LASER MACHINE
Operation Manual

Model: Omicron G-series

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Read and understand operation manual before using this machine.

Failure to follow operating instructions could result in death or serious injury.

Contents

CO$_2$ Laser Safety & Policies

WARNING: The safety precautions below are mandatory guidelines that must be followed. LightObject will not be held responsible for damages or injuries resulting from improper use of the laser machine.

DO NOT operate the laser machine until you have been properly trained.
DO NOT make contact with any exposed wires on the machine.
DO NOT use any unapproved or unsafe materials such as Polyvinyl Chloride (PVC) which emits noxious gases that can harm your central nervous system.
DO NOT operate the laser near flammable/explosive substances.
DO NOT engrave on shiny metal or mirror as the laser beam can be reflected and deviate that may result in blindness or burn.

NEVER look directly at the laser while in operation and avoid exposure to laser.
NEVER set anything on top of the laser and/or on the worktable when not in use.
NEVER leave the laser machine running while unattended. Monitor the machine when it is running at all times to be able to hear and observe abnormalities and potential hazards.
NEVER push or pull on the laser head housing or gantry while the laser is running.
NEVER dismantle the laser machine as there are laser and high voltage parts that could harm or result in injury.
NEVER open the upper cover of the laser machine while it is running.

ALWAYS wear proper goggles during machine operation.
ALWAYS unplug the machine before making any further adjustments.
ALWAYS keep hands away from machine while operating and stand clear from laser tube area.

In Case of an Emergency:
TURN OFF the POWER SWITCH of the machine OR
Press the EMERGENCY STOP button

Fire & Hazardous Materials

WARNING: Leaving the machine unattended while in use can result in a fire and substantial damage to the machine and the building it resides in. Any damage caused by fire that is not due to defects in workmanship or the machine itself will NOT be covered by the LightObject warranty.

Hazardous Materials: Any materials considered hazardous are NOT recommended to etch, cut or engrave. These materials can produce toxic fumes or cause the machine to not function properly.

Materials that should **NOT** be used on the machine:
Polycarbonate

PVC Compounds
Vinyl

Fumes produced by above materials can cause irritation to eyes, skin and the respiratory tract. This material should not be exposed to elevated temperatures.

Laser Safe Materials:
Acrylic, Wood, Leather, Plastics (ABS, POM, Polyimide, PP, Styrene), Fabric, MDF, Cardboard, Paper, Foam, Fiberglass, rubber, Steel

Accessories

Air Exhaust Fan (optional)

Light adjuster

Air Exhaust Hose

Exhaust Hose Clamps

Tubing for Water Chiller

Laser Tube

Water Chiller (sold separately)

Air Pump (optional)

Air compressor regulator pressure gauge moisture filter

Other accessories

1) Spare tubing

2)   Ethernet Network LAN cable
3)   Sets of Keys
4)   USB cable
5)   Laser cutting head tips (only applicable to some models)
6)   Cotton tipped sticks (for cleaning lens with alcohol)
7)   Other tools for adjustment
8)   Laser Tube Extension Case (only applicable to some models)

NOTE: Software LightBurn is sold separately (depends on controller model)

First Time Laser Setup

The following components are required for operating the laser machine:

Air Assist: to blow smoke away from the beam, preventing damage to the lens and preventing burning the material.

Water Chiller: to circulate cool water into the laser tube to prevent the tube from overheating. The laser tube needs to be at a cool temperature of 15°C - 25°C or else the laser tube may overheat and potentially crack.

Silicone Tubing for Water Chiller and Air Pump: 2 hoses to transfer water for cooling of the laser tube and 1 hose to blow air around the laser head.

Air Exhaust Hose and Air Exhaust Fan: to provide ventilation removing fumes from laser machine.

Unpacking and Setting Up the Machine

1) Uncrate the laser machine.
2) Open up the laser machine and retrieve all accessories that may be inside the machine when shipped.
3) Once all of the accessories have been removed, you are now ready to begin setting up the machine.
4) Depending on the size of your laser tube, you may need to remove the side panel and install the laser tube extension case (only applicable to some models).
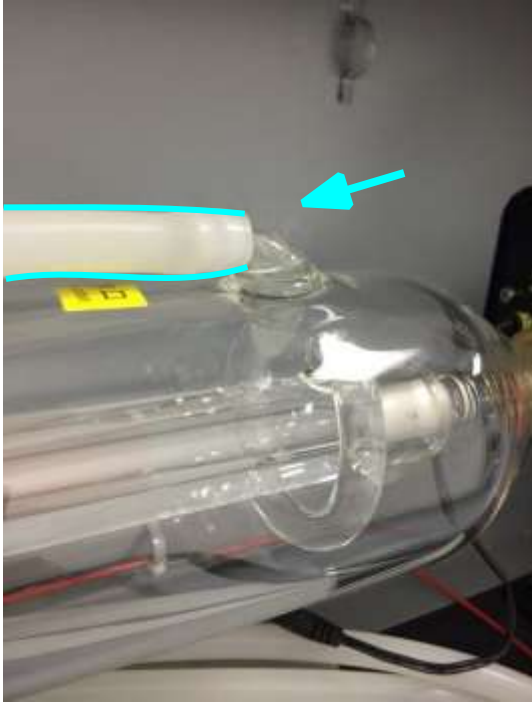

(for reference only)

5) Place the laser tube on the laser tube mounts.

(for reference only; depends on different tubes)

6) Connect the water tubing to the laser tube.

(for reference only; depends on different tubes)

7) Be sure to connect the silicone tubing on both sides of the laser tube. Connect water tubing between chiller and machine. Chiller's outlet goes to machine's inlet. Machine's outlet goes to Chiller's inlet. The correct direction of water flow is from high voltage side (red wire) of the laser tube to the low voltage side.

Chiller's back side
(for reference only; depends on model)

Water inlet and outlet
(for reference only)

Note: The water temperature should always be between 59-77 degrees Fahrenheit when running the machine. (15-25 Degrees Celsius).
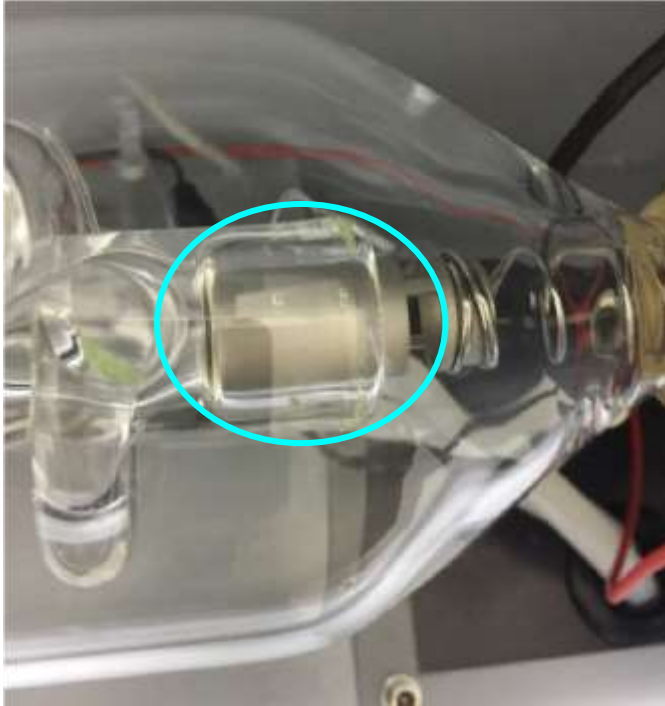
8) Chiller Signal cable needs to be connected between water chiller's alarm outlet and laser cutter. If it is not connected to the machine, it won't fire.

Chiller's back side
(for reference only, depends on model)

9) Fill up the water chiller with distilled water and power up, observe the water flow direction. Switch the inlet/outlet if it is wrong.

10) Check air bubble trapped in the laser tube. **Squeeze the water tubing or tilt the laser tube carefully to get rid of the big bubble.** Small bubbles are acceptable.
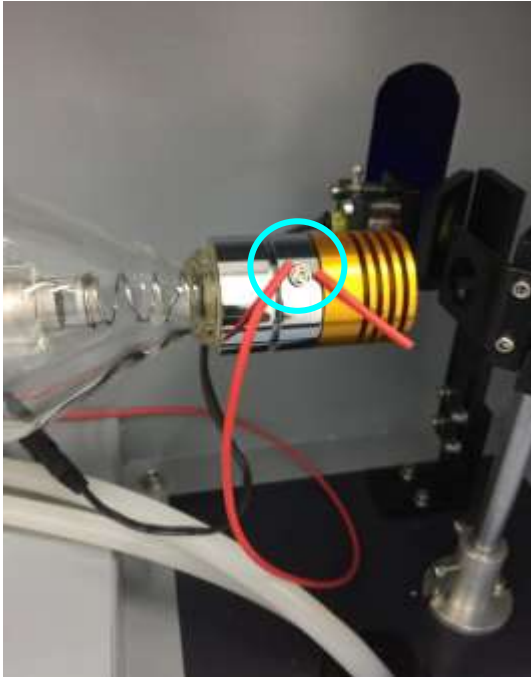

IMPORTANT: the glass can overheat quickly if large bubbles are present when the laser is firing which can cause the tube to crack.

11) Secure the laser tube on the laser tube mounts. Make sure the laser tube is horizontal by using a level.

(for reference only)

12) For screw type connection, clamp the wire under the screw. Put the rubber cap back on the tube on the high voltage side.

(for reference only)

For wire type connection, make a twist like a hook and clamp the hook under the screw.

Twist

(for reference only)

OR

Wrap the wire around the tube's metal pin. Fix the connection by proper soldering OR applying silicon glue. Make sure to shield it with a piece of silicone tubing to prevent arcing.

(for reference only)

13) Hookup the power cord of the machine and power up the machine. Flip the main switch to ON position.

14) Release the emergency stop button.

15) Press the machine power button. The laser power button can be pressed later, when it is time to fire up the laser.

Installing Other Accessories

Exhaust Fan Installation
Some materials such as leather or wood generate larger amounts of smoke than other materials. The exhaust is necessary to remove harmful fumes and smoke. The exhaust must be ducted to the outside and away from any area where animals or humans congregate.

Connect the air exhaust hose by using the hose ring clamps provided, connecting the exhaust hose is done in the rear or underneath (varies based on machine). See picture below.

Turn the exhaust fan on when doing any cutting and engraving to remove the smoke and fumes.

Note: Avoid excessive length, kinks and turns when installing the exhaust pipe/hose.

Air Assist
Connect the air pump to the laser machine air input. Turn on the air before doing any cutting or engraving to prevent any clouding on the lens and to prevent the material from burning

Note: Some CO2 metal cutter model come with high pressure tubing to enable easy upgrades for larger air compressor. An air pressure regulator is used along with an air compressor to adjust the air flow from your compressor to your laser machine.

For some models, the Air compressor regulator pressure gauge moisture filter has been installed on the machine.

For Constant Air

For Compressed Air

Air Pump / Air Compressor
The Air Pump or Air Compressor (sold separately) are used to blow air through the laser head. This will blow away debris and smoke from the laser beam while allowing for a cleaner cut and protecting the lens.

The Air Pump on/off switch should be close by and preferably on the same circuit as the water chiller and exhaust fan to ensure it is in operation while running the laser machine.
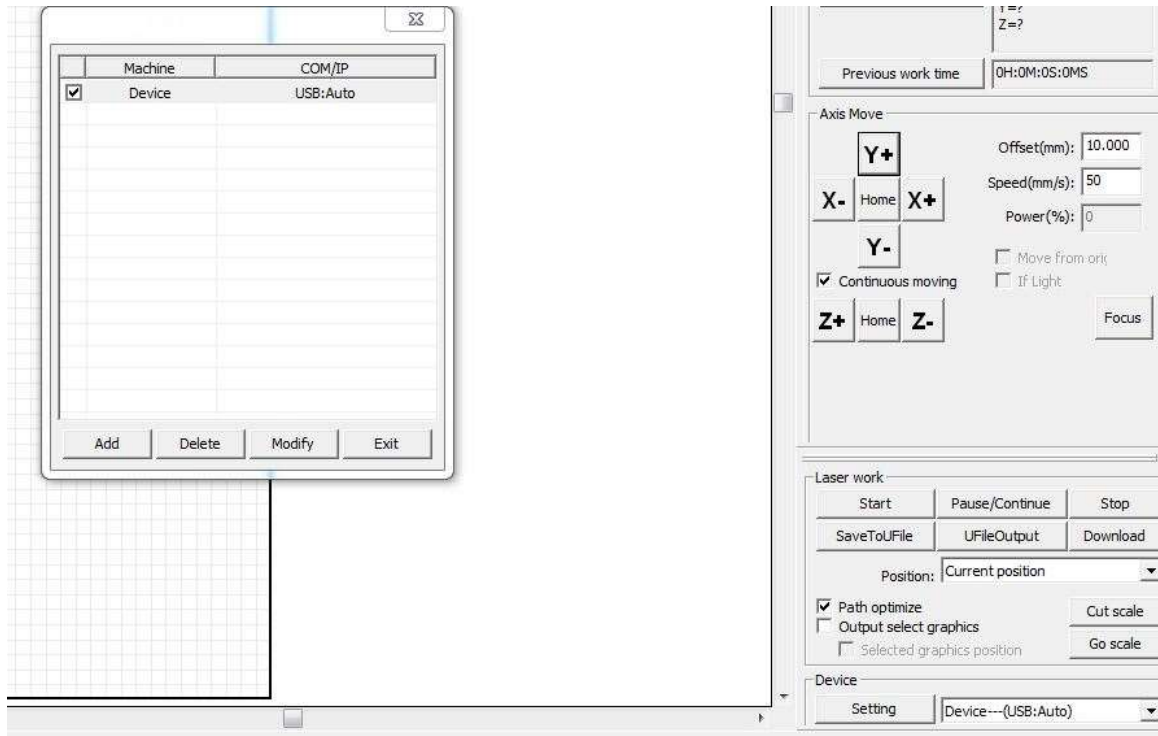
Connecting Laser Machine to Computer

The laser machine (with e.g. Ruida controller) work with below software
   a)   RDWorks (for Windows only)
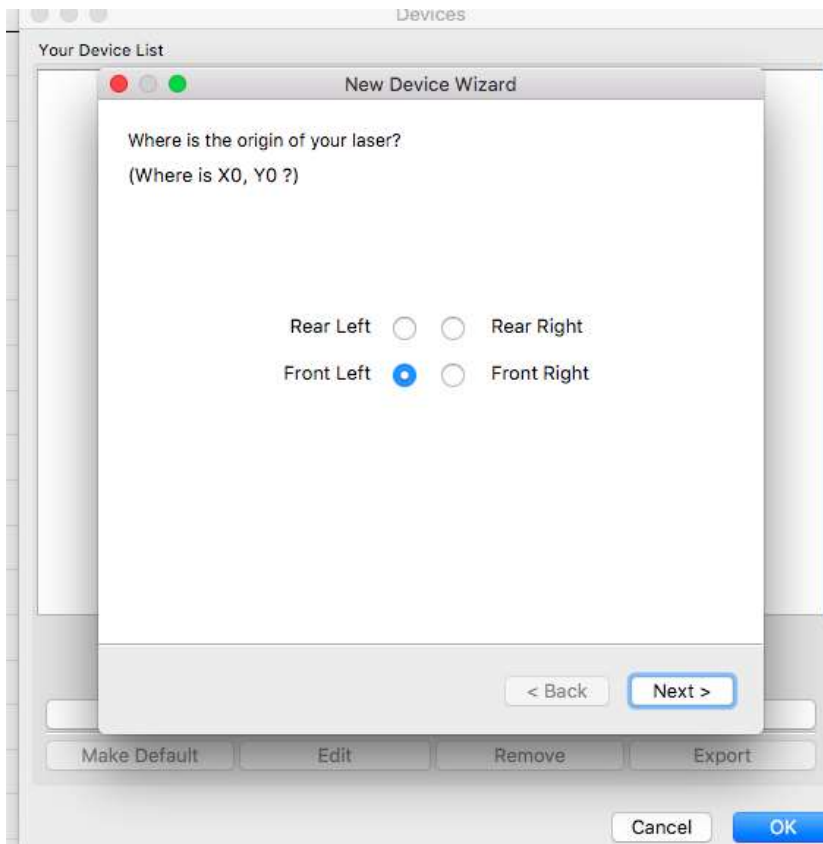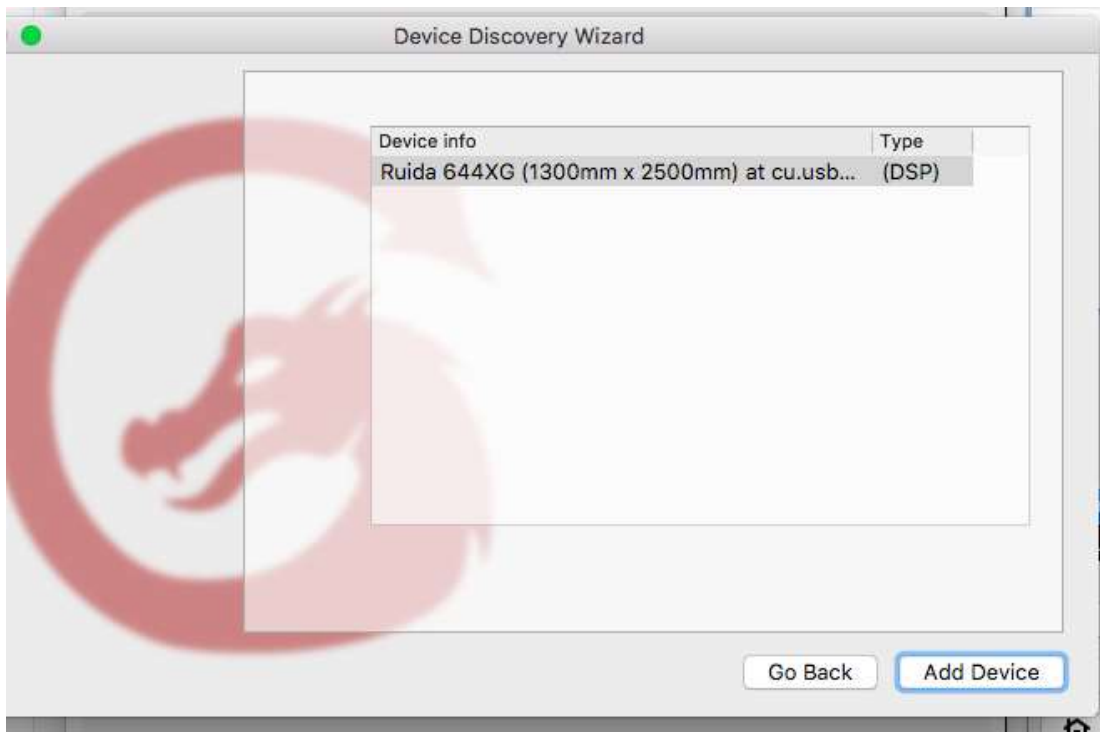   b)   LightBurn (for Mac and Windows)

Set up with RDworks
1)   Download and install the software RDWorks from http://www.rd-acs.com/
2)   Connect the USB cable.
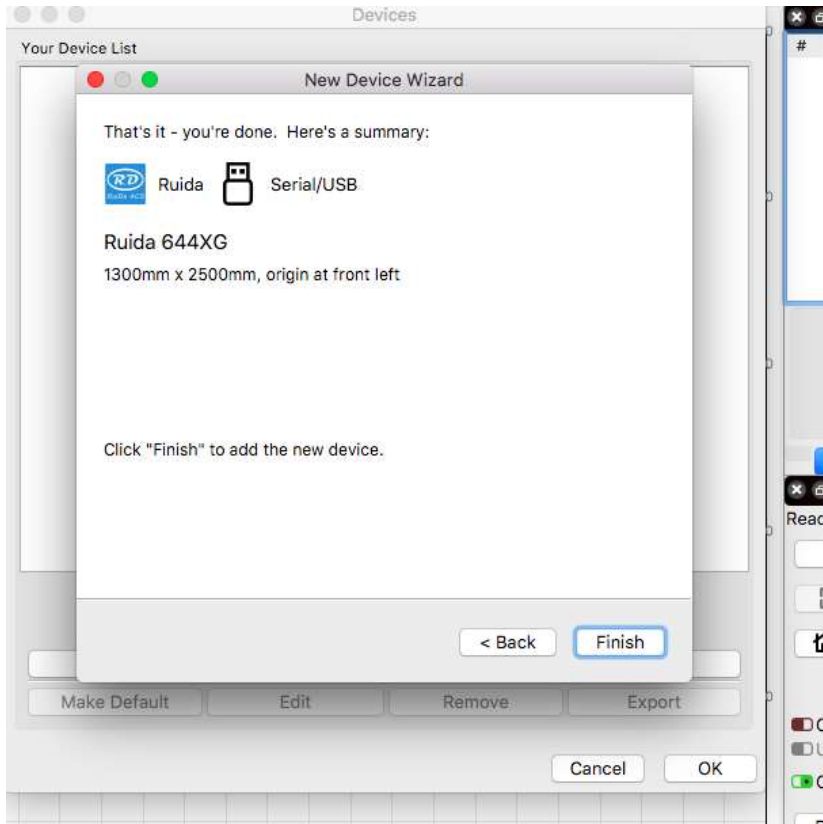3)   Click on "Setting" in Device. It should show the device is connected.

Set up with LightBurn

1) Download and install the software LightBurn from https://lightburnsoftware.com/
2) Connect the USB cable.

3) Follow the instruction from the screen, and it will guide you connecting the computer to the laser machine.
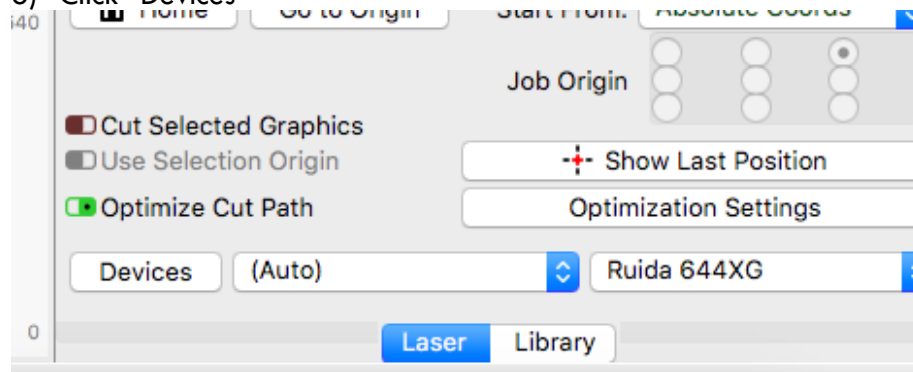
NOTE: Please refer LightBurn instruction manual and tutorials in their site for configuration and usage

If you are using LAN connection, input the same IP address set on the laser controller.

NOTE: Please make sure LAN cable is connected between computer and laser machine.

4) Press Menu on the controller panel
5) Select "System config"
6) Select "Read"
7) IP address should be shown e.g.169.254.164.041 (depends your network).
8) Click "Devices"

9) Click "Create Manually"
10) Select "Ruida" in New Device Wizard", click "Next"

11) Choose "Ethernet/UDP"
12) Input the IP address you have seen in the DSP control panel e.g.169.254.169.041
13) Input the Name you would like to call it
14) Input the dimensions of the work area e.g. 1300mm for the width, 2500mm for the height
15) Select the origin, then click "Next"
16) It will show the setting, then click "Finish"

Sending files to your Laser Machine

Once you have established the connection between the computer and the laser machine, job files can be transferred.

To do this, click on the "Send" button (LightBurn) OR "Download" button (RDWorks) located on the right side of the laser software.

Alternatively, save the file as UFile and put in a USB stick. Then, download the file from the USB stick on the laser control panel.

Control Panel Keypad

Note: Since the laser cutter can be connected to different controllers (e.g. Ruida RDC644XG), please always refer to the controller manuals for details.

Functions of typical keypad:

Reset: Reset the whole system;

Origin: Set the relative origin;

Laser: Let the Laser to splash;

Frame: To track by the current file's frame;

File: The management of the memory and U disc files;

Speed: Set the speed of the current running layer, or set the direction keys' move speed;

Max. Power: Set the laser power of the current running layer, or set the "Laser" Key.

Min. Power: Set the min laser power of the current running layer;

Start/Pause: To start or pause the work;

Left and right arrow: To move the X axis or the left/right cursor;

Up and down arrow: To move the Y axis or the up/down cursor;

Z/U: The Z/U key can be pressed when the system is idle or the work is finished. On pressing this key, it will show some entries in the interface, each entry includes some functions, Z axis move, U axis move, each axis to go home

Esc: To stop work, or to exit menu;

Enter: Validate the change;

Focusing the Lens

The lens should be adjusted and focused according to the thickness and type of material.

To adjust the focus, adjust the height to accommodate the thickness of the material by pressing the up and down arrow in the auto focus panel.

Do some cuttings on the material, and try to find the smallest burn on the material by adjusting the height of the tip. The smallest burn with the specific height of cutting height you find on the material means it is focused.

OR

You may do a ramp test. Put a piece of wood at an angle like a ramp. Laser cut a line across it. Move the laser head over the narrowest section of burn mark. The gap between the tip and the material is the focus height.

Maintenance

Cooling:

Automotive antifreeze should not be used as a laser coolant. Distilled water shall be used. The coolant should always be clean and clear.

Focal lens:

This is the lens that is used to focus the laser beam. This lens should be cleaned at least once per week. It is not possible to clean the lens while it is mounted in the focal tube. The laser beam alignment should be checked after cleaning is completed. If there is any incident of fire or large issue of smoke/fumes, then it is advised to check the lens and clean it. Use denatured alcohol and/or acetone as the cleaning solvent. Use a lens tissue or cotton tipped swabs.

The focal lens should be replaced if it is cracked, the coating is scratched/pitted, the core material is darkened, the coating is delaminating, or any other significant damage is found.

Mirror:

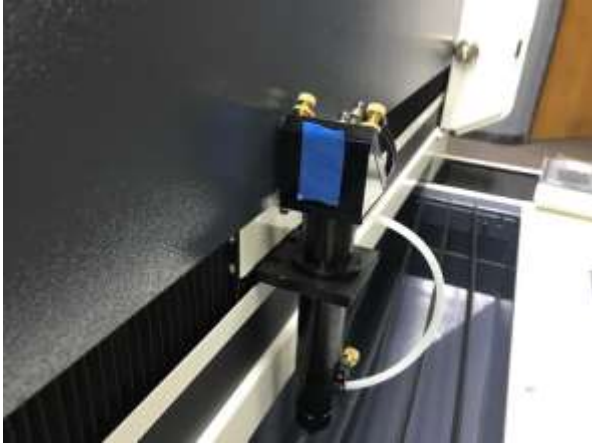This mirror should be cleaned at least every three months.

Laser Alignment:

WARNING: DO NOT obstruct the path of the laser, beam is invisible!

NOTE: Due to transportation, the alignment may be off.

1) To make sure that the laser is properly aligned, place an adhesive note around the alignment housing or put a paper on the Light adjuster which can be mounted on the alignment housing next to the mirror.

OR

Note: In case the Light adjuster is too loose from the alignment housing, you can apply Teflon tape on the light adjuster to make it fit to the mount.

2) Set the laser power low to avoid burning the paper.
3) Start with the first mirror; press the laser button once. If that mirror is aligned correctly, the burned mark should be in the center of the circle on the housing.
   If it is not aligned, then the three screws at the back of the alignment housing for each mirror must be adjusted little by little until the laser hits the center. Test after each adjustment.
4) Once the first mirror is done, repeat the steps to align the 2nd mirror.
5) When mirrors are aligned correctly, the mark will be in the center regardless of the x and y position (wherever the laser head moves).

Troubleshooting

The machine does not turn on:

1. Is the emergency button pressed?
2. Is the power switch turned to the on position?
3. Is the breaker tripped, fuse blown?
4. Does the DC power supply function properly?

Laser does not fire:

1. Check if the water chiller functions properly.
2. Try different files and power setting.