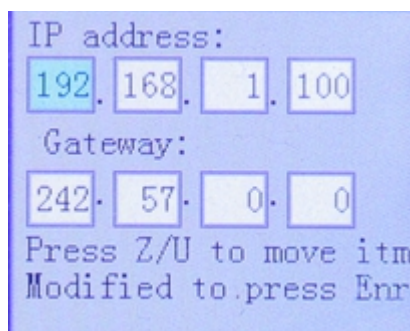
Backup to U Disk: Saves current parameters to a USB flash drive.

Restore Para from U Disk: Restore saved parameters from a flash drive.

Upgrade from U Disk: Upgrades the controller software from a flash disk.

4.4.26 Setting the Machine's Date and Time

In the controller Set submenu, select Time Setting+ to display the following interface:



Select and adjust the parameters by pushing the arrows. When you finish your adjustments, move the cursor to Write and press **Ent** to save the parameter change or **Esc** to exit without saving. Read can load saved parameters.

Reset to origin:	<input type="text" value="YES"/>
Return position:	<input type="text" value="Origin pos"/>
Origin on overscale:	<input type="text" value="NO"/>
U Focus distance:	<input type="text" value="100"/> mm
<input type="button" value="Read"/> <input type="button" value="Write"/>	

Select and adjust the parameters by pushing the arrows. When you finish your adjustments, move the cursor to Write and press **Ent** to save the parameter change or **Esc** to exit without saving. Read can load saved parameters.

4.4.23 Adjusting Rotary Axis Parameters

In the Para Setting submenu, select Rotate Function Setting to display the following interface:

Enable rotary Func:	<input type="text" value="YES"/>
PPR:	<input type="text" value="50"/>
Diameter:	<input type="text" value="10.0"/> mm
<input type="button" value="Read"/> <input type="button" value="Write"/>	

Select and adjust the parameters by pushing the arrows. When you finish your adjustments, move the cursor to Write and press Ent to save the parameter change or Esc to exit without saving. Read can load saved parameters.

4.4.24 Setting an Interface Password

When the cursor is on Panel Lock, press Ent, and the following dialogue box will pop up:

<input type="button" value="Password Set"/>
<input type="button" value="Keyboard locked"/>

4.4.27 Authorization Management and Keyboard Layout

When the user first buys this product from our company, the product should be authorized. If the current product is not authorized, enter your permission code by going to the main menu and selecting Permission. The following interface will pop up:

Permission not activated!

00000 - 00000 - 00000 - 00000

Change permission code

Press **Ent** once to select the first field, and press **Ent** a second time to bring up the keyboard.

Permission not activated!

00000 - 00000 - 00000 - 00000

Change permission code

1	2	3	4	5	6	7	8	9	0
A	B	C	D	E	F	G	H	I	J
K	L	M	N	O	P	Q	R	S	T
	Y	V	W	X	Y	Z			

Set successful, unlocked

Use the direction keys and **Ent** to select the correct character. Press **Esc** and then **Ent** to re-enter a field if you make any mistakes. Use the arrow keys to move to the other entry fields, and enter their contents in the same way. After all fields are correctly entered, select Change Permission Code and press **Ent** to leave this screen and return to the main menu.

5. Maintenance

5.1 Overview



The use of procedures other than those specified herein may result in hazardous laser radiation exposure.

Before any cleaning or maintenance work, always switch off the device and disconnect it from its power supply.

Always keep the system clean, as flammable debris in the working and exhaust areas constitutes a fire hazard.

ONLY allow trained and skilled professionals to modify or disassemble this device.

- Clean distilled water must be provided to the water cooling system at all times.
- The working table must be cleaned and the waste bin emptied on a daily basis.
- The mirrors must be checked every other day and cleaned if required.
- The lens inside the laser head and the exhaust system must be checked every week and cleaned if required.
- The beam alignment should be checked weekly.
- The wiring should be checked every week for loose connections, especially the wiring for the laser tube power supply.
- The air assist must be checked every month and cleaned if required.
- The whole laser machine, including the other components such as the water cooling system must be checked every month and cleaned where required.

5.2 Water Cooling System



NEVER touch or adjust your engraver's water supply while the water pump is still connected to its power supply.

The laser tube requires cool and clean distilled water to avoid overheating. The optimum cooling water temperature is between 60-70°F (15-21°C). The water system should be allowed to run, filling its pathway and clearing any bubbles, before any use of the laser tube. If the temperature of the water ever approaches 75°F (24°C), discontinue work until it has cooled, or reduce its temperature without interrupting the supply of water to the laser tube. Do not allow the water temperature to fall below 50°F (10°C), which could also cause the glass laser tube to shatter during use. Always check the cooling water tank level before use to ensure adequate water supply.

5.3 Cleaning

5.3.1 Cleaning the Water System



NEVER touch or adjust your engraver's water supply while the pump is still connected to its power supply.

The water tank should be shielded from ambient dust created during work. If the water ever becomes visibly dirty, discontinue work. The debris in the water will reduce its cooling efficiency, can heat up itself, and can damage the cooling pipes. Change the water, place the water outlet tube into a separate bucket, and run the cooling system until all contaminated water has been flushed from the engraver. Clean the water tank itself before refilling it with clean and cool distilled water, replacing the outlet tube, and continuing operation. If the water remains visibly clean at all times, it is still recommended that you clean the water tank about once a month as a precaution, changing the water as you do so.



If you use an industrial water chiller instead of the provided pump, follow its separate instructions for maintenance but similarly ensure that the water used remains cool, clean, and pure.

5.3.2 Cleaning the Main Bay and Engraver

Check at least once a day whether dust has accumulated in the main engraving bay. If so, it must be removed. The exact cleaning interval and requirements strongly depend on the material being processed and the operating time of the device. A clean machine guarantees optimal performance and reduces service costs, as well as reducing the risk of fire or injury.

Clean the viewing window with mild cleansers and a lens or cotton cloth. DO NOT use paper towels as they can scratch the acrylic and reduce the cover's ability to protect you from laser radiation. Clean the interior of the main bay thoroughly, removing any debris particles or deposits. Paper towels and window cleaner are recommended. When necessary, clean the cover of the laser tube after it has been allowed to cool completely. Allow any fluid used in any cleaning to dry completely before further use of the engraver.

5.3.3 Cleaning the Focus Lens

The lens has a durable coating and won't be damaged by correct and careful cleaning. You should check the lens and the 3rd mirror daily and clean them if there is any debris or haze on their surface. Your laser will be less efficient and heat buildup on the oil or dust itself can damage the lens.

1. Move the engraving table to a distance approximately 4" (10 cm) under the lens holder.

2. Move the laser head into the center of the workbed and put a cloth under the lens holder so that the lens will not be damaged if it accidentally falls from its holder.

3. Unscrew the lens holder, rotating to the left.



4. Remove the pressurized air hose and laser guide connections.

5. Once positioned over your clean lens-cleaning tissue, remove the lens from the lens holder by carefully turning the lens holder and letting the lens and its O-ring drop onto the cleaning cloth.

6. Examine the O-ring and, if necessary, clean it with a cotton bud and a lens-cleaning tissue or cloth.


7. Remove coarse dust as well as possible by blowing air onto the lens surface.

8. Check the surface and if necessary clean the lens with the lens cleaning liquid and lens tissue or cloth.

9. Hold the lens assembly by its edge with a lens-cleaning tissue and use a drop of lens-cleaning liquid. While holding the lens at an angle, flush both surfaces to wash away grime.

10. Put the lens on a clean lens-cleaning tissue and put some lens-cleaning liquid on one side of the lens. Leave the liquid to take effect for approximately one minute and then gently wipe it away with lens-cleaning tissues soaked with lens-cleaning liquid. Dry this side of the lens with dry lens-cleaning tissues/cloth.

11. Repeat the same cleaning process on the other side of the lens.

 **NEVER** use a cleaning tissue twice. Dust accumulated in the cleaning tissue could scratch the lens surface.

12. Examine the lens. If it is still dirty, repeat the cleaning process above until the lens is clean. Do not touch the surface of the lens after cleaning.

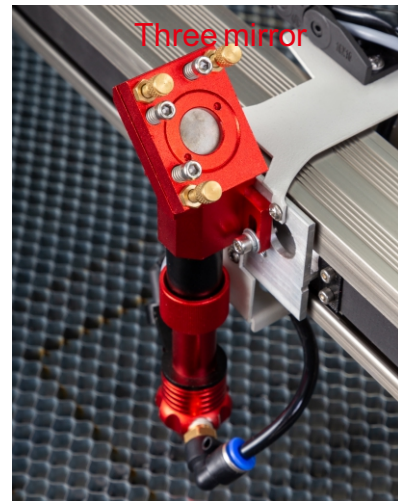
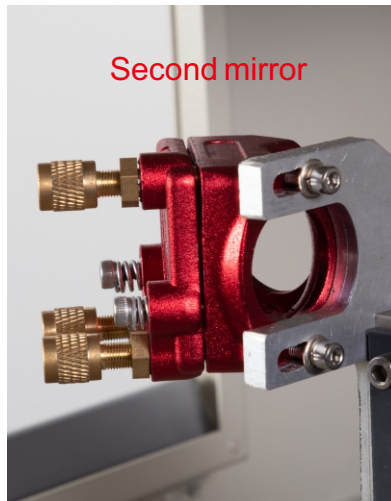
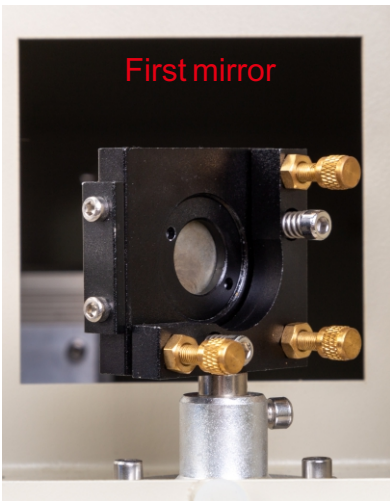
13. Carefully insert the lens into the lens holder, ensuring that its rounded convex side is facing upwards. Put the O-ring on top of the lens.

14. Carefully reassemble the lens and laser head attachments in reverse order.



5.3.4 Cleaning the Mirrors

The mirrors should be similarly cleaned if there is any debris or haze on their surface to improve performance and avoid permanent damage. The 1st lens is located in the back left of the machine beyond the far end of the Y axis. The 2nd lens is located on the Y axis at the left end of the X axis. The 3rd lens is located on top of the laser head on the X axis. The most detritus accumulates on the 3rd mirror and it should be checked daily along with the focus lens. The 1st and 2nd lens can be checked daily if desired but are usually fine if they are only checked once a week.



5.4 Laser Path Alignment

Having a proper beam alignment is important for the overall efficiency of the machine and quality of its work. This machine went through a complete beam alignment before shipping. When the engraver first arrives and about once a week during normal operation, however, it is recommended that users confirm that alignment is still at acceptable levels and that the mirrors and focus lens have not shifted due to the movement of the machine.



You will need to place a piece of tape at each stage of the laser path, marking it to confirm that that stage remains correctly aligned. When it is not, you will use the laser tube's brackets or the screws on the back of the misaligned mirror to correct the problem. Once the provided tape runs out, we recommend masking tape as it is easy to manage and use.



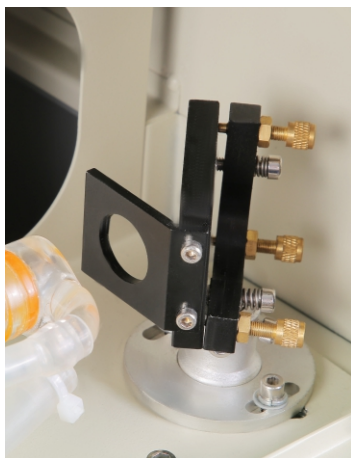
Performing a beam alignment can expose the operator to small amounts of radiation if performed carelessly. Please follow these procedures correctly and always take caution when performing a beam alignment.



Perform a beam alignment at low power levels: 15% or less. Any higher percentage will cause the laser to ignite the testing tape instead of marking it. Be sure that you set the Max. Power (not Min.) to 15%.

5.4.1 Laser Tube Alignment

To test the alignment of the laser tube with the 1st mirror, cut out a piece of tape and place it on the mirror's frame.

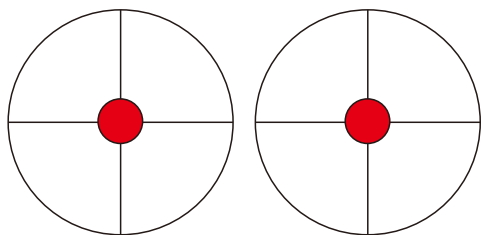


DO NOT place the tape directly onto the mirror. Turn on the machine and set the power level to 15% or lower.

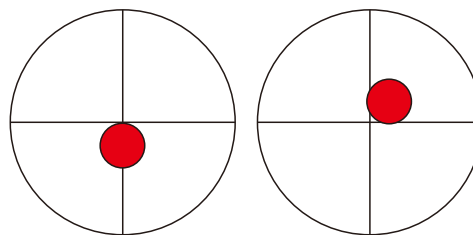
Press **PULSE** to manually fire the laser. You should be able to see a small mark on the tape. If it is not noticeable, press **PULSE** again.



Pressing PULSE activates the laser. Always make sure the path is clear between the laser and its target. Never allow foreign objects between the laser and its target. Take care not to leave any part of your body in the laser path while pressing the PULSE button.

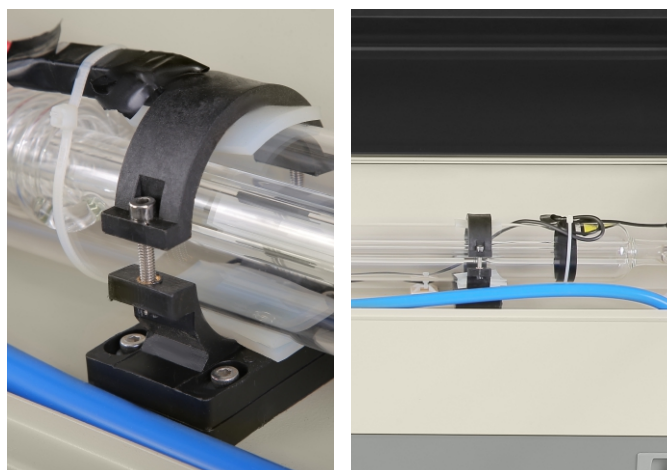


These marks are OK.



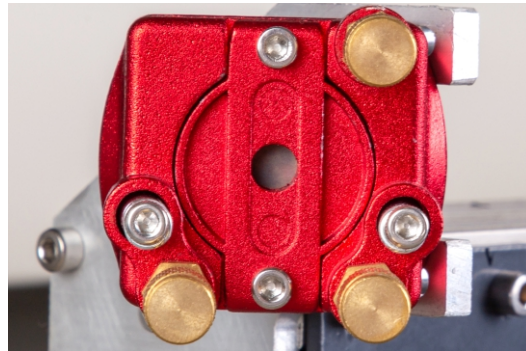
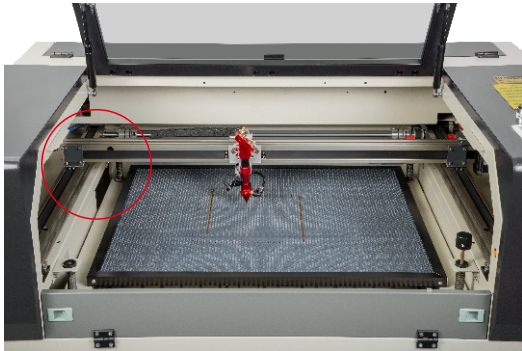
These marks require adjustment.

The laser mark should be near the center of the hole. If the laser is not centered on the 1st mirror, cut the power to your laser and carefully adjust the laser tube on its brackets. This may require loosening the screws on its stand and adjusting its brace wheel. Be careful not to over loosen the screws and not to over tighten them. Only adjust one stand at a time.

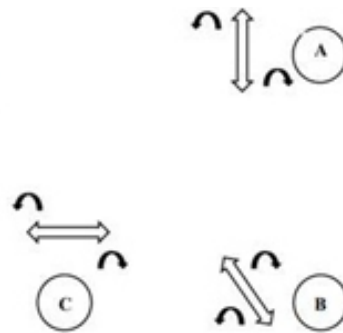
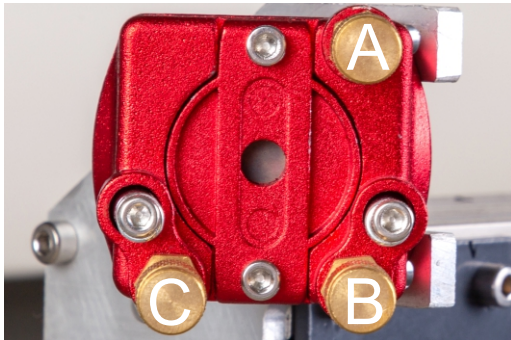


5.4.2 1st Mirror Alignment

After ensuring the laser is well aligned between the laser tube and 1st mirror, check the alignment between the 1st and 2nd mirrors. First, use the direction arrows on the control panel to send the 2nd mirror to the back of the bed along the Y axis.

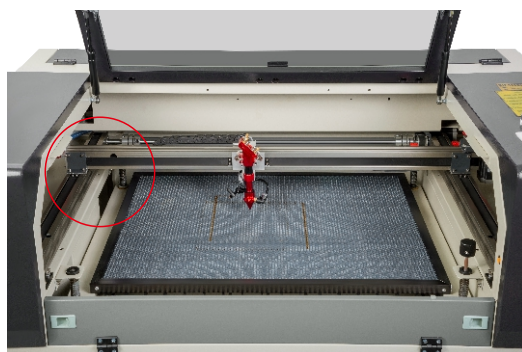


Once set, place a piece of tape on the 2nd mirror's frame. **DO NOT** place the tape directly onto the mirror. Repeat the steps from 5.4.1. If the laser is not centered on the 2nd mirror, you will need to adjust the 1st mirror's set screws accordingly.



To adjust the mirror, loosen the nut on the screw and then slightly turn the screw either clockwise or counterclockwise. Each screw adjusts a different position or angle. Keep track of which screw you are adjusting and the direction of adjustment. Do not turn the screw more than $\frac{1}{4}$ turn at a time and, especially at first, test the position of the laser after each adjustment so that you learn the effect of each change. Test until the beam is well aligned and then retighten the nuts on the screws once all adjustments are completed.

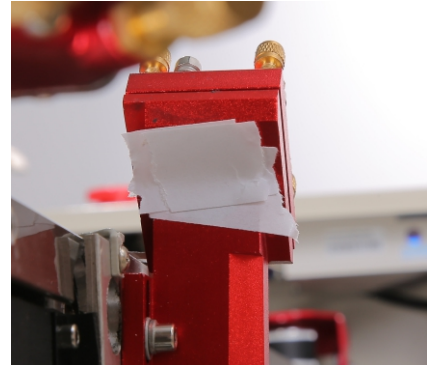
Next, use the direction arrows on the control panel to send the 2nd mirror to the front of the bed along the Y axis.



Once set, place another piece of tape on the 2nd mirror's frame. **DO NOT** place the tape directly onto the mirror. Repeat the steps from 5.4.1 and, if necessary, adjust the set screws on the 1st mirror. Test again until the beam is well aligned and retighten the nuts on the set screws.

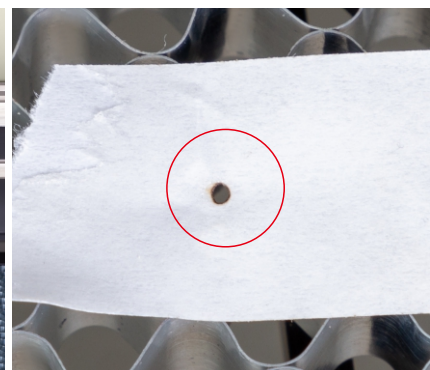
5.4.3 2nd Mirror Alignment

After ensuring the laser is well aligned between the 1st and 2nd mirrors, check the alignment between the 2nd and 3rd mirrors. Repeat the steps and adjustments above, taking care to use the tape on the mirror's frame and not its surface.



5.4.4 3rd Mirror Alignment

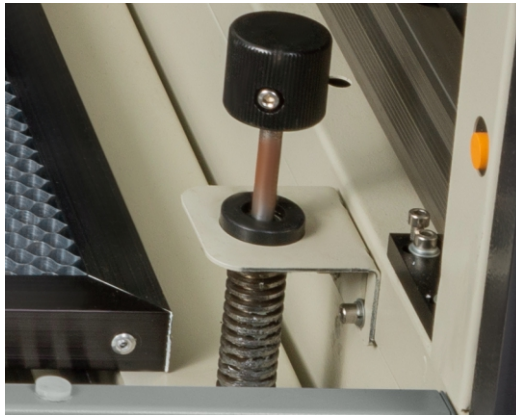
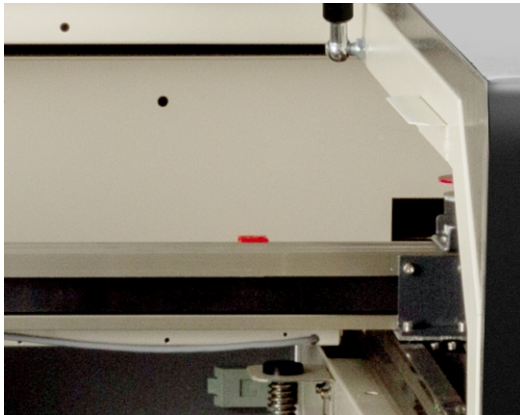
After ensuring the laser is well aligned between the 2nd and 3rd mirrors, check the alignment between the 3rd mirror and the workbed. First, unplug the air assist hose from the laser head. Then, place a piece of tape across the bottom of the laser head and press it onto the nozzle with some force. This will leave a ring mark that can help you check the accuracy. Repeat the steps from 5.4.1. If the laser is not centered through the laser head, adjust the 3rd mirror's set screws accordingly as in 5.4.2. Test again until the beam is well aligned and retighten the nuts on the set screws.



When the laser is well centered along the entire path from the tube to the workbed, your laser mirrors are all correctly calibrated and (assuming they are clean) performing at optimum efficiency.

5.5 Rail Lubrication

It is recommended that you add a small amount of white lithium grease to the X and Y-axis guide rails and screws at least every two weeks.



5.6 Parts Replacement

The engraver should not be modified or disassembled by anyone except trained and skilled professionals, but some consumable parts may require replacement after prolonged use. Be sure only to use compatible replacement parts with this engraver. Contact our technicians if you have any questions about fitment. Using incompatible components is highly dangerous and waives all the manufacturer's liability for any damage or injury caused.



Always completely disconnect the engraver from its power supply before replacing any parts.

Take special care when replacing the laser tube or its power supply, as both have extremely high voltage connections. If you replace the power supply with an identical model, you will be able to use the same screw terminal blocks as a unit. If you change to a different laser power supply, refer to the following diagram:



- FG: Ground Wire for the Mains & Case
- AC₁: Neutral Wire to the Main Power
- AC₂: Live Input from the Main Power
- H: Connection for Active-High Devices (like this machine)
- L: Connection for Active-Low Devices
- P: Line to the Laser Trigger, Water & Other Systems (such as the door switch)
- G: Ground Wire for the Control System, PWM Level Shifters, Potentiometers, &c.
- IN: Input Power for PWM Level Shifters or Potentiometers
- 5V: 5V Connection for Digital Signals



5.7 Disposal Instructions



Electrical products should not be disposed of with household products. In the EU and UK, according to the European Directive 2012/19/EU for the disposal of electrical and electronic equipment and its implementation in national laws, used electrical products must be collected separately and disposed of at the collection points provided for this purpose. Locations in Canada and the US may have similar regulations. Contact your local authorities or dealer for disposal and recycling advice.

Contact Us

Thank you again for choosing our laser equipment for your needs!

If you're satisfied with the machine's performance, please consider leaving a positive review at the website listing where you made your purchase. If you encounter any problem regarding this engraver, do not hesitate to contact us with your order ID at (MP Customer support Email: support@monportlaser.com and Amazon / eBay Customer support [Email:support@monportlaser.com](mailto:support@monportlaser.com) and our customer service team will respond within 24 hours.

Thank you and we hope you will choose us again for your next purchase!