CALCA® ADVANCED LASER SYSTEM

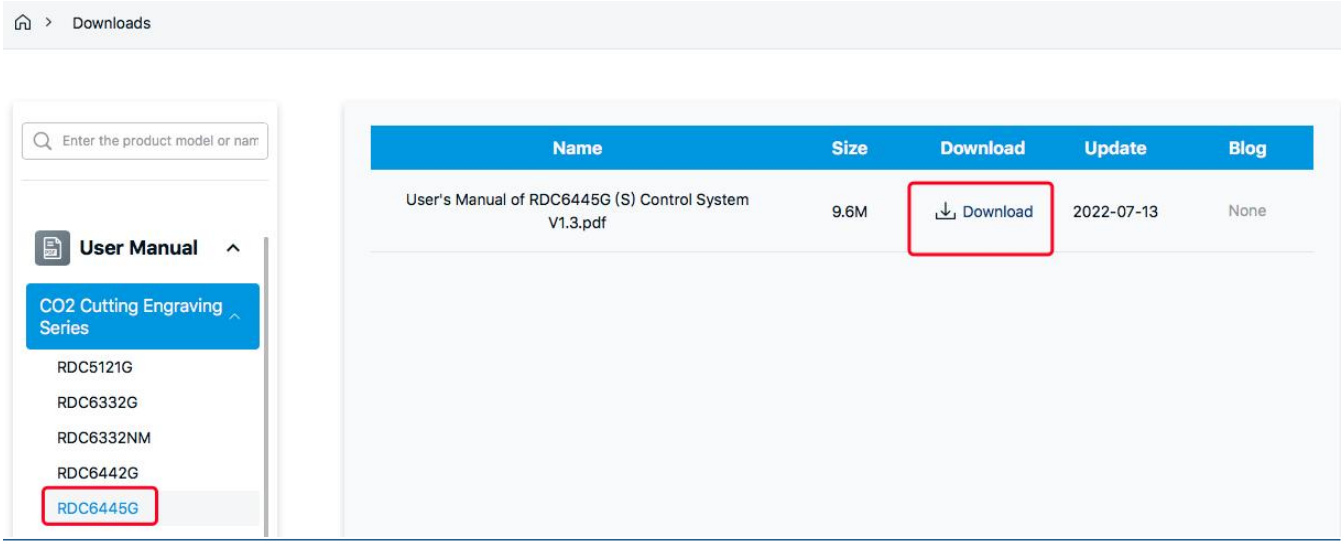
DR-1390-150W-K 51" x 35" CO2 Laser Engraver

USER MANUAL

CATALOG

PROLOG

Thank you for purchasing the laser-engraving machine from Sign-in-Global.us. This equipment is a high-tech product integrating light, machine and electricity, with strong professionalism and high technological content. In order to let our users operate and maintain the equipment better, we write this manual. We add many real pictures of this manual so you can understand easily.
This manual has been designed as the DR 1390 series Laser systems, laser machine installation and user guide; the manual is divided into 6 chapters, including machine appearance and accessories, machine Installation and debugging, how to Adjust optical path of the device and how to confirm the optical path is precise and straight, equipment maintenance and common malfunctions, warranty regulations and common problems and solutions.
At the same time you can also refer to the help files that RDWorks 8.0 Software Download, the link is as below,
https://www.rdacs.com/en/download



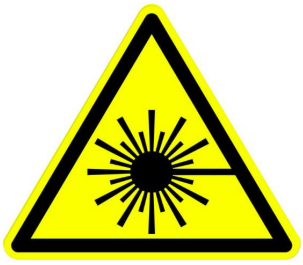
Machine Installation Instructions

Safety Precautions:

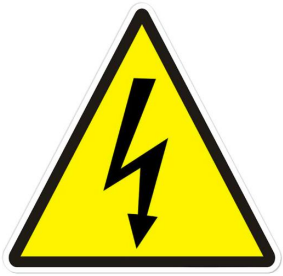
- For your personal safety, please read this manual carefully before operating the equipment. And please make the operation strictly adhere to the manual direction. Notice and understand all the warning labels located on your machine, non-professionals don't touch.
- This equipment uses four types of laser (strong light source). The Laser radiation may cause the following accidents:
  - Ignite the Flammable surrounding;
  - Different radiation and lethal gas may be generated when cutting or engraving different materials;

- The direct shooting of laser radiation will do harm to human body. Therefore, flying and explosive materials should not be stacked on the workbench and it's surrounding and fire-fighting equipment must be equipped. Please maintain good ventilation when the machine is working.

> Non-professional operators are prohibited from approaching this equipment.
> The materials for cut or engrave and the gas emissions shall comply with the requirements of local laws and regulations.
> Laser cutting or engraving may be risky. Please consider whether the material is suitable to be cut or engraved by laser carefully.
> High pressure or other potential hazards inside the machine, only manufacture and professional person can disassemble the machine.
> When the machine is working, the operator must be by the machine and cannot leave unless the work is stopped. Please confirm all power is turned off before the one is left.
> When the machine is working, the user cannot open the cover at any time.
> The engraving machine can be started only after the machine and other related equipment be safely grounded.
> To prevent the laser from being reflected on the human body or flammable objects, it is strictly forbidden to place any total reflection or diffuse reflection objects in the equipment
> When the machine working, the operator must observe the working conditions of the machine all the time. If an abnormal situation occurs, cut off all power supplies immediately and actively take corresponding measures.
> The equipment should be located at the place where is dry, free of pollution, vibration, strong electricity, strong magnetism and other interference and noise. The working environment temperature is 5-40℃, and the working environment humidity is 5-95% (non-condensing water).
> As the machine may cause electromagnetic interference to the electrical equipment, which is sensitive to electromagnetic interference, the machine should be put far away from this kind of equipment.
> Machine working voltage: AC110V, 60Hz. When the grid voltage is unstable or mismatched, it is strictly forbidden to start the machine. The manufacturer is not responsible for any loss caused by improper use or non-compliance with the above rules.



DANGER: Laser Radiation
This warning can be found on the laser tube, the laser beam will be initiated in the laser tube itself and it is important to have all panels and access doors closed prior to firing the laser. Also, make sure to disconnect



DANGER: High Voltage
This warning indicates that precautions should be taken when touching or handling any electrical components of the machine. Please make sure to disconnect the laser from all power sources prior to opening these cabinets or handling the internal electrical components.

Statement

1. The content of this manual may be different from the actual product due to product upgrades and improvements. In addition, the content of this manual may change without prior notice.
2. The pictures in this manual may be different from the purchased product due to product improvement and other reasons. Please refer to the actual product you purchased.

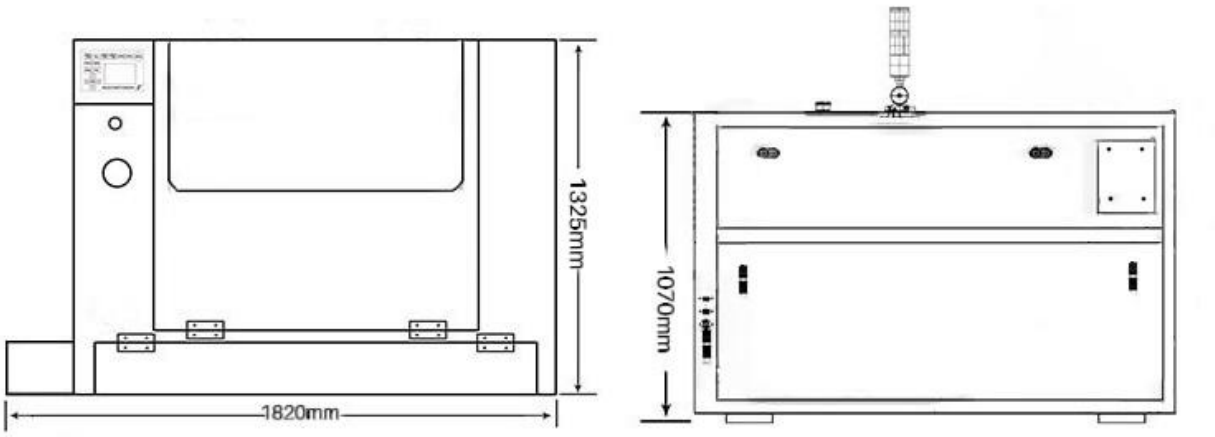
CHAPTER 1. UNPACKING & PLACEMENT YOUR MACHINE

1.1 Receiving

It is likely that your machine will be delivered by a third party. Before unboxing, be sure to inspect the packaging and shipping documents supplied by the driver. Ensure that there is no visible damage to the shipment. If any damage has occurred because of shipment, note the damage on the bill of lading or refuse the shipment. Immediately call the dealer store where the machine was purchased. Note: Never accept a shipment that is damaged or partial without notifying the shipping company and the purchasing store.

1.2 Placement

Prior to removing the machine from the packaging, decide the operating location of the machine. The dimensions and floor space can be found here:



F1-1

1. There should be sufficient area at the front of the machine to allow you to work on it comfortably.
2. There should be sufficient area at the back of the machine to allow access for adjustments and maintenance to be conducted.
3. Adequate lighting. The better the lighting the more accurately and safely you will be able to work.
4. Solid floor. You should select a solid flat floor, preferably one made of concrete or something similar.
5. Locate it close to a power source and dust collection or fume extraction.

1.3 Unboxing

Your new laser will be delivered in a large wooden crate like the one pictured in F1-2. Please be sure to have the necessary tools on hand when unpacking the crate, we recommend a hammer and a pry bar, as well as some type of metal cutter or tin snips that will allow you to remove the bands from the crate. Our crates will have pallet feet, this allows for a forklift or pallet jack to be used so you can move the crate with ease.

Once you have the lid of the crate off, take out any smaller loose boxes that contain accessories (Air pump, tool box, etc.) These boxes tend to fall out if the crate walls were to be taken off first. After those smaller boxes have been removed, move onto the removal of the front panel, two side panels and then the back panel. Save these crate panels if you ever need to move the machine to a different location.

Note:

1. Do not cut deep into a box with knife blade as it could scratch the paint. Only cut deep enough to cut the tape or use a dull edge.
2. Be careful not to use any part of the plywood interior as a focal point for the pry bar, stay on the outside framing to ensure that you will not pierce the plywood and damage the machine.

Depending on what options you had purchased with your laser, the crate or pallet will have several boxes. Additionally, some units will have accessories taped to the working table, locate and identify any of these. If you think anything is missing from your machine or crate, please contact your sales representative. The loose boxes in the crate should contain the following things:

- 1 set Air pump
- 1 set Water chiller
- 1 set Exhaust fan
- 1 set Toolbox that contains necessary software, accessories, or parts.
- Additional accessories such as: rotary attachments.


F1-2

Accessories:

Except of the machine your random accessories should include as below:
Toolbox Contents: air pump, air tube, network line, power cord, USB cable, venting tube, 1 set of inner hexagon spanner, ground wire, operation manual as the picture F1-3 shows below.
Other Accessory: water chiller, exhausting fan, rotary.

F1-3

Setting Up the Laser for the First Time

Make sure to remove any foam or padding from inside or outside of the **machine, this** includes the inside of the cabinet. Remove any plastic ties used for securing the laser head from moving while in transit. Check for any nuts or bolts that may have come off or become loose during transit, these can usually be found in the bottom of the cabinet.

CHAPTER 2. MACHINE APPEARANCE AND CONTROL ELEMENTS INTRODUCTION

2.1 Machine Appearance

Different models have different appearances, and the specifics are subject to the actual product. Here is the front of the machine, as shown in picture F2-1:

F2-1

Here is the back of the machine, as shown in picture F2-2:

F2-2

2.2 Specifications

Model	LCM-DR-1390-150W-K
Working size	51" x 35"(1300mm x 900mm) with double side open door
Z table	Motorized Z (15.7" vertical adjust)
Laser tube type	Reci 150W laser tube
Laser Type	CO2 Sealed Glass 10.64 um
Cooling Type	5200 Series
Voltage	110V, 60Hz
Gross Power	≤1650W, 15A
Driver type	Micro Stepping Motor
Focus Lens	Dia. 20mm FL2.5"
Max. Cutting Speed	15.7 ips (400 mm/s)
Max. Engraving Speed	23.6 ips 600mm/s
Positioning Accuracy	±0.01 mm
Compatible OS	Windows 2000, XP, Vista, 7,8,10
Data Transmission	USB Cable, Ethernet Cable, USB Flash Drive
Support Software	LightBURN, CorelDraw, AutoCAD, Photoshop, etc.
Image form	PLT, BMP, DST, DSB, DXF
Control system	RDC6445
Worktable	Knife blade & honey comb platforms
Rotary Device	Yes
Auto-focus	Yes

2.3 Control & Display Elements

2.3.1 Important switches

There are several switches installed on the laser cabinet. This can be shown in F2-3

F2-3

1. **Emergency Stop Switch (E-Switch)**
   It is the large red circular pushdown button with arrows. The emergency stop push button is normally in the “up” position, but if you push “down” this will cut off all the power to the machine. To reset the emergency, stop button, simply press the button down and turn it in a clockwise motion and the power will be restored.
2. **Rotary Switch**
   Selector Rotary Switch
3. **Main On/Off Power Switch**
   The On/Off switches located on our machines are done by turn key. This ensures than unauthorized person can use the machine.
4. **LCD Display Ammeter**
   Real-time display of processing current and information status

Note:
This switch is placed in the left position by default.
When the switch is in the left position, the current adjustment knob has no effect .The power output is determined only by the 6-pin terminal (green) input.
When the switch is in the right position, the current adjustment knob is in effect. The output power is determined by both the adjustment knob and the 6-pin terminal (green) input.

2.3.2 Control panel LED keypad

RDC6445 control panel is a 5.0-inch TFT LCD screen based human-machine interface, with beautiful interface, man-machine friendly, smooth control, and cost-effective features. The panel can depict the motion track of the controller in real time, which makes the user understand the current processing graphics at a glance, supports file management, file preview, user and manufacturer parameter modification, and supports multi-language interface switching and other functions.

F2-4

Introduction to the Keys:

Reset — Reset the whole system.

St/Pau — To start or pause the work

Pulse — Let the Laser to splash

Stop — Stop working or motor axis motion

Focus — Automatic searching for focus

Origin — Set the relative origin

Menu — User parameters, factory parameters, language settings, etc

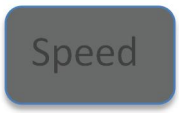
Frame — To track by the current file's frame ◇

Shift — Special function switching

File — The management of the memory and U disc files

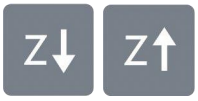
Enter — Validate the change

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



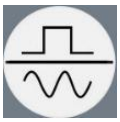
Set the speed of the current running layer, or set the direction keys' move speed

To move the X axes and Y axes or up, down, left and right functions

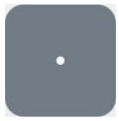


Moving Z-axis.

Moving U axis.



Point movement and continuous motion switching.



Decimal point

Backspace

To stop work, or to exit to some menu

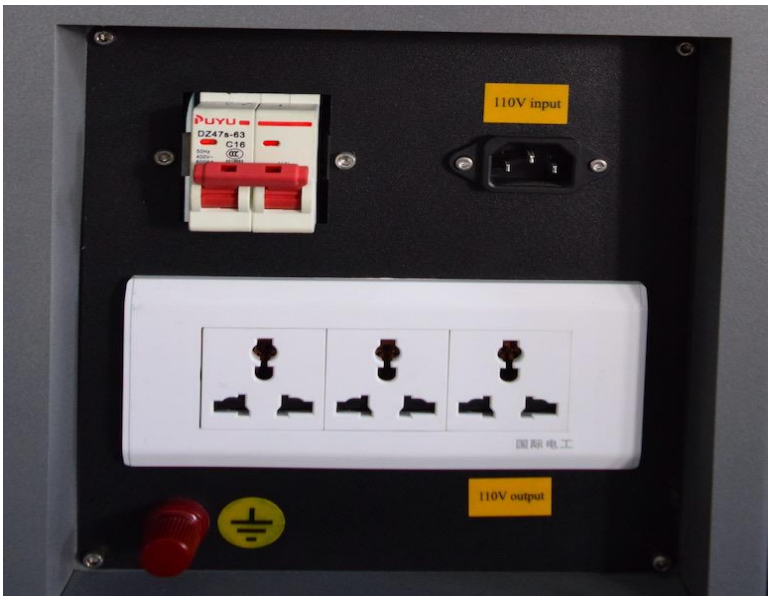
Digital key 0~9: Used to set parameters.

CHAPTER 3. MACHINE INSTALLATION AND DEBUGGING

3.1 Connecting Electrical Power

The complete working system is composed of the laser machine, air pump, water chiller, data transmission line, etc. According to work needs users can configure their own computers, printers, etc.

First, please connect the machine to power and turn on the main power switch, Emergency stop switch in turn. If the laser head is back to the top right corner, it means the machine startup is normal.



The electrical cord is found in the accessory package with your machine. The power cord for the laser plugs into the power receptacle located on the left side of the machine in the rear corner.
The air pump power cord and chiller power cord can be plugged into the white socket

3.2 Water Protection System and Water Chiller Connection

To finish this step you need: water chiller, water inlet pipe, and water outlet pipe

1) Please find the chiller, open the package, and locate the water inlet and outlet, they are located on the right side of the machine in the rear corner. Please check the picture F3-1

F3-1

2) Water outlet of the water chiller connects to water inlet of the laser machine while water inlet of the water chiller connects to water outlet of the laser machine. Aviation connector of the water chiller connects to the aviation connector of the laser machine, you can check picture

F3-3

3) Open the injection port and add water. For best results, use deionized water. Pour slowly and do not fill the chiller completely. There should be about 3-6 inches (80-150mm) between the opening and the top of the water in the machine. Do not allow the water to overflow. For cooling carbon steel equipment, the water should have the appropriate amount of anticorrosive additive.

F3-4

4) Plug in the power and flip the power switch. Don't worry if the fans and other components of the chiller do not activate. They are usually automatically controlled and will not begin working until they are needed by the machine. In different conditions, the time for startup may vary from seconds to a few

minutes. Do not become frustrated and switch the machine on and off, except when necessary to add water.

5) Check the water level of the water tank again, as in Step 2 above. The water level of the chiller will lower somewhat as it fill the cooling path of your machine. If necessary, carefully add more water to the chiller to maintain a level about 3-6 inches (80-150mm) below the top of the chiller. If the water level drops sharply or continues to go down during normal use, turn off your devices and examine the water pipes and cooling path for leakage. Repair any such leaks before restarting the devices and continuing work.
6) Note: Must use rust protection coolants to prevent rust and corrosion. The use of tap water is prohibited.

Always keep the vents clean and unobstructed and the filters clear. Periodically confirm that no dust or debris has entered the water tank of your chiller. If any is found, empty and clean the tank completely before continuing use.

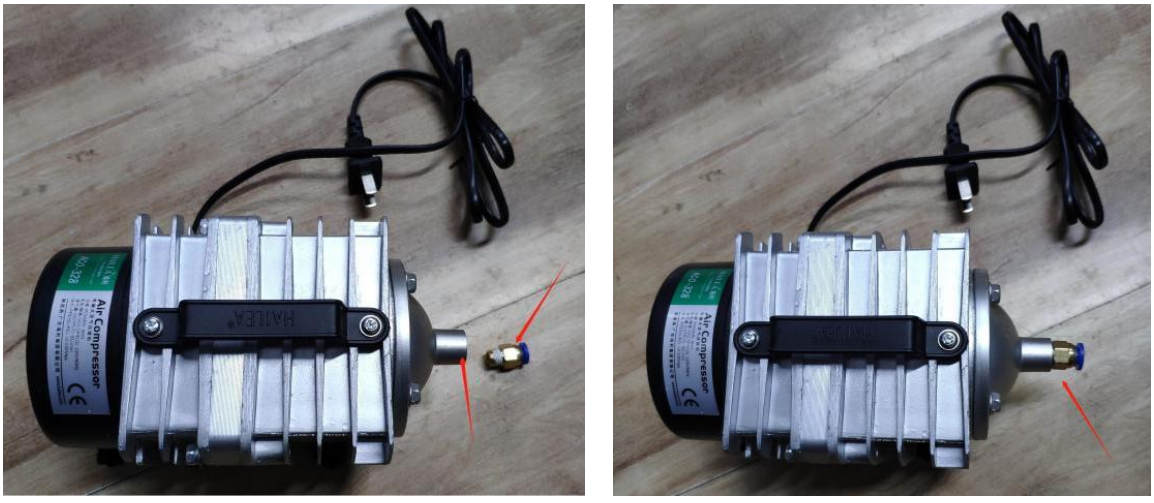
Never use a dangerous system like a laser engraver if the water-cooling system is malfunctioning. If the laser or other dangerous device is already on, shut it down immediately and correct the problem with the chiller before using it again.

3.3 Air Pump Installation

This air pump supplies helps keep the focusing lens clean and cool during the engraving process. Air assist is also critical when cutting to reduce flame-ups and clear the debris field.

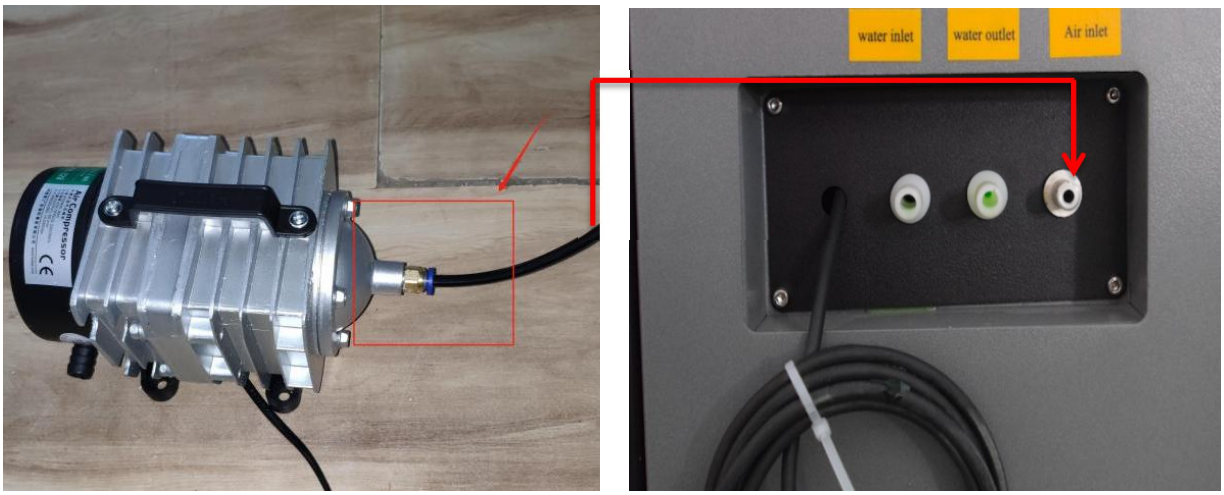
To finish this step you need: Air pump, air pipe, Air blowing mouth (copper)

1) Please open the package and put the air pump out. Install an air blowing mouth (copper) to the air system.



F3-5

2) Please find the air inlet port on the machine, as marked in picture F3-6, then connect one side of the hoses to the air blowing mouth, the other side to the machine.



F3-6

3) Please connect the power cable (of the air system) to the machine. The air pump works normal if it blowing air in air outlet port on the laser head.

The air pump plays an important role in the machine system. Blowing air can help clean the focal lens and it can prevent the material from being burned. So in daily maintenance, the user should pay attention to check if the air pipe is broken or damaged. Otherwise the abnormal blowing may cause the material to burn.

3.4 Exhaust Fan Installation

Proper fume extraction is imperative to evacuate the combustible and noxious fumes that are created during the lasing process. This machine must be equipped with an adequate exhaust system. You can further reduce smells from fine particulate matter with an inline filtering system.

To finish set up the exhaust fan you need: exhaust fan 1 pc, exhaust pipe 2 pcs, clamps 3 pcs.

1) Please find the vent on the back of fuselage, Insert one side of the exhaust pipe into the fan inlet and the other side into the fuselage.
And you need to lock the exhaust pipe with clamps on the ends of exhaust pipe. Insert one side of the second exhaust-pipe into the fan outlet and put the other side of the pipe outside of where you work (If the machine is far from the outside room that the gas manufacture by the machine can not be discharged; then you might need an dust/fume filter, it can keep the air quality of your working environment well). Please refer to figure F3-7 about how to install exhaust pipe.

F3-7

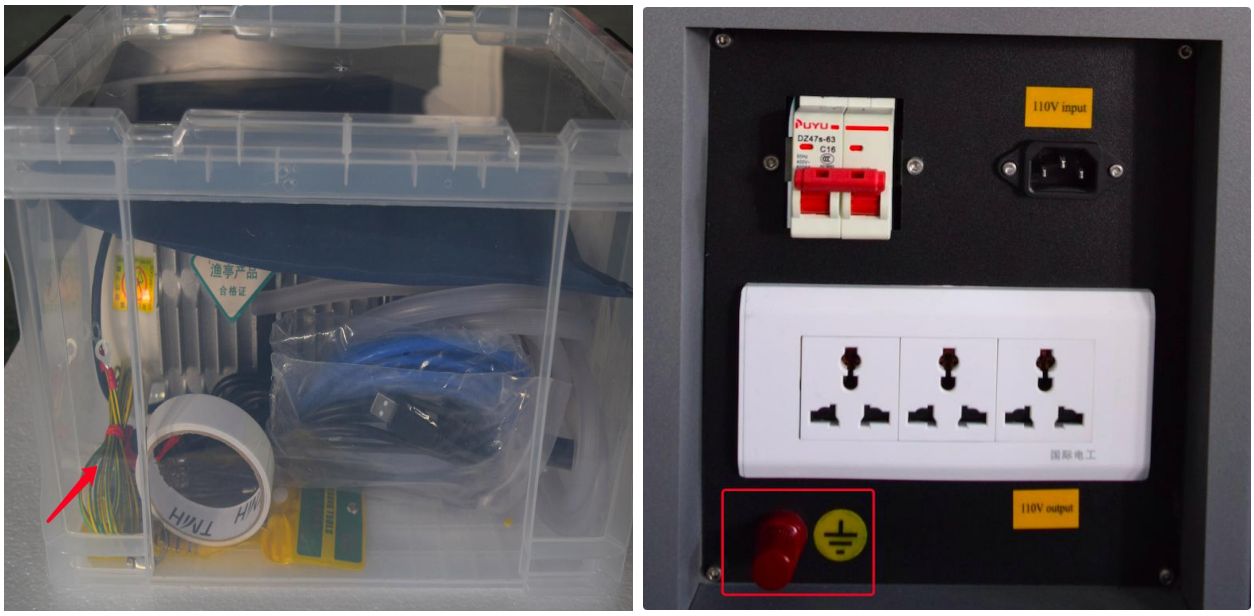
2) Connect the exhaust fan plug to power (considering voltage fluctuations in different areas. We strongly recommend that power exhausting fans individually instead of plug on the machine). And you can test and confirm the fan works normally.

3.5 Ground Wire Installation

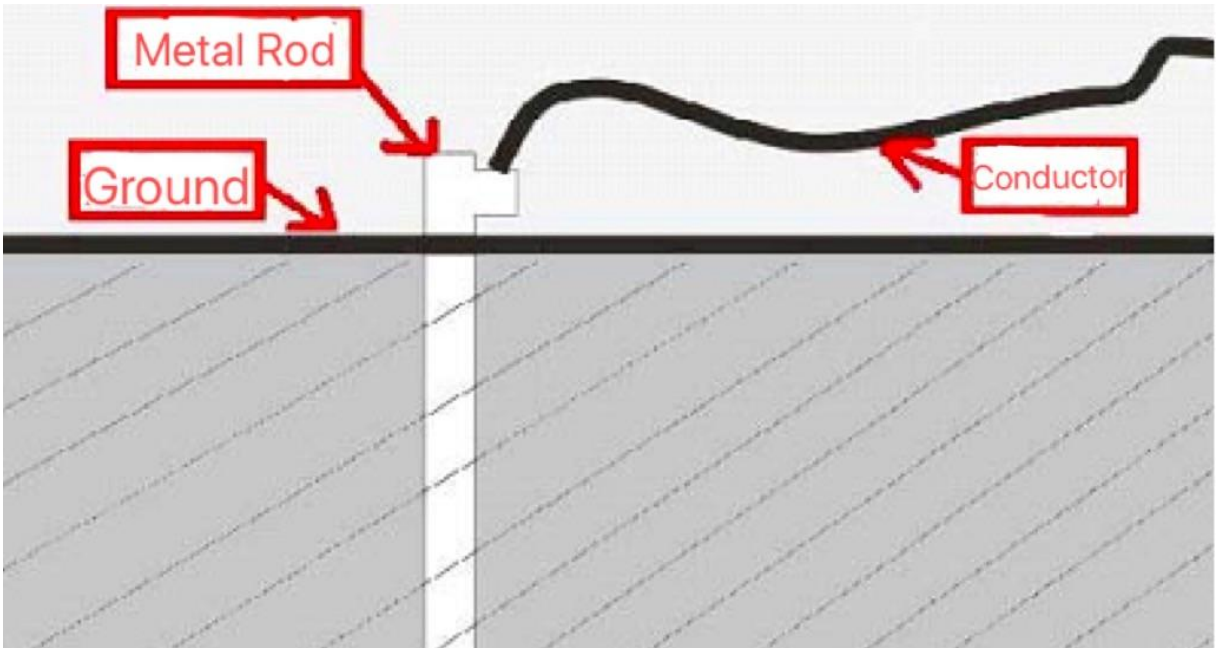
The laser tube used in this laser machine is a Class IV laser, and the Class IV laser. When users operate the machine, they must adhere to the "Safety Attention" and we put forward strict requirements for the user's safety grounding. The requirement for the safety ground wire to the ground should be less than 5Ω.

The assembly of the Ground: Connect the ground security, in the toolbox, find a wire (above one square meter), and should connect the machine to the ground. The other end connect the steel bar, it must be buried under the ground 1.5 meters. If in the wet place, the bury depth can be shallow.

The specific connection method is shown in figure F3-8 and F3-9:



F3-8



F3-9

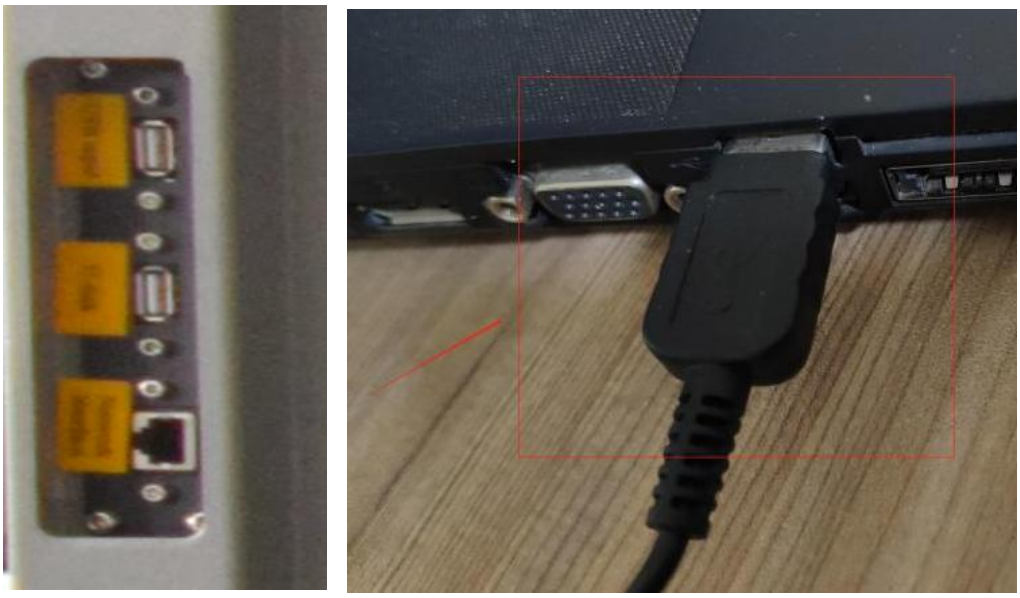
Please note:

The machine must be grounded. Poor grounding will lead to a high failure rate of the equipment and may cause other safety accidents at the same time! ! !

The company does not assume any responsibility or obligation to the failures or accidents caused by no grounding! ! !

3.6 Connect The Machine With Computer

1) Firstly connect the machine plug to the power,
2) Connect the USB cable.
   Connect the computer and the machine by using the USB cable, like Figure F3-10 shows below:



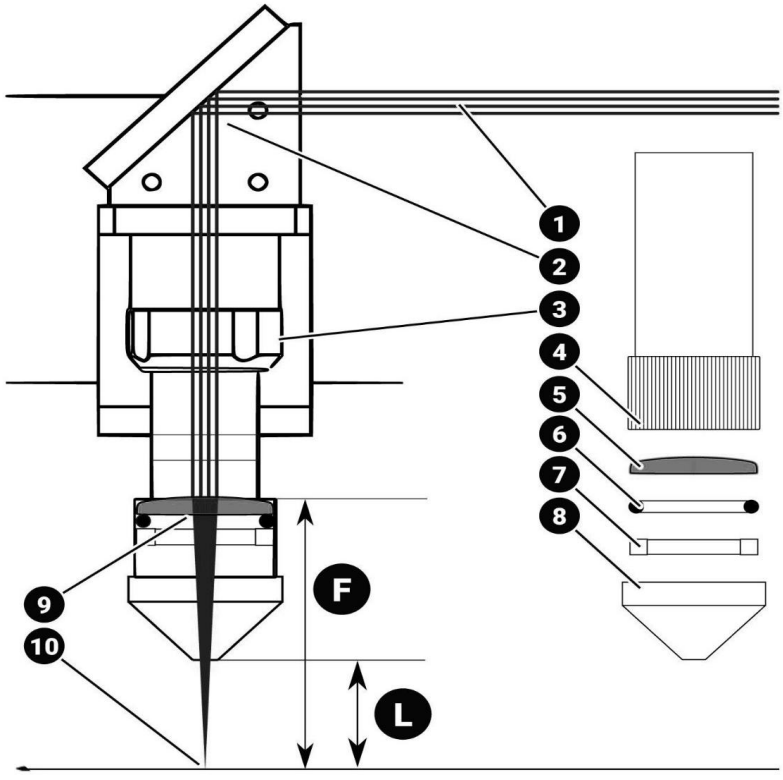
F3-10

Note: This machine support output by Ethernet, USB and U-Disc.

3.7 Adjust The Focal Length

3.7.1 Focal lens assembly

(F) Focal Length. (L) Focal Spacing. (1) Unfocused Laser Beam. (2) Laser Head Mirror. (3) Head Removal Set. (4) Lens Removal Set. (5) Focal Lens. (6) Rubber Gasket. (7) Locking Nut. (8) Nozzle. (9) Focusing Beam. (10) Focused Beam -- Surface. As is shown in Figure F3-11



F3-11

Lens is 0.79” (20mm) in diameter, and has a focal length of 2.5” (63.5mm).

Note:

The lens should be checked often for cleanliness and can be changed for lenses of different purpose.

3.7.2 Adjust the focal length

Manual Focus:

Focusing the lens is a very important part of running this laser machine.

The laser will enter the head assembly and concentrate via the focal lens. Making sure that the laser has a correct (f) Focal Spacing is extremely important to the quality of the process. The machine lens must be focused each time a material with a different thickness is placed on the working table.

The first step is placing your material on the worktable, next is locating the focal guide (There will be an acrylic sheet on the laser head, we call it focal guide). The focal guide will need to be placed on the ledge of the nozzle as shown in Figure F3-12. While the focal guide sits on the ledge of the nozzle, use the up and down arrow keys on the control panel to move the Z-axis (the table) up or down. (It is best to hold your focal guide in place while you move the table). Once the material meets the focal guide, your lens is now focused!

F3-12

The distance from the laser beam outlet port to the material is fixed and this distance is the width of focal guide.

Note:

1. If you lost your focal guide by accident, the reference focal guide width of this machine is 6.5 mm.
2. Always be careful when focusing your lens with thick material, do not allow the material to collide with the lens housing. This can cause SERIOUS DAMAGE to the laser machine.

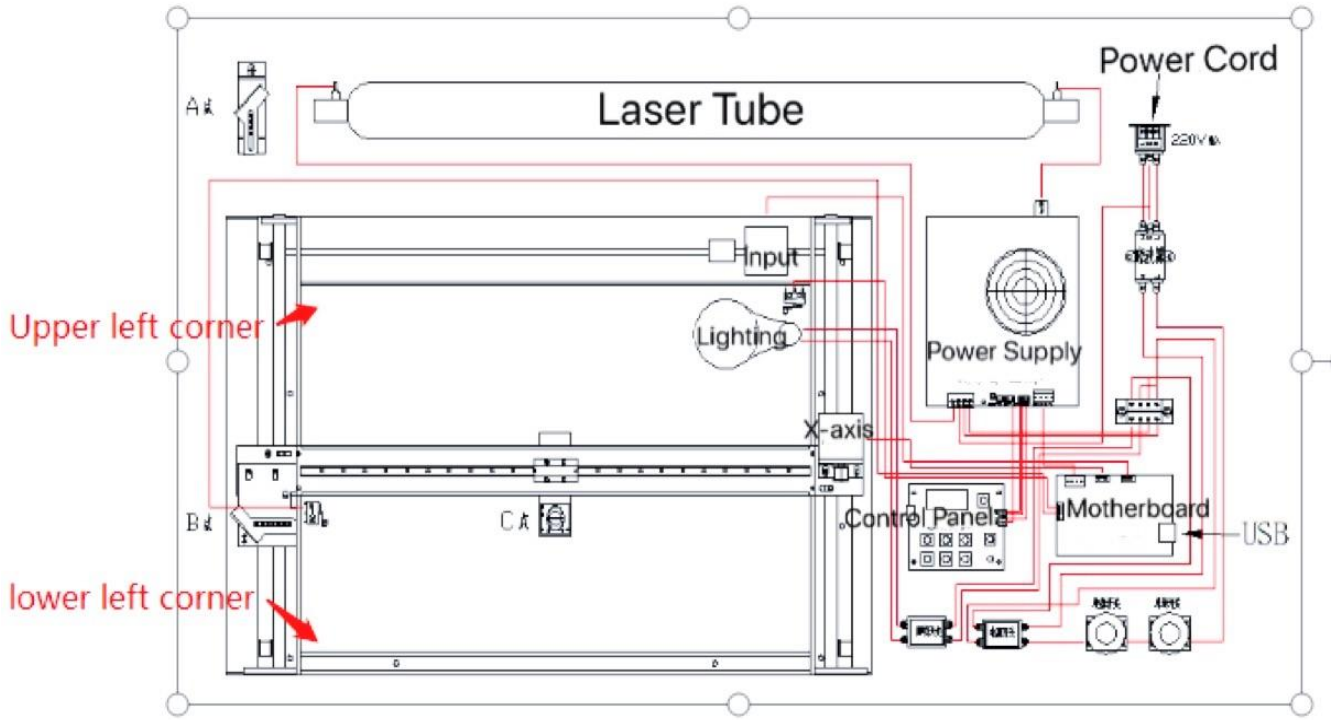
Auto-Focus:

First, place the material on the working table and press the “Z/U” key on the control panel. Be sure that the nozzle as shown in Figure F3-12 is positioned above the material you wish to cut or engrave, not above the bare table.

When your laser head nozzle is above the material, press the “Z/U” key once and then use your up/down arrow keys to navigate the options until the highlight is on “Auto Focus”. Use the “Enter” key to select it and the Z-axis will automatically travel upwards until your material touches the nozzle of the laser head, it will then lower to the perfect focal point. Your lens is now focused, and your machine is ready to cut or engrave!

CHAPTER 4. LASER BEAM PATH ADJUSTMENT

4.1 Device Schematic Diagram



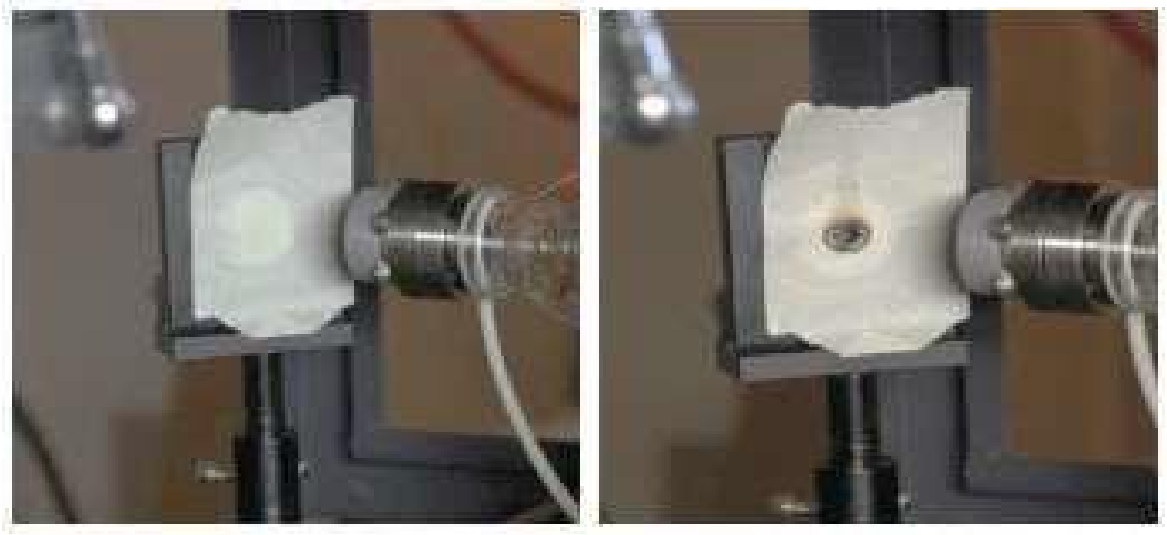
F4-1

4.2 How to Adjust Optical Path of The Device

Before the machine is shipped from factory, technician has adjusted the laser path. However, it is inevitable that the light path will deviate during transportation.

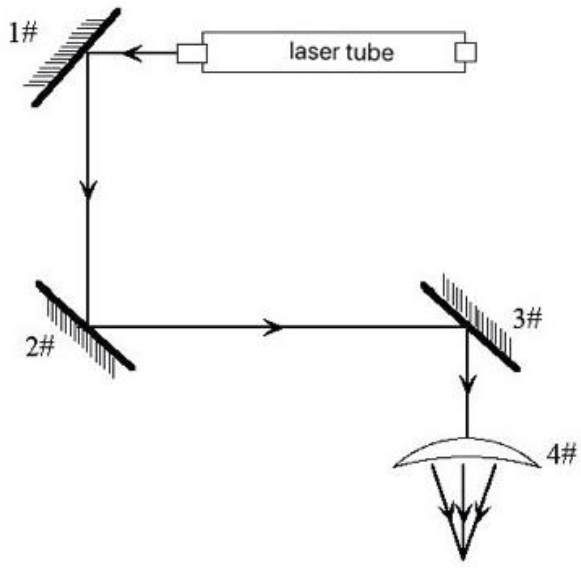
Please connect all the power cord and power on and power on the laser machine. At this time, the machine starts to reset and returns to the last positioning point, which indicates that the machine is operating normally.
Turn on the laser switch and you can start to adjust the light path.

1) Put the dimming paper (paper tape) on front of the first lens A (#1).
Change the laser power to ... then click on "Pulse" button on the panel (tap it immediately released, can be seen laser hit spots in the dimming paper).

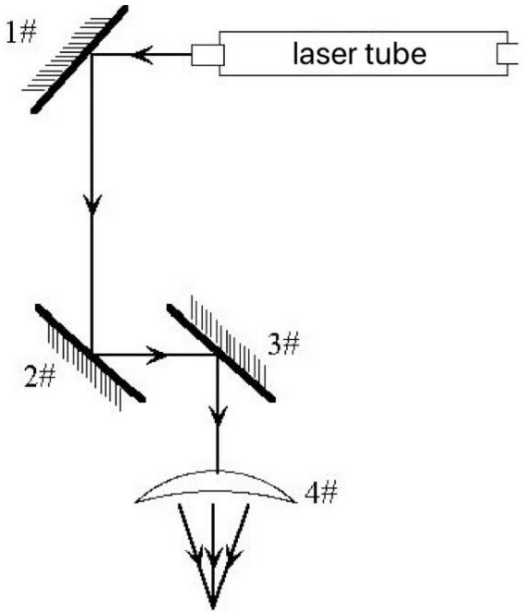


F4-2

It is ok if the spot falls almost in the middle position of the first lens.



F4-3

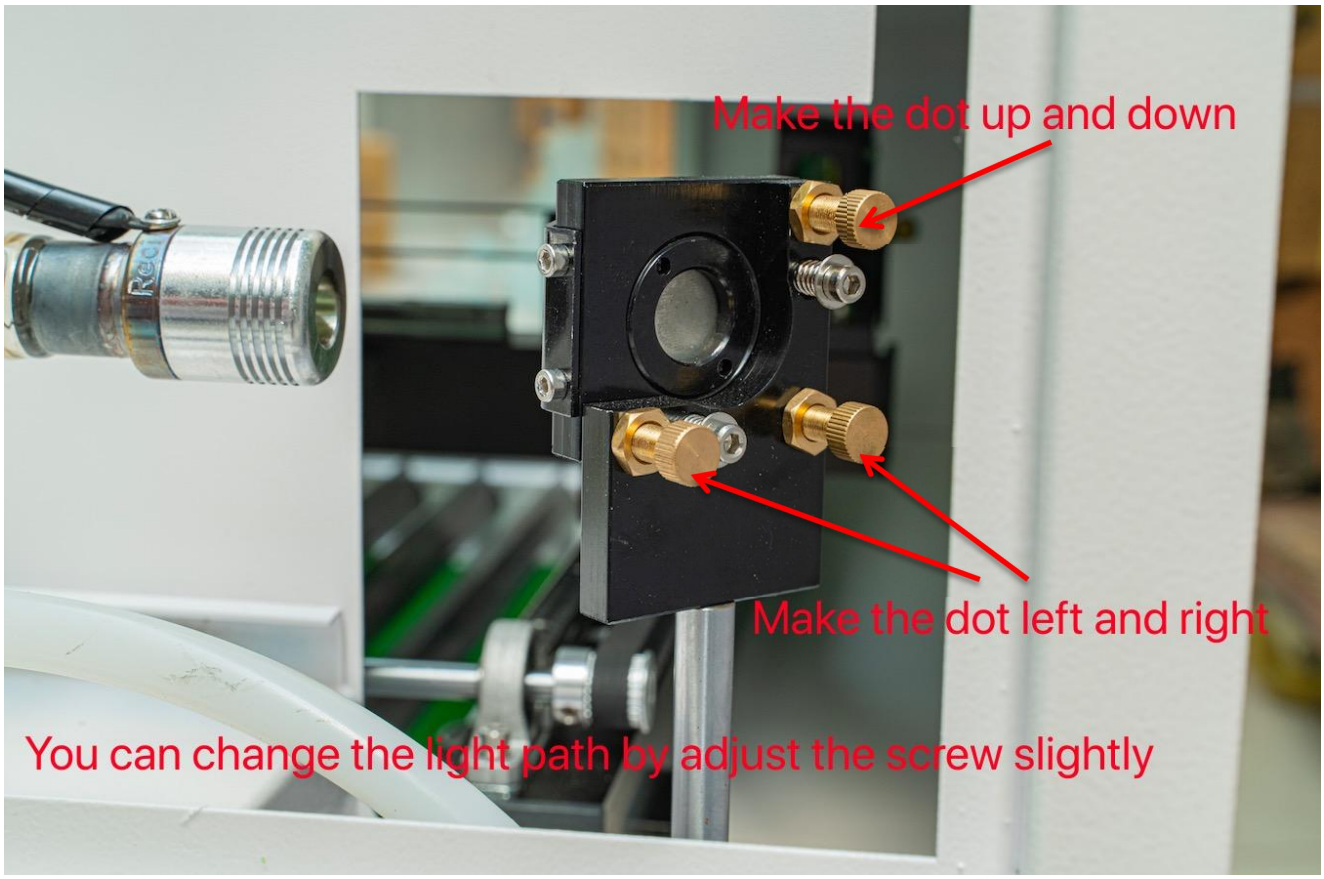


F4-4

2) Adjustment of optical path B (#2).
Put the lens dimming paper onto front of the second mirror frame B (#2). Press the arrow keys on the control panel and move X rail to the upper left corner of

the rail position. Click the "Pulse" button to see the location of the laser spot. As shows in Picture F4-3.
Then press the arrow keys on the control panel and move X rail to the lower left corner, the same press "Pulse" button and there will be the other laser spot. As shows in Picture F4-5.
Please check if these two spots (upper left and lower left corner) position are coincident.

If the spot overlap is located near the center of the lens, this mean the optical path between of first lens with the second lens is correct.
If the spot is above the middle of the lens, you can adjust the top screw of the three screws; if the spot is left or right to the middle, you can adjust the screws on the bottom, just move two of the three screws are ok.
Please refer to F4-3
Repeated adjustments and tests until the two mark centers completely coincide.
(Note: First pulse at the point closest to point A and leave a spot on the dimming paper, then pulse at the farthest point from point A and leave a spot, this is the second step. In the next step, the closest point will be fired first, and then the farthest point will be fired.
The essence is to compare the spot position made by pulsing in the farthest point to the nearest point and repeat the process of pulsing in the nearest point and the farthest point.)

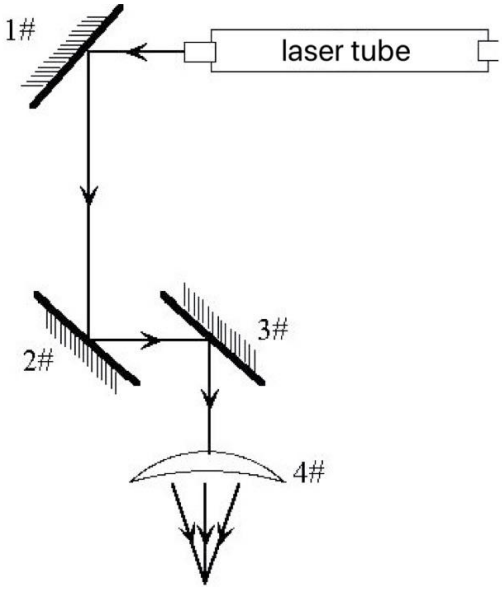


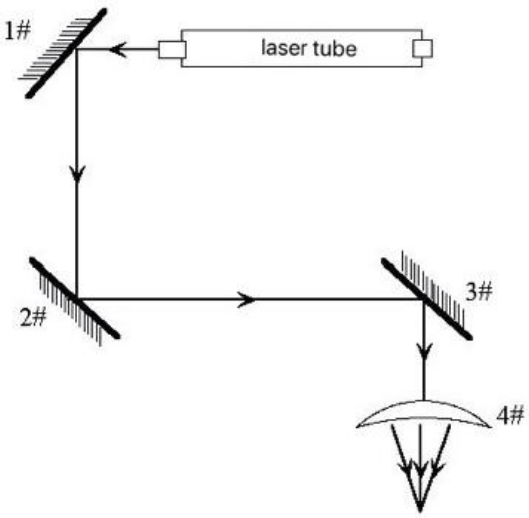
F4-5

3) Adjustment of optical path C (#3).

Put the lens dimming paper onto front of the second mirror frame C (#3). Repeat pulsing in the farthest point to the nearest point of C (#3). As shows in F4-6 & F4-7.

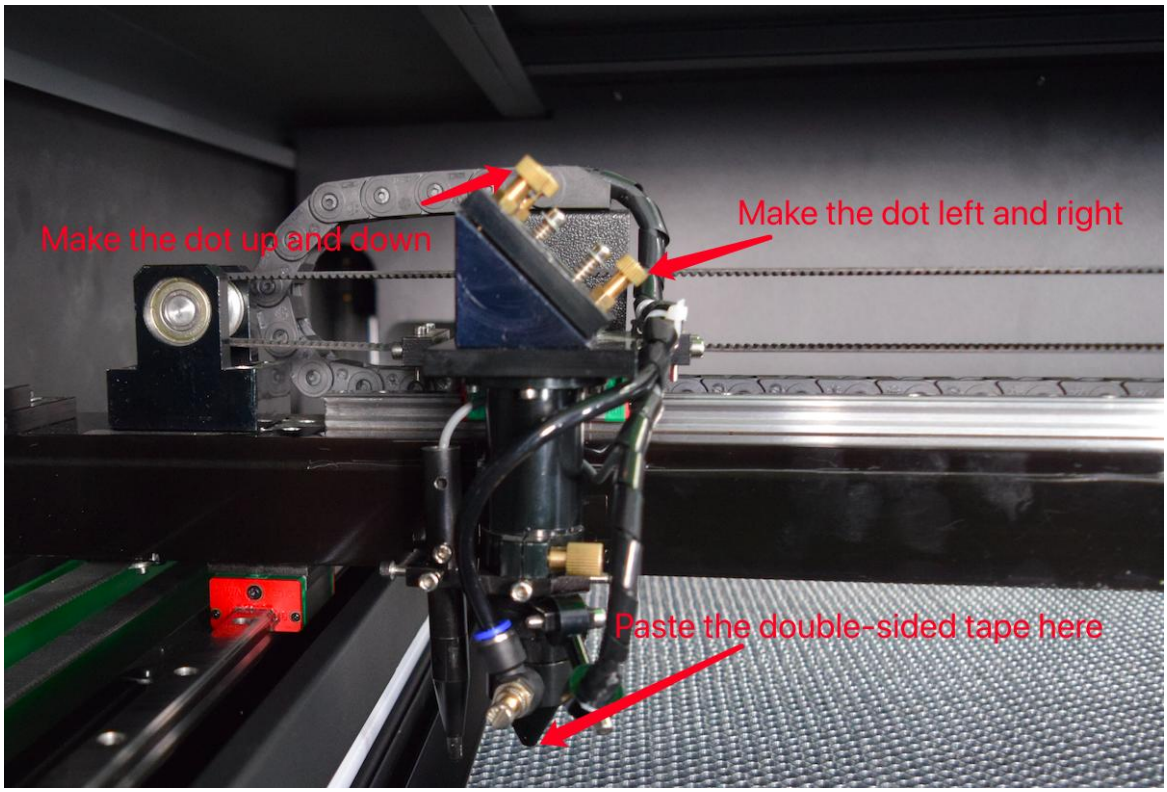
(First, move the laser head to the left of the X-axis, put the test paper in front of the hole of the laser head, press "pulse" slightly and check the spot. Then move the laser head to the right of the X axis, press "pulse" again, and check whether the two spots coincide with each other).



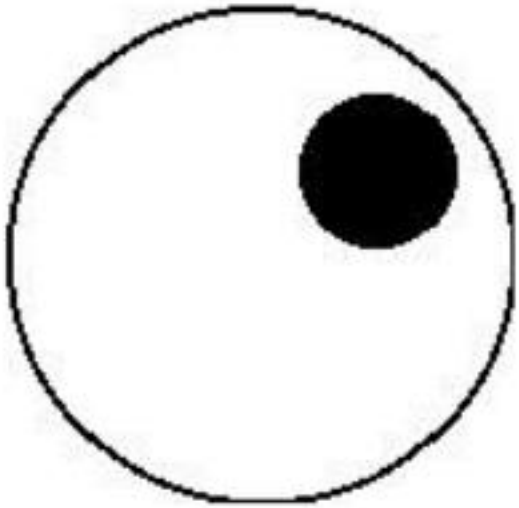


F4-6 F4-7

4) **The optical path adjustment between the third reflective lens and the focusing lens.**
Put the dimmer paper into the below of laser head, then press the “Pulse” button, check if the spot hit the middle of dimming paper. If it happened to be in the middle of the below of laser head, the light path is positive.



F4-8



In this example, the spot is on the upper and outer sides, not in the middle:
1. Adjust up and down deviation:

Only raise or lower the laser tube.

2. **Adjust inside and outside deviation:**
   The laser tube can only be adjusted inward or outward.
3. **In this example, the laser tube (referred to here as the low-pressure end of the laser tube) must be lowered, and then all readjusted from the first step;**

Note: The above work must be performed by professionally trained personnel. Otherwise, the relevant personnel must be asked for help.
Users must pay attention to safety when adjusting.

CHAPTER 5. EQUIPMENT MAINTENANCE

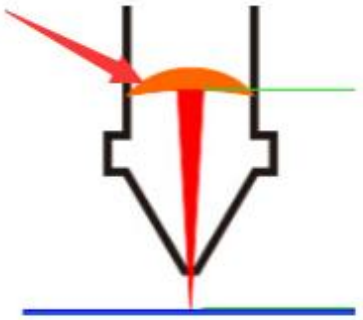
Storage of the Laser:
Keep the laser machine in a clean, dry and warm location with no vibration. Make sure there is NO MATERIAL (S) left on the worktable when the machine is not in use.
Machine Memory:
There should always be little to no files stored on your machine's memory. A large number of files can cause the controller card to have a slower reaction time when using the LED Control Panel and screen. If the machine's memory is pushed to its limits, it has the possibility to crash the controller card and or lock up the entire machine. This machine is just like a computer, if you acquire a large number of files over time, it will cause the operating system to slow down.
Make a Maintenance Schedule:
The easiest way to follow a cleaning schedule is to use a calendar and keep it close to your machine, write the dates that you want to do maintenance on. Some maintenance is needed on a regular basis while other cleaning could be an immediate requirement after a fire or large amount of smoke or fumes. A laser machine that has lack of maintenance could result in a laser that is not working properly.
Caution-use of controls or adjustments or performance of procedures other than those specified here in may result in hazardous laser radiation exposure.
Before starting cleaning and maintenance work always switch off the device and unplug the main plug.
Always keep the system clean, as flammable parts in the working area or exhaust area rise the fire hazard.
You should check at least once a day, weather dust has accumulated in the engraving system. In case of soiling the machine must be cleaned. The cleaning interval strongly depends on the material that is being processed and the operating time of the device. Please bear in mind that only a clean machine guarantees optimal performance and reduces the service costs.

5.1 General Cleaning Notes:

- Make sure that the device is switched off and unplugged. Open the protective cover.
- Move the working table into a position in which it is easiest for you to clean the surface with a window cleaning agent and paper towels.
- Thoroughly remove all loose dirt particles and deposits in the interior of the machine.
- Clean the cover of the laser tube.
- You can clean the viewing window with a cotton cloth. Do not use paper towels as they could scratch the acrylic.

5.2 Focal Lens Cleaning





This is the lens that is used to focus the laser beam and it should be cleaned at least once per week. It is NOT possible to clean the lens while it is mounted in the focal lens tube. The laser beam alignment should be checked after the cleaning of the lens has been completed. If there is any type of fire or large issue with smoke or fumes, it is advised to check the lens and clean it.
When cleaning the lens, use denatured alcohol as the cleaning solvent, use a lens tissue or cotton swabs to apply the solvent. Lens cleanings alcohol free wipes will also do the trick but, DO NOT scrape the lens, only use soft fabrics and approved solvents when cleaning the lens. Only use a soft swirling motion when applying the solvent then use a dry swab in a soft swirling motion to evaporate the solvent completely.
Make sure not to leave any dirt, smudges or water on your focal lens. The focal lens should be replaced if it is cracked, chipped, the coating is scratched, the core of the lens is darkened, the coating is wearing off or any other significant damage is found that could impact the laser beam passing through the focal lens. Some minor blemishes are acceptable, but these problems waste power and will result in reduced laser power at the target material. Any dirt, contaminate, or damage to the lens will cause the lens to deteriorate more quickly.
Laser Tube Output Coupler Lens:
This lens is located inside the output end of the laser tube, should be cleaned at least every 3 months. You must be very careful when cleaning this lens, it CANNOT be removed from the laser tube or replaced. As with other lenses and mirrors, use cotton swabs and isopropyl alcohol or lens wipes with an alcohol-free solution to clean this lens. The goal when cleaning this lens is to remove dust, film contamination from humidity, smoke or fumes. Be very careful, do not scratch the lens, it is non-replaceable unless the whole tube is replaced.

5.3 Gantry Rails and Worm Rods:

The gantry rails and worm rods should be checked at least every 3-6 months. The time between the cleaning and re-greasing of the gantry will depend on environment, usage of machine, cleanliness of area, etc. Your gantry and worm rods should be re-greased with White Lithium Grease, as needed. If the grease on

your gantry or worm rods is discolored, clumping or filled with debris, it must be cleaned.

5.4 Linear Rails & Bearings

The linear rails are the guiding rails along the left and right sides and across the gantry. These rails should be kept clean and without rust and have alight coating of white lithium grease. The linear rails should be cleaned and examined once a month to prevent the laser head from seizing up. The surface of the rails should always have white lithium grease on them and should be “wet” to the touch but not saturated or dripping.

The linear bearings are found under the gantry (to mount the gantry to the side rails) and under the focal head (to mount the focal head to the gantry). We recommend using white lithium grease and applying that onto the linear rails and inside the linear bearings.

5.5 Incline Portion of Table & Collection Tray(s):

It is HIGHLY RECCOMENDED that these areas be cleaned of debris before, between and after operating the machine. Doing so will help prevent any accidental hazards that may cause afire or excessive smoke.

5.6 Rubber Belts:

The rubber belts should be checked for appropriate tensions at least every 6months. You should expect the two side belts to be the same tension and should be adjusted and tensioned on the same maintenance schedule. These side belts work together to move the gantry from front to back. If one belts tensioned more often than the other, that belt could become stretched out more than the other. It is difficult to describe the appropriate tension of the belt but there should be no slack, sagging or flapping. If the belt appears to be worn on one side, it would be best to check the bearing alignment and assure that there is no damage. There are many laser machine designs but the method of changing the belt tension should not be too complex. It is normally a method of tightening a screw and then applying a lock nut to keep the screw in place.

5.7 Water Change

Check the water volume in the tank of chiller: it is recommended to check once a half-month in summer and once a month in winter. If the volume of cooling water is below 60% of the total volume, please input more water in time (should be soft water or distilled water, completely replace the cooling water every two months). You can also simply follow the sign marked on the chiller and make sure it is in the middle part of “normal” range.

Note: Before the machine is started to run, make sure the laser tube is full filled cooling water.

5.8 Clean And Install Laser Tube

Generally, the glass turns yellow because of oil stains in the air and alkali in water vapor, such as scale. In addition, the laser tube will have a burning smell after use, and the surface color of the laser tube will turn brown. This is because static electricity will be generated in high-voltage environment, and static electricity will produce adsorption phenomenon. There is a lot of dust in the working environment, especially in the case of long-term carving wood, this discoloration will be more serious, but this will not affect the normal operation of the machine. This is not the fault of the power supply or the laser tube. As long as you pay more attention to the hygiene of the working environment, this situation can be avoided. If the laser tube has changed color, you can wipe the outside with water or alcohol. Regularly remove the dust and sundries on the laser tube and the water cooler to ensure that less dust pollutes the laser tube. However, if the interior of the glass tube has been polluted, it needs to be cleaned in time.

1) Disconnect the anode and cathode wires and the water inlet and outlet of the Co2 laser tube, at the condition that the power is off.
2) Pour out all the water from laser tube, stick adhesive tapes onto the laser beam exit, and make sure the output optic will not be contaminated at all when cleaning the tube.
3) Input vinegar or hydrochloric acid into the water inlet of the laser tube until it is full.
4) Place it carefully on the table and wait for 30 minutes, then shake it smoothly, and then make liquid out of the tube.
5) Pour out the mixed liquid, and rinse the laser tube with a lot of water (purified water). After this, if there still is some dirty adhering to the tube, repeat step 4 and 5. Notice: the mixed liquid shall not be kept in the glass tube for more than 30 minutes, and rinse it right after the solution is out.
6) Dry the water on the laser tube, the beam exit, and the high voltage end with absorbent material, especially on the electrodes.
7) Take the adhesive tape away from the laser output window, check if the optic is contaminated, clean it properly and carefully if any contamination or water left on it, and then mount the Co2 laser tube on the machine.

Connect the power and run for 2-3 minutes (let the laser tube full filled with recycled water)

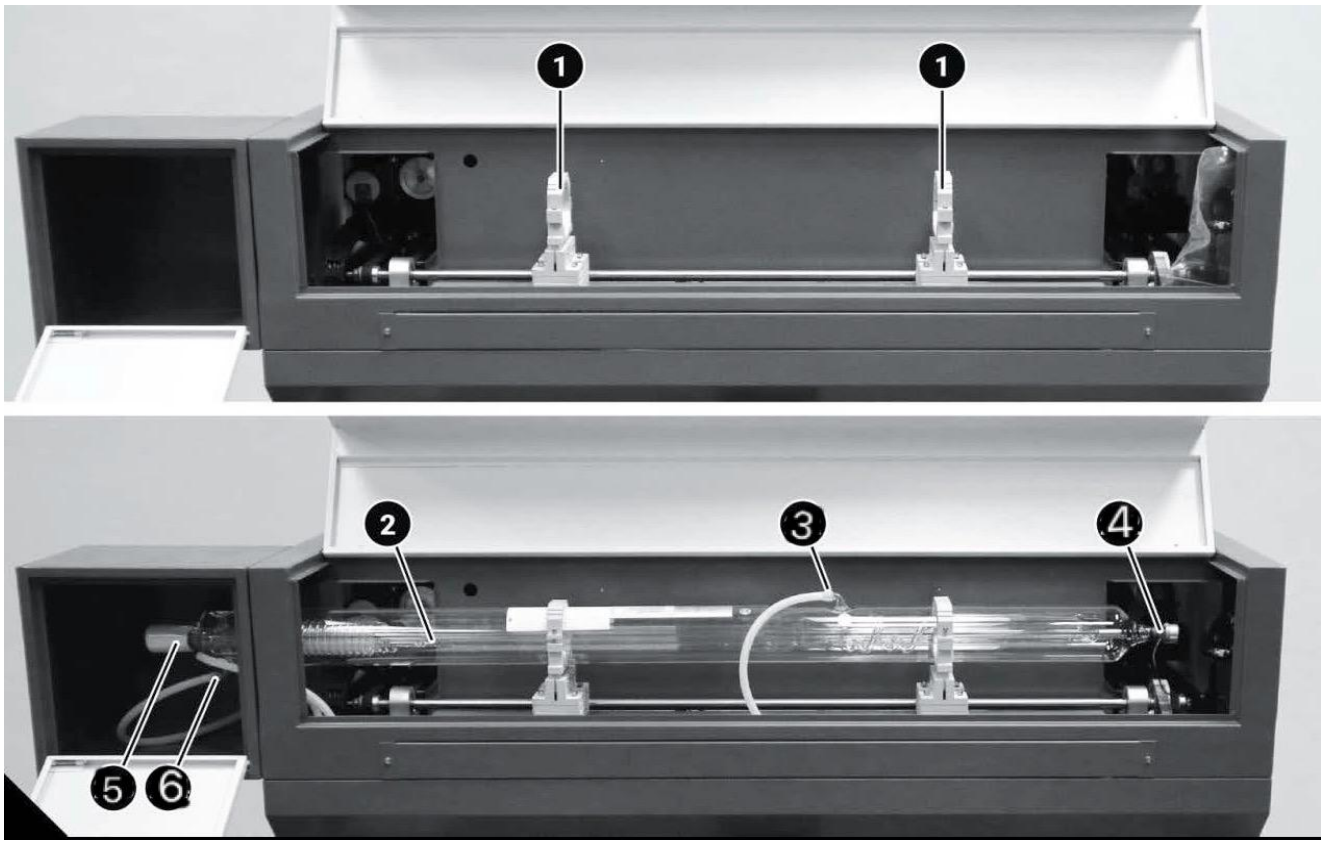
5.9 Laser Tube Installation

To reinstall the laser tube, follow the procedure exactly. Avoid any adjustments to mirrors or laser tube mounts during the installation.

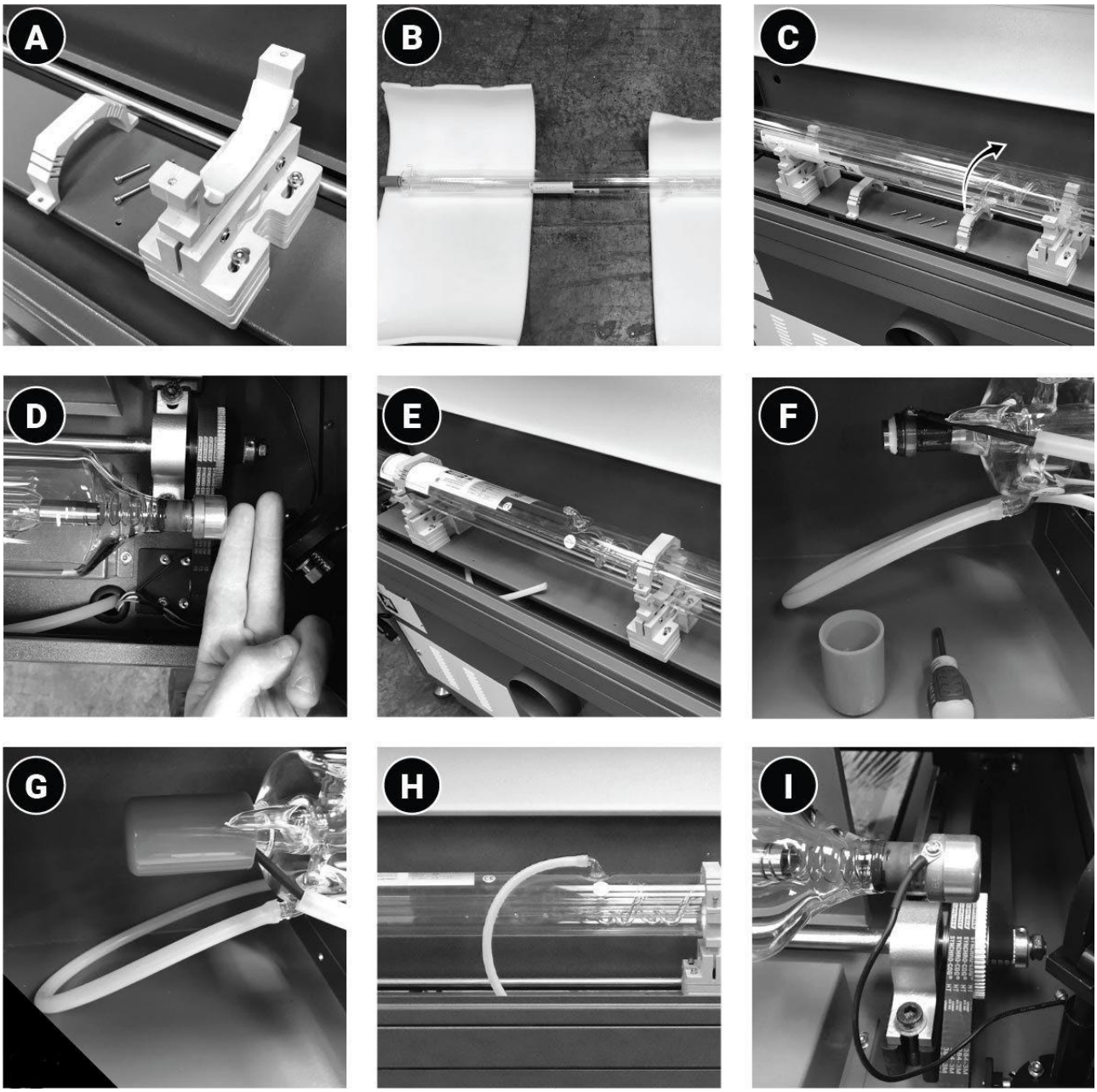
Tools Needed:

Allen wrenches. Phillips head screwdriver (short)

Make absolutely sure that the machine is not connected to the power source.
Laser Tube Installation, as is shown in picture:



(1) Laser Tube Mount. (2) Laser Tube. (3) Water Outlet.
(4) Anode Terminal. (5) Cathode Terminal. (6) Water Inlet.



(A) Laser tube mount.

(B) Laser tube packaging.

(C) Laser tubes in place rotate water outlet vertical.

(D) Laser tube two-finger spacing from mirror.

(E) Laser tube mounted.

(F) Cathode connection & water inlet connection.

(G) Cap.

(H) Water outlet connection.

(I) Anode connection.

A. Remove the top portion of each (1) laser tube mount with an Allen wrench. Do not make any adjustments to the other components of the laser tube mounts.
B. Carefully remove the (2) laser tube from the packaging.
C. Carefully place the (2) laser tube in the laser tube mounts. Once in place, rotate the laser tube so that the (3) water outlet tube is pointed straight up. This will eliminate any air bubbles form staying stagnates in the laser tube.
D. Position the laser tube by translating the position of the laser tube to a distance of 1.5-2" form the first mirror assembly. A width of 2 fingers is adequate.
E. Reinstalled the top mounts of the (1) laser tube mounts. Only tighten down enough to secure the tube, do not over tighten. Do not adjust the height or position of the tube mounts at this time.
F. Unscrew the red cap and connect the (5) cathode wires to the laser tube with the Phillips head connection screw. Install the (6) water inlet connection by wetting the tube with water and pushing it completely into place.
G. Screw the red safety cap back in place.
H. Connect the (3) water outlet tube by wetting the end of the tube and pushing into place.
I. Connect the (4) anode wire to the laser tube with the Phillips head connection screw.

5.10 Clean fan

There will accumulate a lot of solid dust inside of the fans after prolonged use of fan. So fans have a lot of noise and not good for exhaust and remove taste. When the fan suction is inadequate and smoke cannot be exhaust smoothly, it should be powered off firstly then unplug vent pipe connected with the fan.
Remove dust inside of the vent-pipe and then make the fan upside downslide the fan until clean up the dust. After all pipelines and fans are cleaned, install the fans.

5.11 Inspection of the light path

In the optical path, the focus lens does not have deviation problem. However, the three mirrors are all fixed by mechanical parts, and the possibility of deviation is relatively large. Although there will be no deviation under normal circumstances, it is recommended that the user should check whether the optical path is normal before each work. For details, please refer to Chapter 4.

CHAPTER 6. TROUBLESHOOTING

Laser Not Turning On:

First, make sure that the electrical outlet is working, plug in a lamp or phone charger to ensure that its the machine and not the outlet.
Check the simple stuff first

1. Is the emergency stop button pressed?
2. Is the key in the machine and turned into the on position?
3. Is the cord plugged into the machine and electrical outlet?

Machine is turning on but Not Firing:

The laser has multiple protection modes built in to prevent possible injuries or damage to the machine. Problems with any of these modes can prevent the machine from firing but the laser head will still move around as if the machine is working correctly.

1. Check to see if the chiller is working and flowing water throughout the tube. If no water flow is detected by the machine, it will not fire.
2. Check to see if the exhaust fan is on and working, the machine will not fire without it.

If the water chiller alarm is going off (a beeping noise), it can be one of three reasons:

1. The waterline hoses are pinched so that the water cannot freely flow.
2. The water chiller does not have enough water
3. The temperature is either below or above the alarm levels.

CHAPTER 7. WARRANTY REGULATIONS

7.1 Warranty

The machine warranty is 12 months from the day you order the machine (except the consumable parts).

WARNING!
VOLTAGE. Before connecting this tool to a power supply (receptacle, outlet, etc.) makes sure that the voltage supplied is the same that is specified on the nameplate of the tool. IF in doubt, do not plug in the machine. Using this tool with a voltage different than that stated on the nameplate can damage the electrical components of this machine and any such damage will not be covered by a warranty.
CIRCUIT BREAKET. Also make sure that the power supply is equipped with the appropriate breaker and plug according to your local electrical code. To do this, first check the motor plate to get the FLA amperage of the appropriate circuit breaker, please consult an electrician or an electrical supply source.
ELECTRICAL SHOCK. It is extremely dangerous to work on live wires and or electrical systems that are connected to a power source. ALWAYS disconnect the power from the machine prior to performing any maintenance or adjustments work.
MOTOR WIRING: The information in this manual was current at the time of printing but may be different than the diagram on your machine. ALWAYS use the supplied wiring diagram with the machine or motor (under the electrical covering) if present.

7.2 Warranty Clause

This warranty clause is based on the products sold by Sign-in-Global.us, as the object of warranty.

During the warranty period, if the normal use of the company's products fails, you can present the warranty card or invoice according to the content of this warranty clause to enjoy the company's free warranty service.

Under the following circumstances, you will not enjoy free services, and you will be charged according to the specific circumstances:

1) Maintenance services are not caused by the quality of the equipment;
2) The warranty period has expired;

3) Failure to perform the agreed obligations in accordance with the provisions of the contract;
4) Unauthorized disassembly, modification, and maintenance of the product without the consent of the company;
5) Do not operate according to the items specified in the "Instruction Manual" (such as: grounding, etc.).
6) The high-quality accessories provided by our company are not used.
7) Force majeure such as natural disasters, fires, thefts, etc.
8) Damage caused by smoke, chemicals and other similar factors.
9) Damage caused by dismantling and repairing by the maintenance department not designated by the company.

The equipment malfunctions due to human factors or force majeure.

The company only assumes due legal obligations for the products sold, but does not assume other responsibilities arising from the use of the company's products.

Warranty Card 1 year warranty from date of purchase	
Reference No.	LCM-DR-1390-150W-K-US
Serial No.	
Date of Purchase	
www.sign-in-global.us	

Chapter 8. Common Problems and Solutions

1. **Problem: No reset, chaotic engraving, misplacement after booting.**
   Reason: The ground wire is not connected or the ground wire is not connected well.
   Solution: Connect the ground wire as required.
2. **Problem: The engraving depth is uneven.**
   Reason: The water circulation system does not work, and the light path is not adjusted properly.
   Solution: Turn off the machine and wait for 1 hour, restart the water circulation until there is water out of the outlet pipe, and then turn on the dimming.
3. **Problem: There is no voltage when starting up.**
   Reason: The fuse on the right side of the machine has been looped.
   Solution: Replace the spare fuse.
4. **Problem: The engraving depth is too shallow.**
   Reason: The laser beam is not in the center of the lens or the lens is too dirty.
   Solution: Adjust the laser light path and clean the lens.
5. **Problem: The lettering is blurred.**
   Reason: The lens is reversed or the focal length is wrong.
   Solution: Align the lens and adjust it to the specified focal length.
6. **Problem: The machine discharges and ignites.**
   Reason: The connection of the wiring is not good or the air is too humid. There is dust on the terminal.
   Solution: Connect the ground wire, clean up the dust, ventilate and dry.
7. **Use the table below and select the material whose material properties are closest to the work piece being cut or engraved.**

	LASER TUBE WATTAGE		
Material	Examples or sub categories of material.		
Process	Speed (mm/s) – Min Power%		
	60W	90W	130W
Hard Plastics	Acrylic (Lucite, Plexiglass, PMMA), Delrin, Polyethylene film (Mylar)		
Engrave	450 - 40%	450 - 35%	450 - 25%
Cut 1/8” (3.2mm)	35 -100%	50 -100%	60 -100%
Cut 1/4” (6.4mm)	15 -100%	20 -100%	35 -100%
Cut 3/8” (9.5mm)	-	5 -100%	15 -100%
Cut 1/2” (12.7mm)	-	-	5 -100%

There are commonly two types of acrylic. Casted acrylic produces a frosted-look engraving. Extruded Acrylic (the cheaper of the two) is best for cutting and produces a clear engraving.			
Wood	Hardwoods, Plywoods, MDF, Particle Boards		
Engrave	200 -100%	300 -100%	450 -100%
Deep Engrave	100 -100%	175 -100%	300 -100%
Cut Veneer	200 - 80%	250 - 80%	300 - 80%
Cut 1/8” (3.2mm)	50 -100%	100 -100%	200 -100%
Cut 1/4” (6.4mm)	15 -100%	25 -100%	50 -100%
Cut 3/8” (9.5mm)	-	5 -100%	40 -100%
Cut 1/2” (12.7mm)	-	-	5 -100%
Cut with the grain when possible. Consider that the density and water content of the wood will play a role in the above parameters. Do not process woods with flammable surface finish like lacquer or varnish.			
Rubber	Silicone, Vulcanized Rubber, Polyurethane, Neoprene, Gaskets, Rubber vibration mats, Rubber stamps		
Engrave	200 - 80%	325 - 80%	400 - 80%
Cut	80 -100%	120 -100%	150 -100%
Fabric	Polyester, Nylon, Leather, Denim, Netting, Neoprene, Cotton.		
Cut / Engrave	450 - 20%	450 - 15%	450 - 15%
Paper (thin materials)			
Cut / Engrave	500 - 10%	500 - 10%	500 - 10%
When cutting paper, be very cautious of the fire danger. Achieve laser settings such that the laser cuts the material as quickly as possible without leaving burn marks.			

If there are other problems, please call the company's technical service hotline or dealer phone.