-[AEON LASER]

AEONlaser®

[User Manual]

[for MIRA&PLUS]

Preface

Thank you for buying our Laser System. This User manual will help you to get to know how to use our laser engraving and cutting machine properly and effectively step by step, also learn how to maintain the machine to get as much from it. The manual is divided into six chapters, Including machine general information, safety Note, installation guide, operation instructions, maintenance principle and basic trouble shooting techniques. We also take many real object photographs in the manual to help you understand.

Caution:
Before installation and operation of the machine, please read and follow this Manual carefully. Damage to persons and/or material can result from not following individual points of the Operation Manual!
Operation of the system is only permitted with equipment and spare parts supplied or listed in the spare parts and consumables lists. Auxiliary equipment must be adjusted to the base machine (any queries to dealer or manufacturer).

  It should be emphasized that the installation of each system must meet the requirements, and make it consistent with the installation requirements of AEON Laser. If not, the machine will not working properly，resulting in poor performance，life shortened，maintenance costs increased and even machine damage. The note is for getting a specific requirement of system installation，and we hope every customer try to understand these notes before installation and usage, thus you can correctly install and use. If you meet any installation problems, you can contact our technical staff and customer service staff.

Welcome to provide us your valuable comments or suggestions, we'll be very appreciated!

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Chapter I General Information

1.1 Overview of the machine

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1.2 Technical Parameters of the Machine

Electricity, Power, Fuse

Electricity Requirements: 110V AC 60Hz/220V AC 60Hz/220V AC 50Hz Single Phase

Power Consumption: 1200W

Recommended fuse: 10A

Mechanics

Working Area: 300mm*500mm/11.9"*19.7"

Worktable Size: 750*480mm

Z Axis Height: 150mm

Max. Engraving Speed 1200mm/s

Cutting Speed: depends on material, thickness and Laser Power

Motor: Stepper Motor

Work Table: Metal(Honey comb worktable)

Max. Load of worktable: 40Kg

Net Weight: 105Kg

Lens Available(focal length): 1.5"

Focus lens diameter: 18mm

Reflector Diameter: 20MM 1pcs, 25MM 2pcs

Beam Combiner diameter: 20mm

Dimensions

W*L*H

Control System

Laser Power: 40W

Interface Hardware: RD6442S

Interface Software: RDworks

Laser Equipment

Laser Type: CO2 Laser

Wavelength: 10600nm

Cooling System

Air Cooling System: No

Water Cooling System: Yes

Ambient Conditions

Ambient temperature: +15°C to +35°C / 59°F to 95°F

Humidity: 40% to max. 70%, not condensing

Laser Safety

Laser class: CDRH Laser Safety, Laser Class IV

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1.3. Designated

The AEON laser system is used for engraving and cutting of signs, stamps and suchlike. A wide variety of materials such as rubber, acrylic, coated metal, tin, special steel, anodized aluminum, cork, cardboard, glass, leather, marble, several plastics and wood can be processed on the laser.

❖ The engraving process must only be performed with a perfectly adjusted machine.
❖ For cutting applications with 40W the use of the cutting table is absolutely necessary.
❖ Use of the system in other areas is against the designated use. The manufacturer does not admit liability for damage to personal and/or equipment resulting from such use.
❖ The system must only be operated, maintained and repaired, by personnel that are familiar with the designated field of use and the dangers of the machine!
❖ Non-observance of the instructions for operation, maintenance and repair described in this Operation Manual excludes any liability of the manufacturer if a defect occurs.
❖ Caution when processing conductive materials (carbon fibers), Conductive dust or particles in the ambient air might damage electrical components and lead to short circuits. Bear in mind that those defects are not warranted.

1.5 Disposal of the machine

Do not dispose the machine with domestic waste!

Electronic devices have to be disposed according to the regional directives on electronic and electric waste disposal. In case of further questions, please ask your supplier. He might take care of proper disposal.

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Chapter II Safety

2.1 General Safety Information

Principle of a CO2 Laser

LASER is the acronym for Light Amplification by Stimulated Emission of Radiation. A CO_2 laser works by electrically stimulating the molecules within a carbon dioxide gas mixture. When focused through a lens, this highly-intense and invisible beam will vaporize many materials. Depending on the speed and intensity of the projected beam, a CO_2 laser may be used to engrave or cut through a wide variety of materials

Safety Lock System

The laser system is equipped with a safety interlock system utilizing magnetic sensors on the top right corner of the laser working window , The magnetic sensors will deactivate the laser when the acrylic lid of the machine is open. After closed the door, the laser will be connected again.

⚠ **WARNING**

- DO NOT operate the laser system if any component of the safety system is malfunctioning.
- DO NOT attempt to remove or modify any component of the safety interlock system.

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2.2 Safety Materials

Laser Machine use high heat to cut or etch a given material. Some materials respond to this method beautifully, others not so much. It is important to know the material you are working with, since some, like PVC are easy to cut, but give off a chlorine gas that's not healthy for human or the machine. Below is a list to use as a guide. New materials come out daily, if you are not sure about its laser ability, contact us and we'll try and identify its properties and determine if it's safe and possible to be processed by Laser machine.

Plastics:
- ◇ ABS(acrylonitrile butadiene styrene)
- ◇ Acrylic(also known as Plexiglas, Lucite, PMMA)
- ◇ Delrin(POM, acetal)
- ◇ High density polyethylene(HDPE)-melts badly
- ◇ Kapton tape(Polyimide)
- ◇ Mylar(polyester)
- ◇ Nylon-melts badly
- ◇ PETG(polyethylene terephthalate glycol)
- ◇ Polyethylene(PE)-melts badly
- ◇ Polypropylene(PP)-melts somewhat

Styrene

Two-tone acrylic-top color different than core material, usually for custom
instrumentation panels, signs and plaques.

Foam

Depron foam-often used for RC planes

EPM

Gator foam- foam core gets burned and eaten away compared to the top and bottom hard shell

Other:
- ◇ Cloths(leather, suede, felt, hemp, cotton)
- ◇ Papers
- ◇ Rubbers(only if they do not contain chlorine Teflon(PTFE, Polytetrafluoroethylene))
- ◇ Woods(MDF, balsa, birch, poplar, red oak, cherry, holly, etc)

Materials that can't or should not be cut

★ Metals

★ Polycarbonate(PC, Lexan)due to the fumes

★ Any materials containing chlorine

a. PVC(Cintra)-contains chlorine

b. Vinyl- contains chlorine

High pressure materials include all the above guidelines and as listed:

★ Stainless steel up to 18 gauge

★ Mild steel up to 18 gauge

★ Thicker and denser woods

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2.3 Safety Notes

➢ This laser engraving system contains a carbon dioxide (CO2) laser of class 2 that emits intensive and invisible laser radiation. Without safety precautions the direct radiation or even diffuse reflected radiation is dangerous!

➢ Without safety precautions, the following risks exist with exposure to laser radiation:

Eyes: Burns to the cornea

Skin: Burns

Clothing: Danger of fire

➢ There are high voltage and other potential dangers in this machine. Please keep from those that got little knowledge of this machine.

➢ All personnel involved in installation, set-up, operation maintenance and repair of the machine, must have read and understood the Operation Manual and in particular the"Safety" section.

➢ The machine must only be operated by trained and authorized personnel.The scopes of competence for the different activities in the scope of operating the machine must be clearly defined and observed, so that under the aspect of safety no unclear questions of competence occur. This applies in particular to activities on the electric equipment, which must only be performed by special experts. For all activities concerning installation, set-up, start-up, operation, modifications of conditions and methods of operation, maintenance, inspection and repair, the switch-off procedures that may be provided in the Operation Manual must be observed.

➢ It is the duty of the operator, to check the machine before start of work for externally visible damage and defects, and to immediately report changes that appear (including behavior during operation) that affect the safety.

➢ Preparation, retooling, change of work piece, maintenance and repair activities must only performed with equipment switched off, by trained personnel.

➢ It is forbidden to perform unauthorized modifications and changes to the machine. It is emphasized, that any unauthorized modifications to the machine are not permitted for safety reasons.

➢ CO2 Fire extinguishers should be placed near laser.Do not store any flammable materials in the inside of the device. Particularly leftovers of produced materials have to be removed to prevent fire hazard.

➢ These lasers emit invisible radiation; safety glasses should be worn when maintenance these machines for your protection.

➢ Do not disable limit switches or safety features as this can invalidate warranties and cause damage to you and the machine.

➢ Do not leave the laser unattended when it is working, small scraps can ignite and without supervision can destroy the machine if not checked.

➢ Before processing materials the user must verify, whether harmful materials can be generated and whether the filter equipment of the exhaust system is suitable for the harmful materials. We emphasize that it is the responsibility of the user, to consider the national and regional threshold values for dust, fogs and gases when selecting the filters and the exhaust system. (The values for the maximum workplace concentration must not be exceeded.)

➢ Keep the machine in dry place, non-pollution, non-concussing, non-strong electricity, non-strong magnetic field etc. environmental temperature should be 5-40℃, environmental humidity should be 5-95%(no condensed steam).

➢ The laser machine should be far from sensitive EMI equipment, it will make EMI to this kind of equipment.

➢ Do not turn on the machine when the power supply voltage is unsteady or mismatch.

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2.4 Safety Warning Labels

➢   **Manufacturer's Label**

This label is located at the right-back side of machine. All the product information such as Serial Number, Model Numbers, Laser Power and Electric power can be found here. Before requiring any further tech support, always provide the service person with the information on this label.

➢   **CDRH Label**

This label indicates the class level of CDRH.

➢   **Laser Path Label**

This label indicates the laser path. Normally you can find this label inside of machine. Please take extra caution of this area when you conduct maintenance

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➢ **Laser Path Danger Label**

This laser indicates the laser path, take extra care of this area when engraving, avoid direct exposure to visible or invisible beam.

➢ **Laser Path Caution Label**

AEON laser machines are very safe under normal functioning conditions. However, in case of any accident, Laser Path Warning Label will be affixed on the possible laser path. When operators are nearby these paths, they should be careful of the possible injury while the machine is operating.

➢ **Laser Warning Label**

This label Indicates that there is laser radiation for the machine, usually found on the outside body of the machine.

Pay attention to the laser radiation, avoid exposure to beam.

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Chapter III Installation Guide

3.1 Unpacking the MIRA

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The gantry of the machines are tied by the binder. You have to cut it before running the machine!

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Accessories inside the Box:

Power Cable

LAN Cable

Exhaust pipe fastening piece

USB Stick and spare screws.

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3.2 Laser machine Parts Overview

Side Panel

PC Lid

Side Panel

Front Panel

Optic path check panel

MIRA

AEON

Electric Circuit Check Panel

WIFI

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Optical path checking panel

water Cooler

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3.3 Set up and Installation Guide

This laser machine is of high compact design, which already integrated with the water cooling system,as well as the air assists system. The installation is quite easy. You don't have to prepare water bucket or install air pump any more.There are mainly five steps to get started.

1. Open the water tank cap, you will find the water inlet, Add about 1.9L pure water into the water tank.

Suggested use purified water or distilled water, and water temperature should be under 35 centi-degree

2. Install the Exhaust Pipe

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Screw in the exhaust pipe fixture, fasten the rings after you put on the pipe on the fixture. Lead the other end of the pipe outside your windows or house ventilation

3. Connect the machine to the computer with data cable or Wi-Fi

The USB interface is used to connect data cable, which you could connect the data cable to computer. Or you could connect WIFI if your machine got WIFI. There are WIFI setting instruction in the following Chapter

4. Connect the power

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5. Turn on the machine. Rotate the Control Switch clockwise, the button will bounce up, then the machine will be powered on. Laser head starts to move back to it's origin point.

Note: For first time installation, after the machine was turned on, please do not operate the machine immediately. Wait one or two minutes to let the water cooling system fill laser tube fully. You could open the back lid to check if the laser tube is full of water. Then you could start firing the laser.

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Chapter IV Operation Guide

4.1 Overview of the keys on the control panel

- ❖ **Reset:** Reset the whole system;
- ❖ **Origin:** Set the relative origin;
- ❖ **Pulse:** Pulses the laser
- ❖ **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 max laser power of the current running layer, or set the power of "Pulse" Key;
- ❖ **Min. Power:** Set the min laser power of the current running layer,
- ❖ **Start/Pause:** To start or pause the work;
- ❖ **Left & Right Arrow:** To move the X axes or the left/right cursor;
- ❖ **Up & Down Arrow:** To move the Y axes or the up/down cursor;
- ❖ **Z/U Button:** 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 axes move, U axes move, each axes to go home etc.;
- ❖ **Esc:** To stop work, or to exit to some menu;
- ❖ **Enter:** Validate the change;

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4.2. Introduction to the main interface

When the system is powered on, the screen will show as illustrated below:
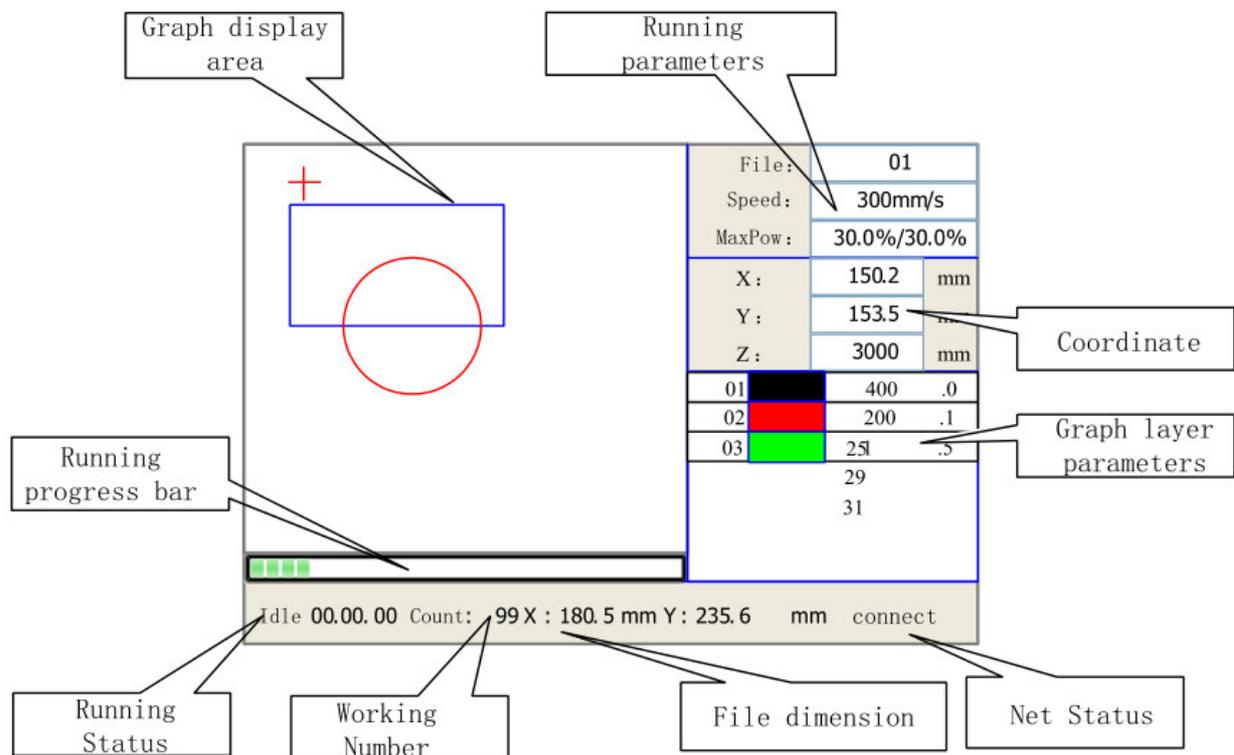
- ❖ **Graph Display Area:** To display the whole file's track, and display the running track.
- ❖ **Running parameters:** To display the running file's file number, speed, max power etc.;
- ❖ Coordinate: To display the current coordinate of X,Y and Z axes
- ❖ **Graph layer parameters:** To display the layers' information of the current file, such as max or min power, speed etc.. When system is idle, double click the layer, then users can change the layer's parameters and the changing would be saved.
- ❖ **Running Status:** To display the current status of the machine, such as Idle, Run, Pause, Finish, etc.;
- ❖ **Running Progress Bar:** To display the progress bar of the current running file;
- ❖ **Working Number:** To accumulate the work number of the current file.
- ❖ **File Dimension:** To display the dimension of the current file;
- ❖ **Net status:** To display the connecting status of the Ethernet.

When work is Idle or finished, all keys can be pushed, users can select a file to run, set some parameters, preview to a select file etc. But, when work is running or paused, some keys don't respond when they are pushed.

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4.3 The Speed Key

Push the "Speed" key when the screen is on the main interface, as shown below:

Speed: 300 mm/s

Modified press Enter
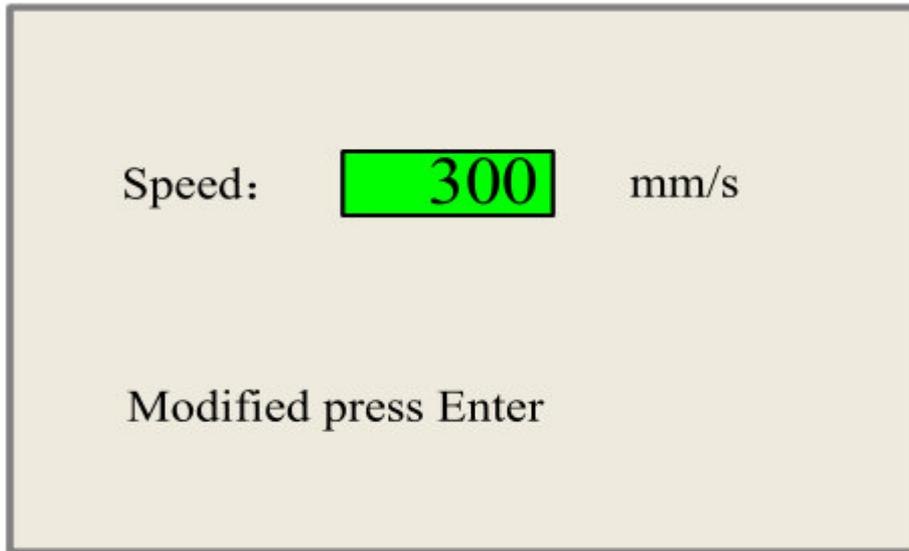
Push the "X+/-" Keys to move the cursor in the numeral area, and push the "Y+/-" keys to change the value, then push the "Enter" key to save the change, push the "Esc" key to invalidate the change.

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4.4Max/Min power keys

Push the "Max Power" or the "Min Power" keys when the screen is on the main interface, shown Below:

MaxPower1:   30.0   %

MaxPower2:   30.0   %

Press Z/U move item
Modified press Enter

MinPower1:   30.0   %

MinPower2:   30.0   %

Press Z/U move item
Modified press Enter
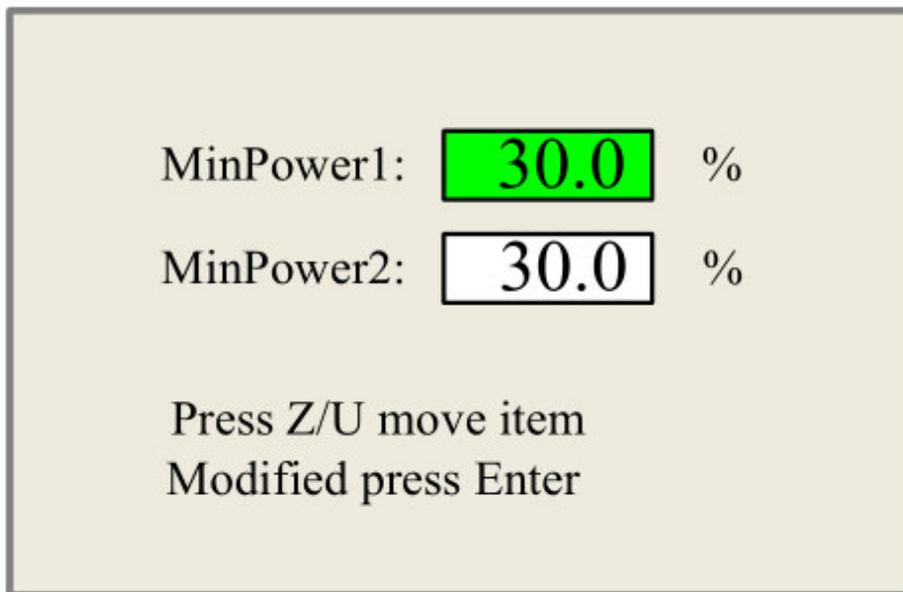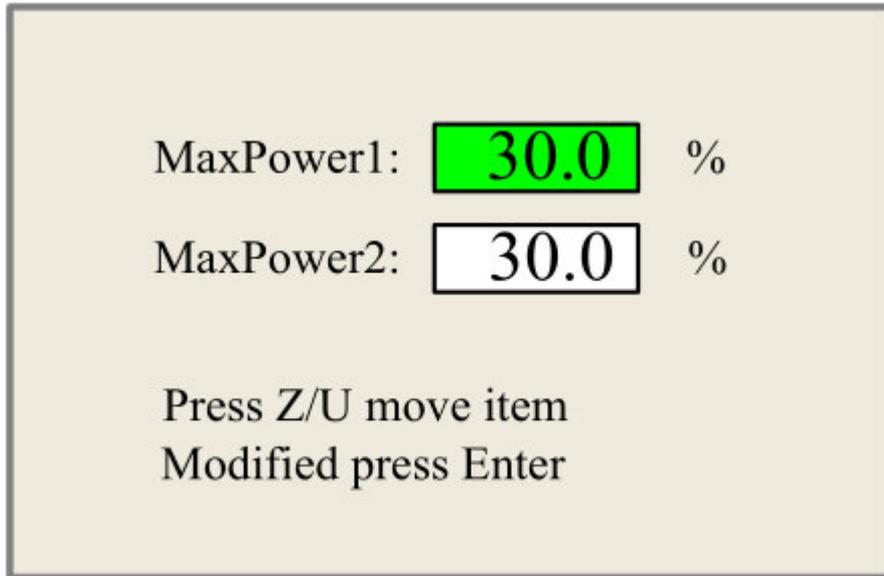
When "Z/U" key is pushed, the green block can move up and down to denote the changing item, then "Y+/-" keys and "X+/-" keys can be used to change the value.

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4.5 Set the layer parameters

After selecting a file to preview on the main interface, user can push "Enter" key to let the cursor move to the first layer, then "Y+/-" Keys can be pushed to select the intent layer, on that time, user can push "Enter" key to check the selected layer's parameters, illustrated as below:

User can push "Z/U" Keys to move the green block on the intent parameter, then you could change the parameter if needed. "OK" to validate the change, and "Esc" to invalidate the change.

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4.6. Z/U Key

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 following interface (shown as below):

Z move	Language+
U move	IP setup+
Axis reset+	Diagnoses+
Manual Set+	Screen Origin+
Laser Set+	
Origin set+	
Set Fact Para	
Def Fact Para	
Auto Focus	
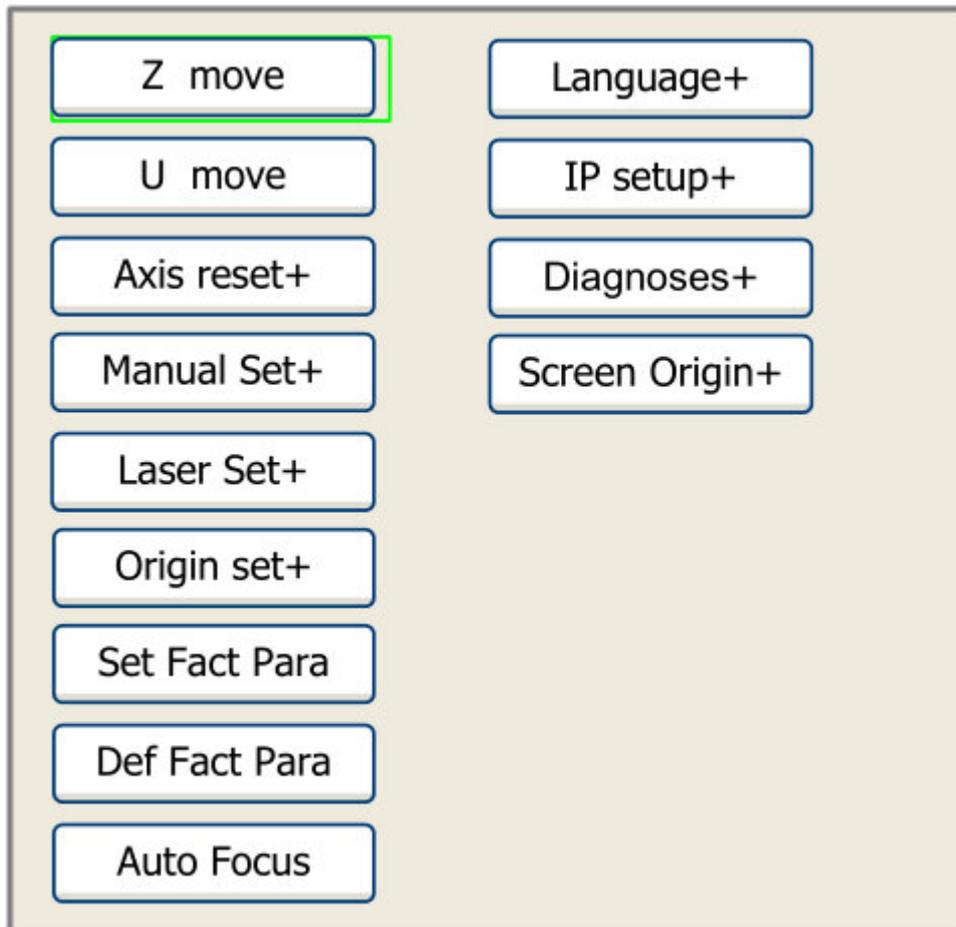
Push "Y+/-" keys to move the green block to the anticipate item, and then push the "Enter" key to display the sub menu.

Z move: When it is highlighted on "Z Move" item, "X+/-" keys can be used to move the z axes.
U move: When the green block is on "U Move" item, "X+/-" keys can be used to move the u axes.

Note: If your machine got "Extended Axis" Menu, the machine got 4 Axis. The Up&down table is different, you can follow the below instructions to control the UP&down of the worktable

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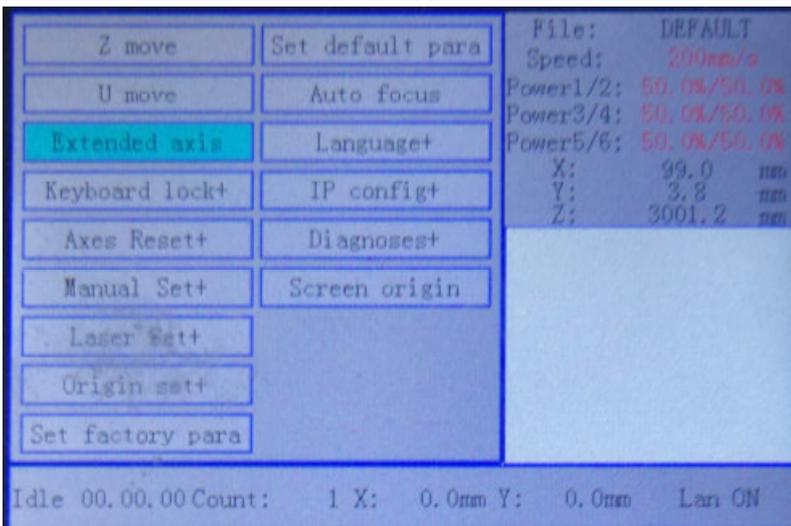
Press Z/U button of the control panel, choose "Extended Axis", Press enter, to enter into secondary menu:
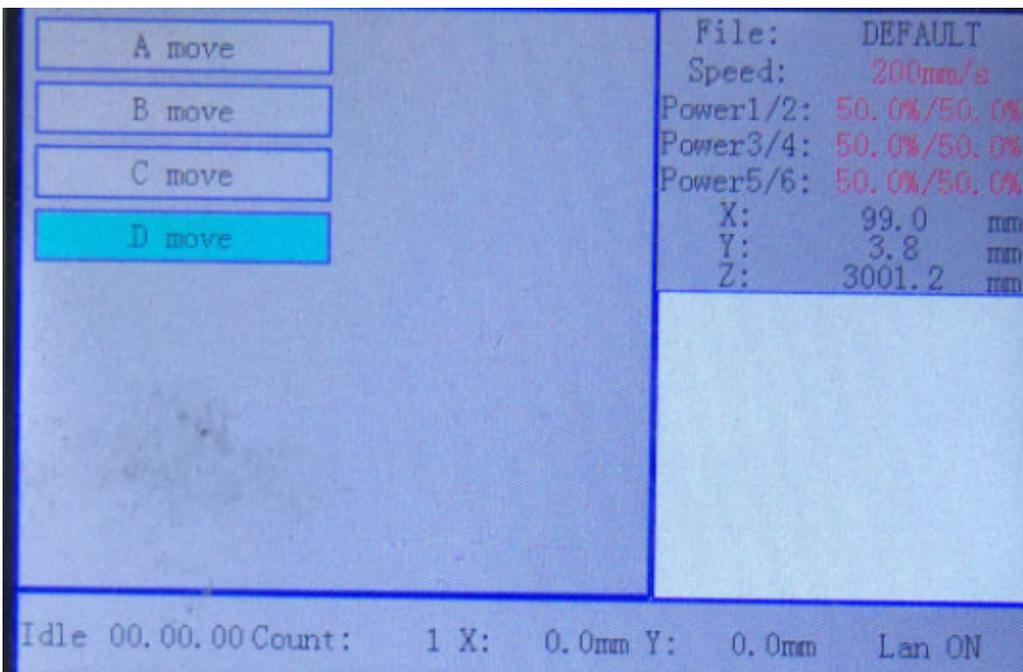
Choose "D move", then the worktable can be moved Up&down by pressing the "<----" and "---->" arrow button.

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4.7. Axis reset+

When the green block is on this item, push the "Enter" key to show as below:
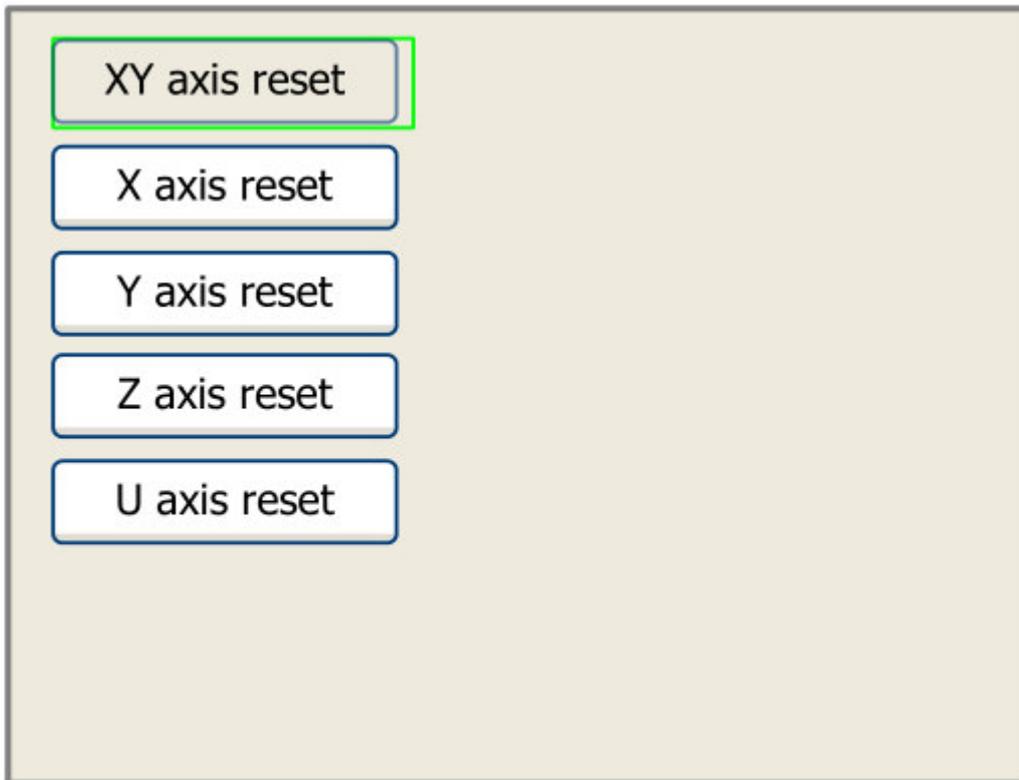
Push the "Y+/-" Keys to move the cursor to one of the entry, then push "Enter" key to restart the selected axis, the screen will show some information when resetting.

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4.8. Manual set+

When the green block is on this item, push the "Enter" key to show as below:
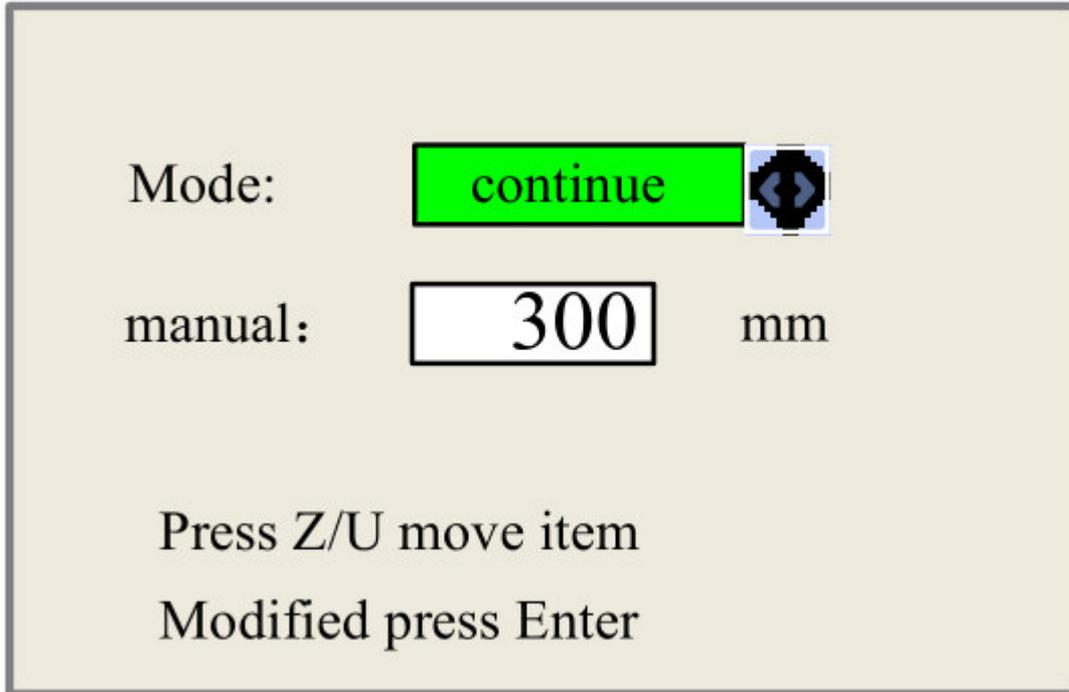
Mode: continue

manual: 300 mm

Press Z/U move item

Modified press Enter

Push "Z/U" key to move the green block, and when the green block is on the "Mode" item, push "X+-" keys to select the anticipate value, "Continue" or "Manual". When "Continue" item is selected, then the "Manual" item is not valid, on that time, push the direction keys to move the corresponding axes, and when the pushed key is loosed, then the corresponding axes will finish moving. When the Mode item is "manual", then pushing the direction key one time, the corresponding axes will move a fixed length, unless the scope is overstepped.

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4.9. Laser set+

When the green block is on this item, push the "Enter" key to show as below:
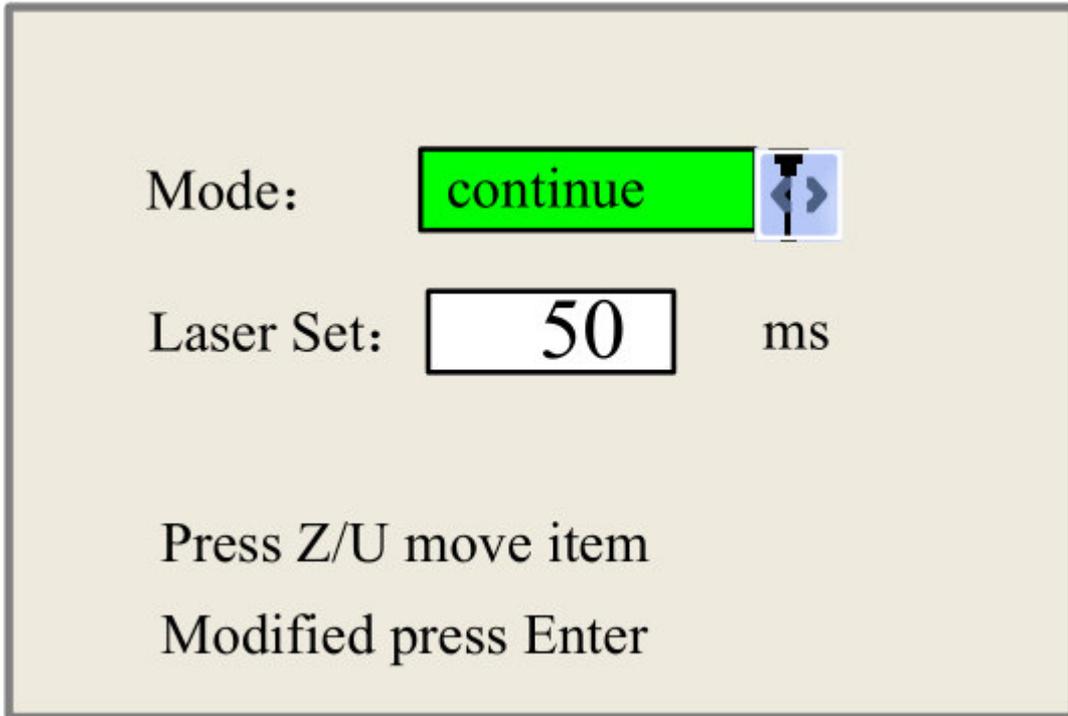
Mode: **continue**

Laser Set: **50** ms

Press Z/U move item

Modified press Enter

Push "Z/U" key to move the green block, and when the green block is on the "Mode" item, push "X+-" keys to select the anticipate value, "Continue" or "Manual". When "Continue" item is selected, then the "Laser Set" item is not valid, on that time, push the Laser key to splash the enabled lasers, and when Laser key is loosed, then the lasers will finish splashing. When the Mode item is "manual", then pushing the Laser key one time, the enabled lasers will splash a fixed time.

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4.10. Origin set+

When the green block is on this item, push the "Enter" key to show as below:

Push "Z/U" key to move the green block to the anticipate item, and when the green block is on "enable" items, push "Enter" key to enable or disable the item, when enabled, the small diamonds is green, and when disabled, the small diamonds is grey. When the green block is on the "Set origin" item or the "Next origin" item, push the "X+-" keys to select the value.

Pay attention to if when the green block is on the "Set origin" item, push the "X +-" keys to select a value, then, "Enter" key must be pushed to valid the change, or, the change is invalid.

Each item introduced as below:

➢ **Multiple Origins Enable:** "Yes" or "No" can be selected. If you select "No", the system will use the single-origin logic. You can press the "Origin" key and set the origin, and only this origin can become valid. If you select "Yes", the system will use the multiple- origin logic and the "Origin" key on the keyboard become invalid. In such a case, the parameter of each origin must be set in the menu as follows

➢ **Origin Enable1/2/3/4:** after the multiple-origin logic is enabled, the four origins can independently be prohibited and enabled.

➢ **Set Origin 1/2/3/4:** after the multiple- origin logic is enabled, you can stop the cursor at "Set as Origin 1/2/3/4". Press the "Enter" key on the keyboard and the system will take the coordinate figures of current X/Y axles as the corresponding ones to the origin 1/2/3/4.

➢ **Next Origin:** there are such five digits as 0~4 for option, which are the origins to be used for the next figure. Origin 0 means the origin set by the "Origin" key on the panel in the single- origin logic. 1~4 means the serial number of the origins in the multiple- origin logic. Next origin can be modified to any one of origin 1~4, so as to control the start location of next work (the premise is that the origin is enabled), but it can't be modified to origin 0.

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4.11. Language & IP setting

The item "Language" helps you to select a appropriate langue which is displayed on the pane
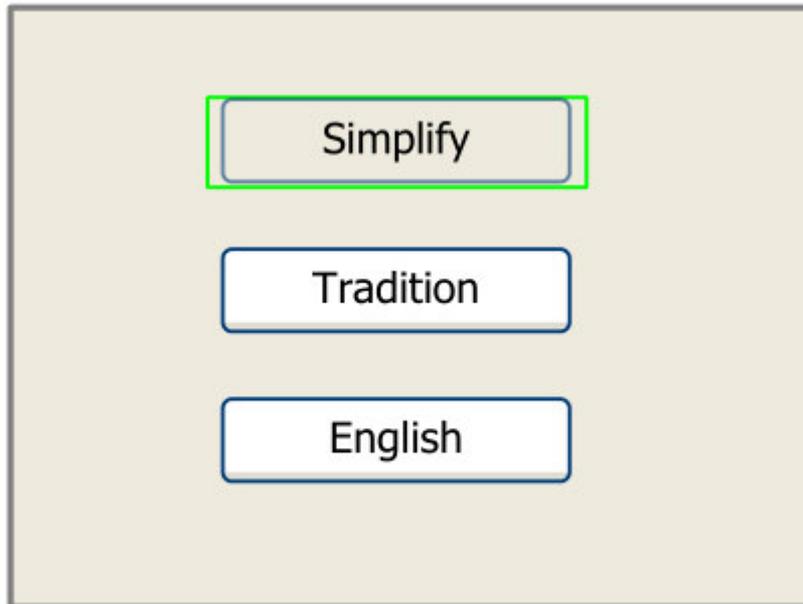
When the green block is on this item, push the "Enter" key to show as below:
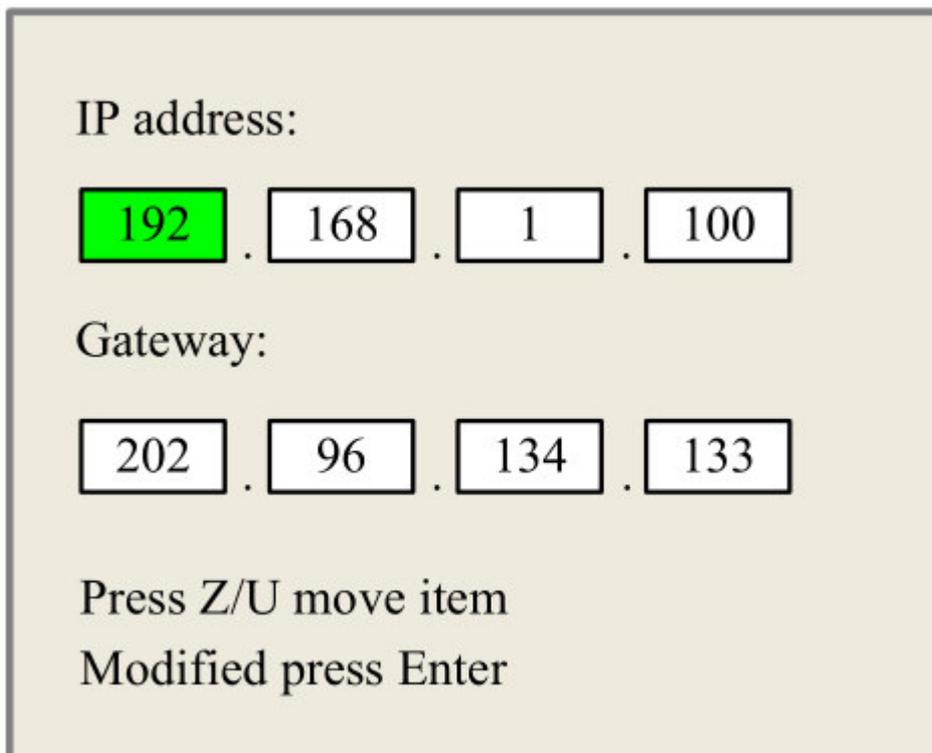
Push "Z/U" key to move the changing item, then push "X+/-" keys and "Y+/-" keys to change the value, when all the IP value and the Gateway value are changed, push "Enter" key to validate the change, or "Esc" key to invalidate the change.

4.12. Diagnoses

If the "Diagnoses" item is pressed, the system will show as below:
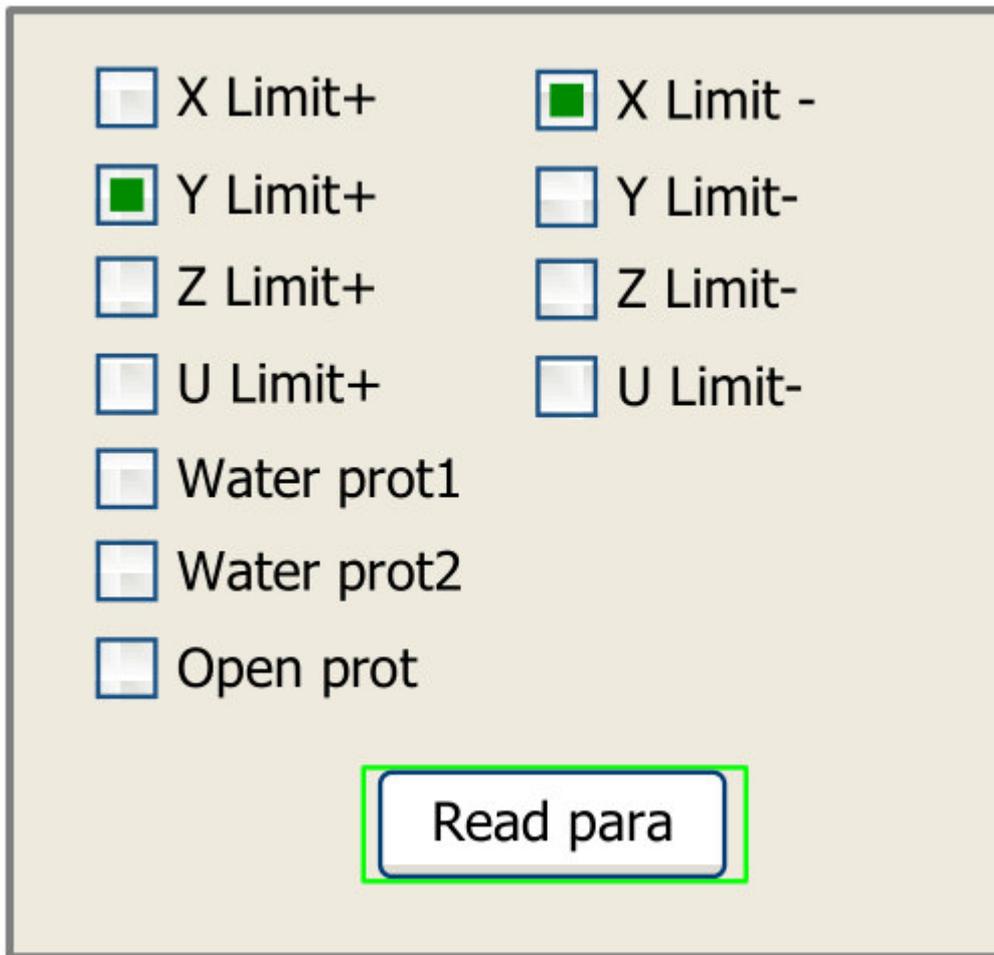
This interface shows some system input information, such as limiter status, the status of the water protecting, and the status of the foot switch etc.. When the input is validated, the color frame will be green, otherwise it's gray.

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4.13. Screen Origin

If the "Screen Origin" item is pressed, the system will show as below:
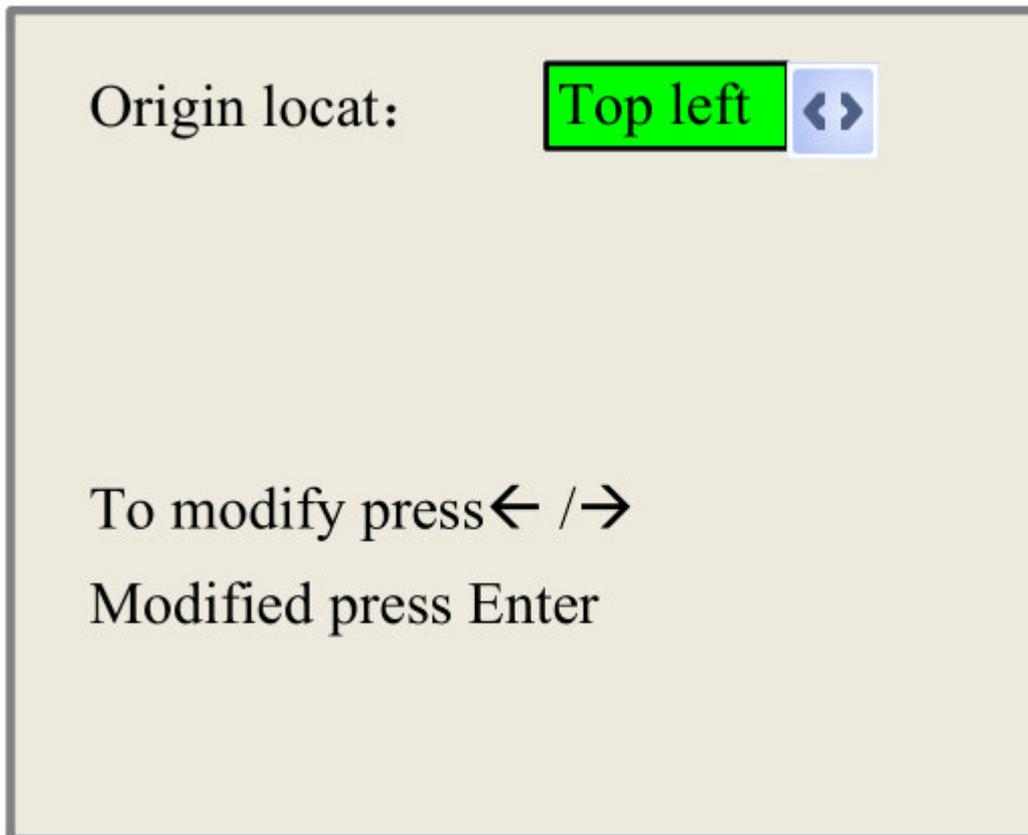
There are four entries to be selected: Top Left, Top Right, Bottom Left and Bottom Right. When one is selected, the previewed graph on the screen would be enantiomorphous based on X or Y direction.

Note: Make sure the Origin location is set to TOP RIGHT

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4.14. File Key

On the main interface, if "File" key is pressed, it will show as below:
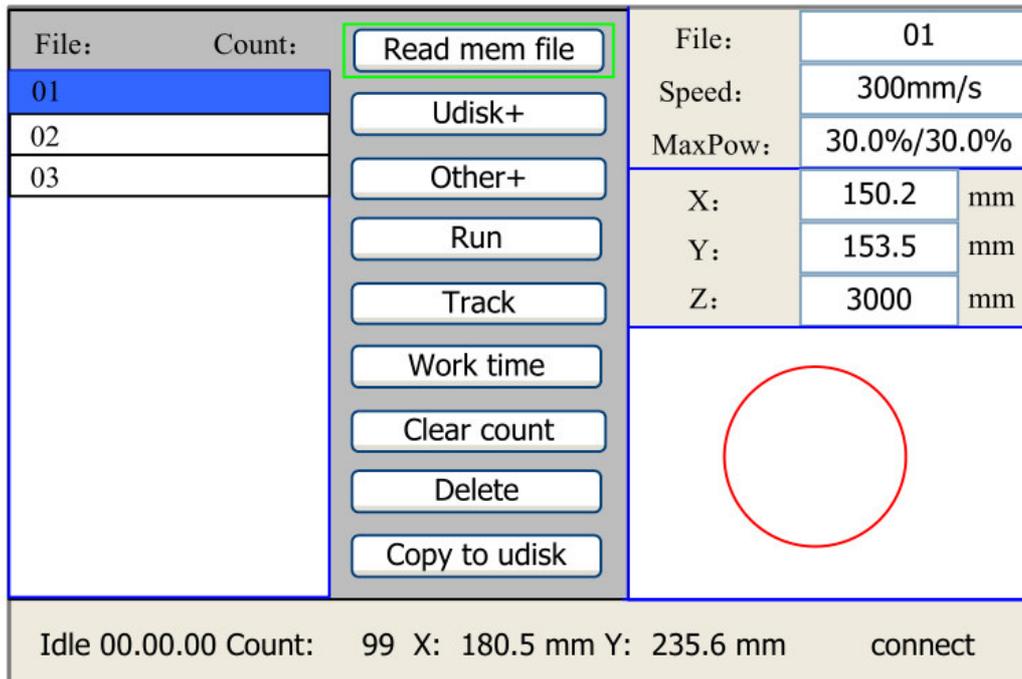
Figure 4-A

When showing this menu, the system would read the memory file firstly, the file name and the work times would be listed in the area, and the selected file is previewed in the bottom right area. "Y+/-" keys could be used to move the cursor on the file name list. When the cursor is on a target file name, presses the "Enter" key, the selected file will be previewed on the main interface, and then if "Esc" key is pushed, the preview will disappear.

"X+/-" keys could be used to move the cursor left and right. All the item show as below:

- ➢ **Read mem file:** read the memory file list;
- ➢ **Udisk:** read the U disk file list;
- ➢ **Other:** the other operation of the memory files;
- ➢ **Run:** To run the selected file;
- ➢ **Track:** To track the selected file, and the track mode is optional;
- ➢ **Work time:** To forecast the running time of the selected file, and the time is accurate to 1ms;
- ➢ **Clear count:** To clear the running times of the selected file;
- ➢ **Delete:** To delete the selected file in the memory;
- ➢ **Copy to Udisk:** To copy the selected file to Udisk;

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If the "Other" entry is pressed, the system will show as below:
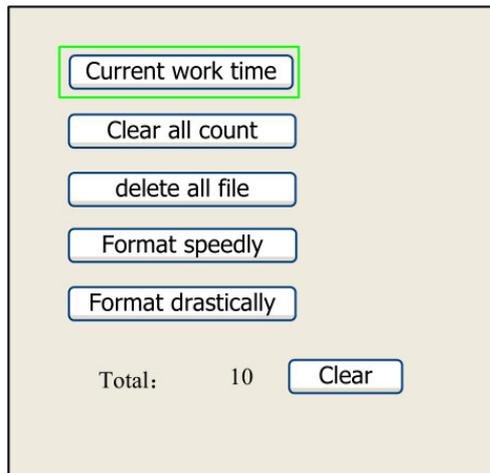
Figure 4-B

- ➢ **Current work time:** To forecast the running time of the current file(the current file No. is showed on the main interface), and the time is accurate to 1ms.
- ➢ **Clear all count:** To clear the running times of every file in the memory
- ➢ **Delete all file:** To delete all memory files
- ➢ **Format speedily:** To format memory speedily, and then all the files in memory will be deleted.
- ➢ **Format drastically:** To format memory drastically, and then all the files in memory will be deleted.
- ➢ **Total:** The total running times of all the files.

U Disk File

If the "Udisk" entry in Figure 4-A is pressed, the system will show as Figure 4-C, and the operation method is all the same as Figure 4-A
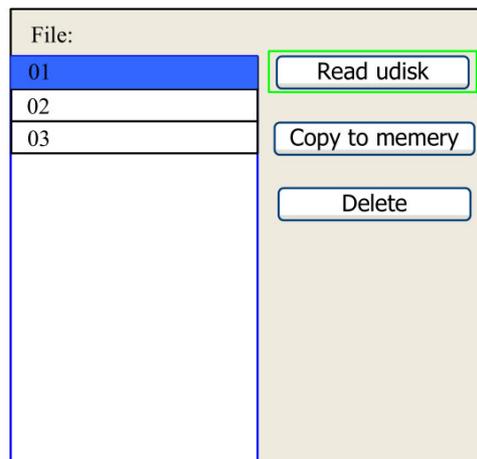
Figure 4-C

- ➢ Read Udisk: Read the file list in the Udisk;
- ➢ Copy to memory: Copy the target Udisk file to the memory;
- ➢ Delete: Delete the selected Udisk file;

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4.15.   WIFI Setting Up(It is an optional function, if your machine carried WIFI, you can refer to this instruction).

Built in WIFI is installed on the down left corner of the machine. When the green light is blinking, the WIFI is available. You can go to computer to check and connect the WIFI.

After it connected, you have to open the RDworks engraving software to set up and test.

First: At the down right of the software, choose Device with IP address
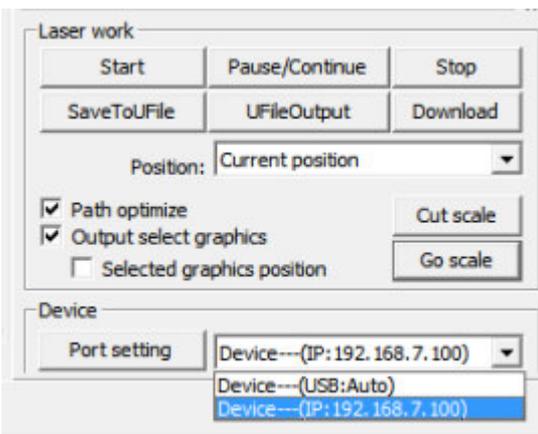
Second: click the "port setting" of the software, bounced up the port setting dialogue window

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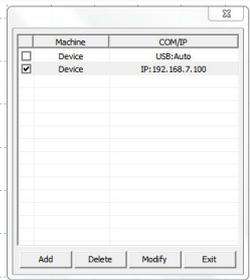
Thirdly: double click the device with IP address, then bounced up another box, go to the control panel of the machine, choose IP config and press Enter, then you could check the machine IP, fill this IP address to the dialogue box.

Lastly, click the 'Test' to test the connection, it shows port test successful, then you can click "确定"to quit and then WIFI setting is ready.

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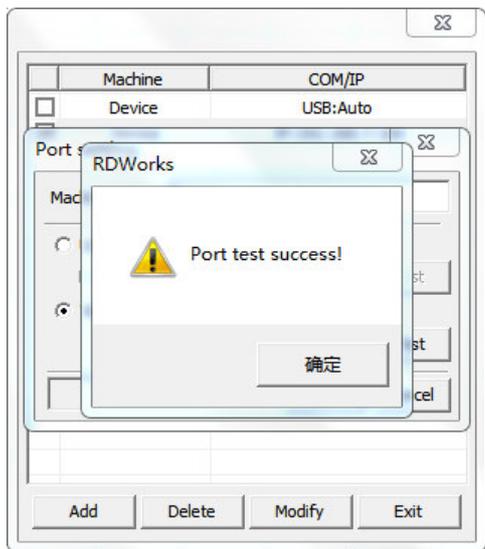
4.16. Autofocus Function(Optional Function, if your machine got it, you can refer to the following instructions)

The autofocus function is easy for starters to get the laser focused.

First, put the material under the laser head
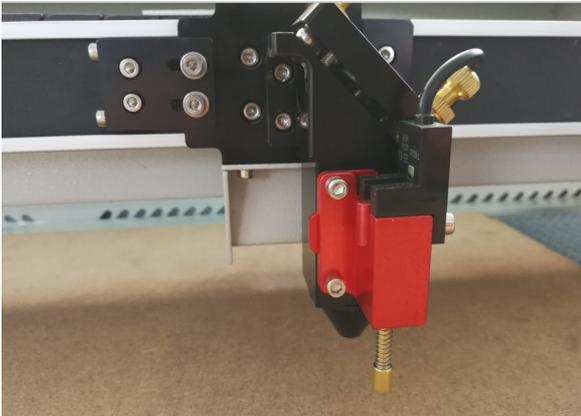
Then, go to the control panel, choose "Autofocus" and press "Enter", the machine will start UP or down, when the probe touched the material, it will reset.When it is stopped, the laser is focused.

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4.17. How to use 4 Axis Rotary device(Optional function, if your machine got Rotary device you could refer to this instruction)

The rotary engraving function allow you to engrave on the cylinder shaped products, like wine bottles, pipes,etc.

Put the rotary device on the worktable of the machine(adjust the height of the worktable to fit):

Plug the rotary device into the rotary port we left on the right of the machine:

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Then go the RDworks engraving software to set up:

At the up right corner of the software, click "Rotate"
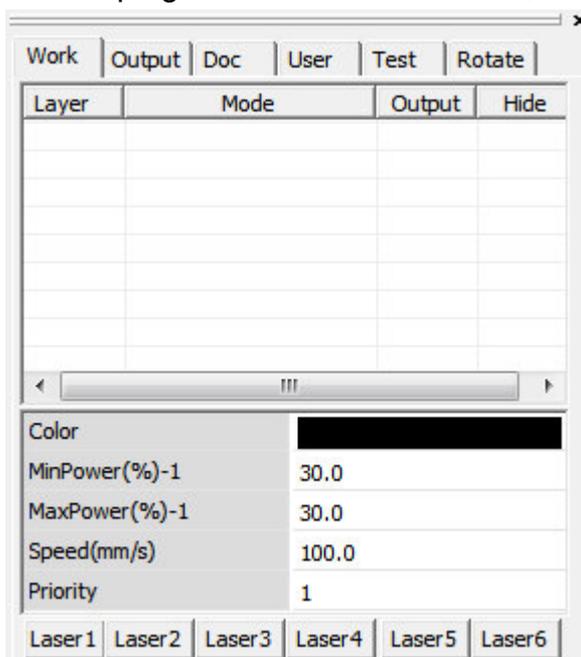
Then you could see the setting up page

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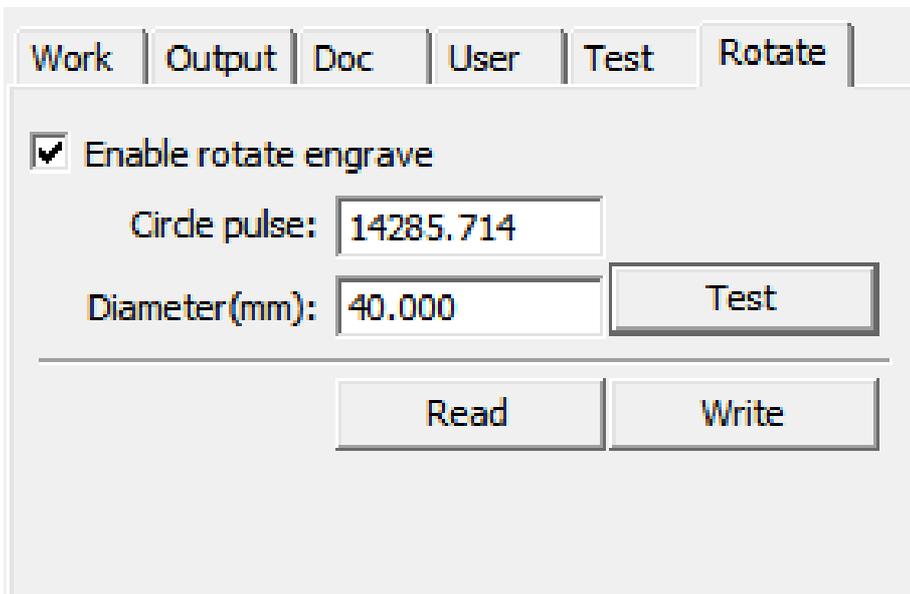
Click "Read"

Check the "Enable rotate engrave", fill the circle pulse: 14285.714 and diameter 40, then click "Read" and then "Write", the rotary device setting up finished. It is ready for engraving.

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4.18. How to focus the laser

Focusing the laser must be re-done every time a new thickness material is placed on the working platform. The laser used highly concentrated energy to do its job. So, focusing is very important..

The distance from the work piece to the laser head normally won't exceed 20mm. To focus the laser, you have to keep in

mind one rule; the smallest spot you make on the work piece is the ideal distance. That means the focus of the laser machine is here, and you'll get the strongest laser power and a precision engraving result. First, put a piece of white printing paper or

other flat materials on the worktable. Press the Up&down arrow on the control panel to adjust the distance from the paper

to the laser head to about 20mm. Secondly, press the PULSE button on the control panel, then the laser will fire and

make a spot on the paper. Then, adjust the distance closer to make another spot on the paper, then adjust to another distance to make more spots. Thirdly, compare these spots, the smallest spots it makes is the ideal distance. Mark it, or make a small piece of wood or acrylic blocks to measure this distance for future convenient usage.
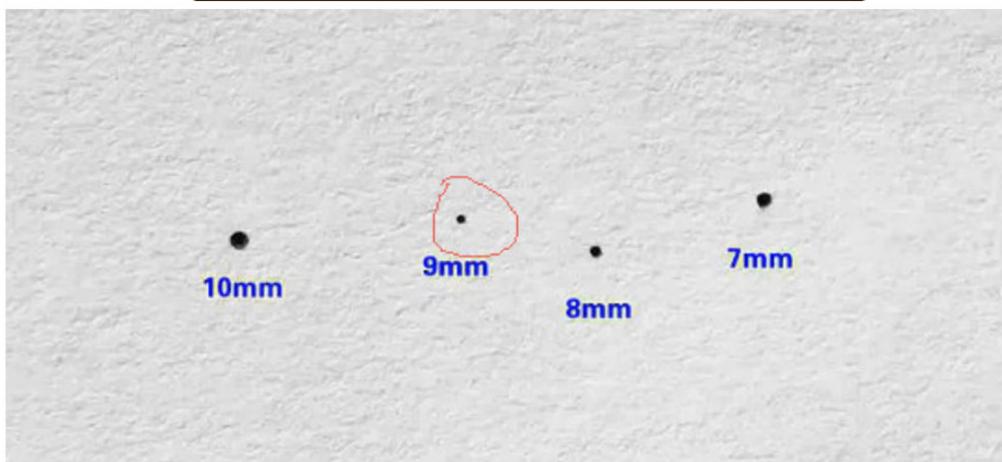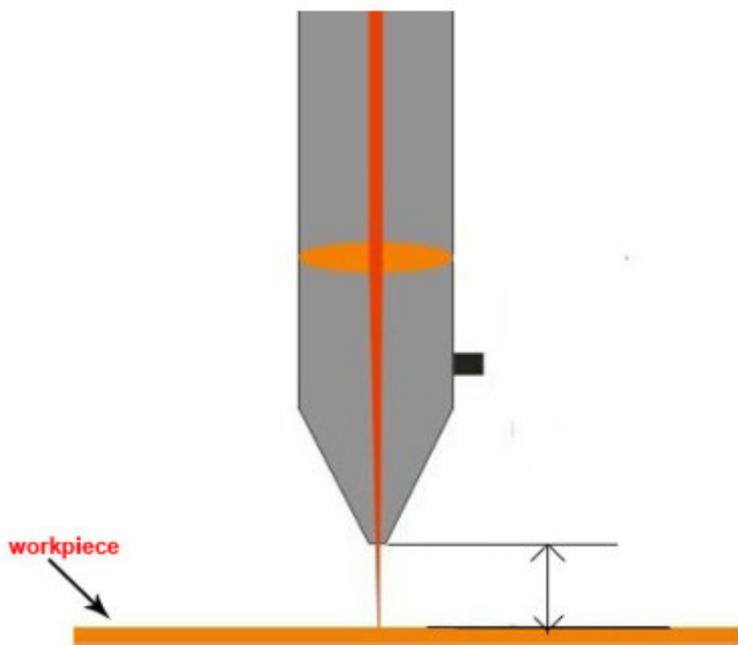
For example, if you make spots at 10mm,9mm,8mm,7mm distance, and found that the smallest spots is the one that made at 9mm, then the focus is 9mm. Remember this distance, it's the focus of this laser machine.

Important: Always be careful when focusing thick material, not to allow material to collide with the lens housing. This can cause serious damage to the laser machine.

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The Use of Focus Tool

The focus tool is a piece of rectangular acrylic block made by the manufacturer, usually sent with the accessory bag of the machine. You could use this acrylic block to focus the laser very conveniently.

See the below illustration photo:
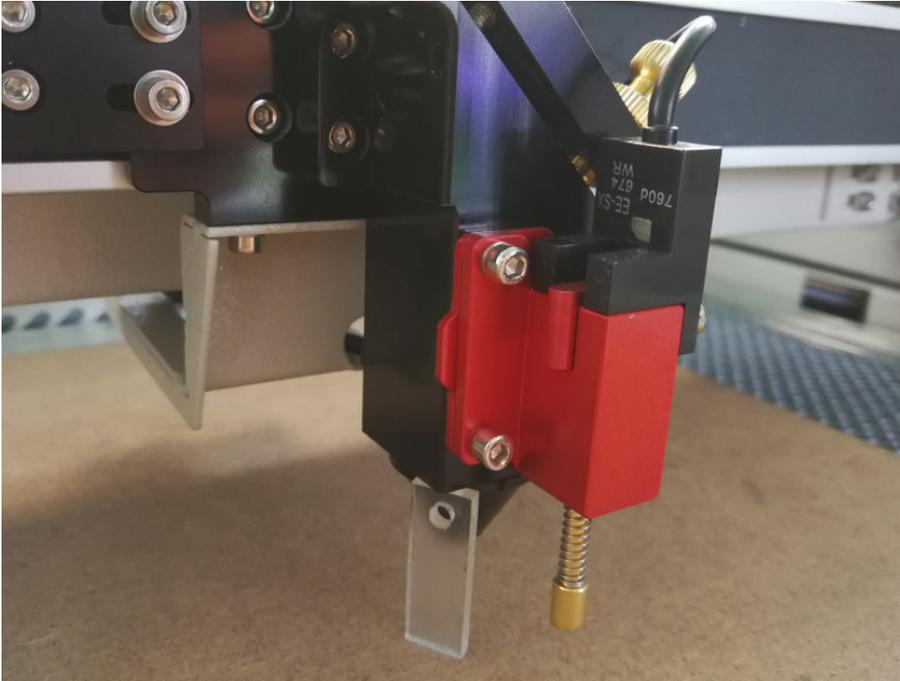
Use the Up&down work table, you could find the focus of the laser with the focus tool very easy.

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4.19. Your First Engraving Test.

The following steps describe how to successfully engrave a first pattern. Please follow the individual steps:

1. First switch on the computer and the Laser.

2. Put the object to be engraved into the laser and move into the desired position on the engraving table. Usually the object is positioned in the upper right-hand corner. Use the rulers to determine the dimensions of the object to be engraved.

3. With the frame keys to ensure that the laser head is positioned over the material to be engraved. You focus with the help of the focus tool

4. Generate a graphic with the help of your graphics software, or import in a picture that you want to engrave,

5. Set it up in the software

6. Use autofocus to focus or use focus tool to get it focused

7. Start engraving or cutting

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4.20. How to adjust the optical path

Usually, before shipping of the machine, we have already calibrated the laser optical path. But, after long distance of transportation or during the common use of the machine, there may appear some deviation with the optical path,resulting in no laser or light path is abnormal, then please refer to the following

method to adjust the optical path:

Step one: First to ensure laser beam from laser tube to the center of 1# reflectormirror.

Step two: Affix multi-storey double sticky tape paper on the 2# reflector (Or other objects can be marked on), move laser beam to closest location of laser tube, press pulse (choose suitable power), get a spot on the paper (with special attention: In order to prevent the laser radiation wounding, with a piece of cardboard first to test the approximate location of the spot, and then adjust)
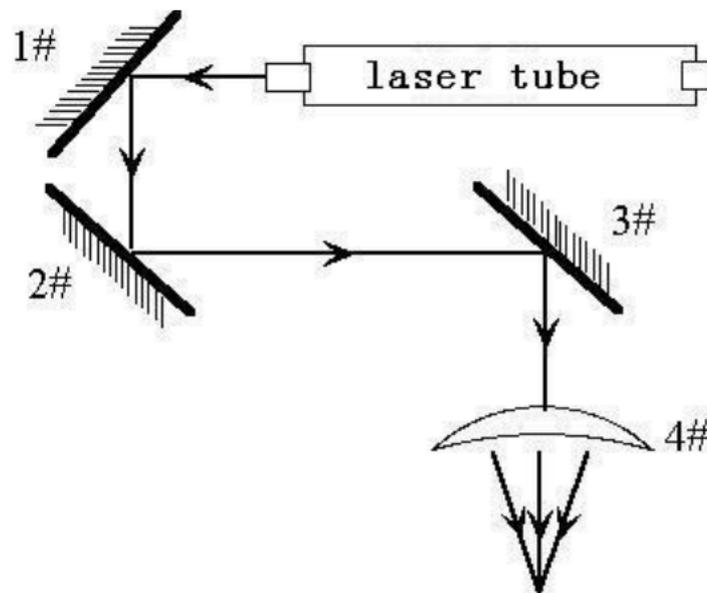
Step three: Move away the beam to the position far from the laser tube, press pulse, get another spot on the paper.

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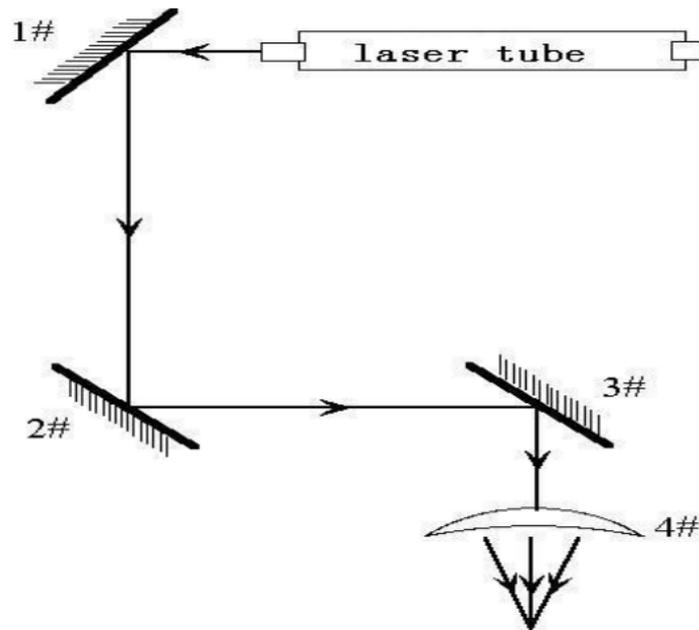
Step four: If the two spots are not superposition, adjust the screws on the back of the 1#mirror to make the laser fire on the same position as the first spot.

Step five: Repeat the second to the fourth steps until the two spots overlap completely. Moreover, the spots should be in the center of the hole.

Step six: Affix multi-storey double sticky tape paper on the 3# reflector ,move laser head to the nearest position from 2# mirror, press pulse(choose suitable power),get a spot on the paper.
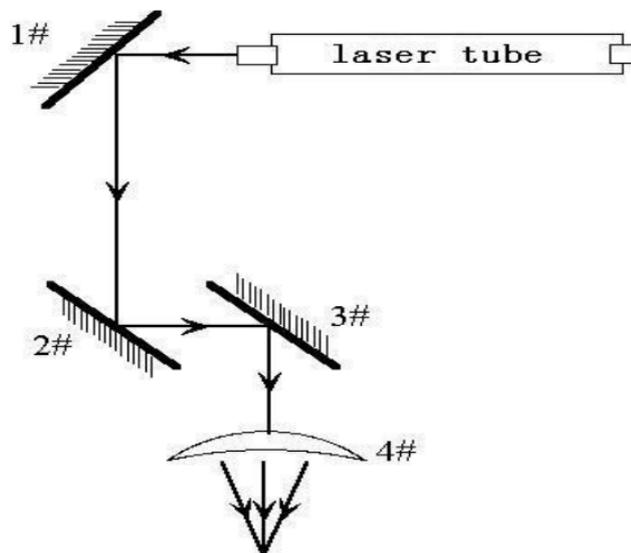
Step seven: Move away the laser head to the position farthest from the 2# mirror,press pulse(first to detect the approximate location of laser with a piece of cardboard to prevent wounding),get another spot .

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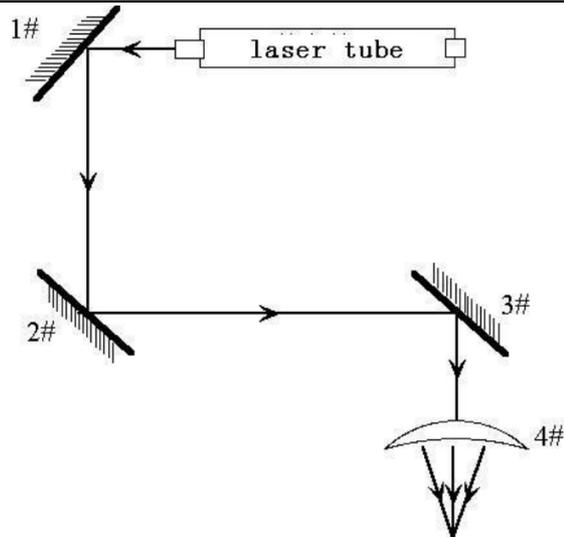
Step eight: If the two spots are not superposition, adjust the screws on the back of the 2# mirror to make the laser fire on the same position as the first spot.

Step nine: Repeat the sixth to eighth steps until the two spots overlap completely. Moreover, the spots should be in the center of the hole.

Step ten: Affix multi-storey double sticky tape paper on the 3# reflector, press pulse, get a spot on the paper. If it is in the center of light hole, then pass.

Step XI: If the laser light is not in the center of light hole, as below figure:
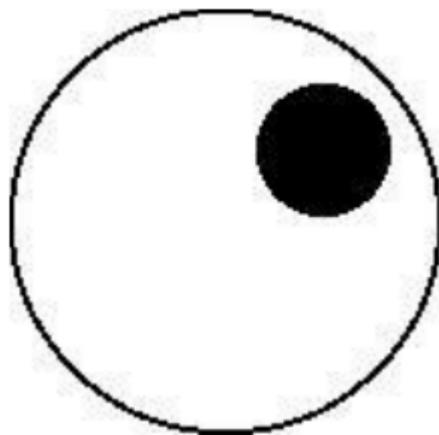
In the left Figure, the spot is upper and right biased. Top to bottom bias: can only raise or lower the laser tube. Inside and outside bias: only move the laser tube in or out to adjust. In this case, it is essential to lower the laser tube (here refers to low-voltage side of the laser tube), and then, from the beginning of all the re-adjustment of the first step.

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4.21. Adjust the Red Beam Combiner

The red beam combiner combine the laser beam and the red beam, which is convenient to position the laser head for the users to get a precision of where to start. Sometimes, the red dot is shifted, and you need to adjust it. You could use a 4mm hexagon spanner to adjust the screw adjuster of the red beam combiner.

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Chapter V Maintenance

5.1. Lens Replacement and clean.

Lenses are one of the few parts of a laser machine that need regular maintenance, primarily regular cleaning. Lens cleaning is simple if done often, difficult or not possible if rarely done.The lens is small, about 20 mm across, with 2 distinct sides, one flat and one convex or curved out. When re installing, the curved side always faces the laser path, away from the working platform.

Take apart the two screws, you could take out the lens assembly, and then you could replace the lens, or you could clean it.Handle the lens carefully, using acetone or lens cleaner/wipes to clean the flat side. Lens paper works well and should show a brown residue after cleaning. Make sure to place the flat side down towards the working platform when reassembling, curved side always faces the laser beam. Lens first, washer and then ring nut. Don't over tighten ring nut, just snug it up against the washer, and then a quarter turn more.Burned lenses are a common problem for new users of any laser machine. Make sure to clean it often, especially if cutting on a regular basis. Kept clean a lens will last a long time.

Different size lens can be inserted as well, just be aware that a 1.5" lens has a different focus point than a 2" lens.

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5.2. Maintenance Schedule

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 (Q-Tips) to apply the solvent. Len wipes with alcohol-free solution will also do the trick. Do not scrape the lens. Use the solvent to dissolve the dirt from the lens surface. Only use a soft swirling motion when applying the solvent. Use a dry swab in soft swirling motion while evaporating the solvent. Use as many swabs as needed to result in a clean lens surface. The lens surface should be somewhat difficult to see. Look at a reflection in the lens to help see dirt on the surface. Make sure to clean the lens and not leave water marks or dirt smears.

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. 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 become damaged faster.

Mirror #3 (in the laser head):

This mirror is located directly above the focal lens. This mirror should be cleaned at least every one month. If there is any incident of fire or large issue of smoke/fumes, then it is advised to check the mirror and clean it. It is possible to clean the mirror in its mounting bracket, but highly advised to remove the mirror from position and thoroughly clean it. The laser beam alignment should be checked after cleaning is completed. Use denatured alcohol and/or acetone as the cleaning solvent. Use a lens tissue or cotton tipped swabs (Q-Tips) to apply the solvent. Len wipes with alcohol-free solution will also do the trick. Do not scrape the lens. Use the solvent to dissolve the dirt from the lens surface. Only use a soft swirling motion when applying the solvent.

Use a dry swab in soft swirling motion while evaporating the solvent. Use as many swabs as needed to result in a clean surface. The mirror surface should be difficult to see. Look at a reflection in the mirror to help see dirt on the surface. Make sure to clean the lens and not leave water marks or dirt smears. The mirror should be replaced if it is pitted/scratched, rusted, discolored from heat damage, or any other significant damage is found. Some minor blemishes are acceptable, but these problems waste laser power and will result in reduced laser power at the target material. Any dirt, contaminate, or damage on the mirror will cause the mirror to become damaged faster.

Mirror #2:

This mirror is located directly at the end of the gantry rail. This mirror should be cleaned at least every two months. Use the same directions as found for Mirror #3

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Mirror #1:

This mirror is located directly in front of the laser tube. This mirror should be cleaned at least every three months. Use the same directions as found for Mirror #3 Laser tube output coupler lens:

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Tonggang Rd, Taicang City, Jiangsu Province, P.R. China   Email: info@aeonlaser.cn

This lens is located inside the output end of the laser tube. This lens should be cleaned at least every three months. You must be very careful when cleaning this lens. This lens cannot be removed

from the laser tube. You can use a Q-tip for applying the acetone. Len wipes with alcohol-free solution will also do the trick. Be gentle. The ideal situation is that you are only removing dust, film contaminate from humidity, or smoke fumes. Do not scratch this lens. It is not replaceable. Linear rails: The linear rails are the guiding rails along the left and right sides, and across the gantry. These

rails should be clean, without rust, and have a slight glaze coating of some oil. The linear rails should

be given some attention about every month. The surfaces of the metal should always have oil on it such that it is wet to the touch.

The best way to see that you need to do some cleaning is to check the end of the rail near where the home switch is located. If you see a dirt line, then clean the rails off and apply fresh oil.

Linear bearings:

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). These bearings have grease fittings for pushing lubricant into the ball bearing areas. You might not have a special grease pump to lubricate the bearings. Try the cheap and easy approach. 1) Remove the grease fitting, 2) Apply the grease to your finger, 3) Push the grease into the little hole, 4) push more grease into the little hole, 5) go to step #2 ..... 6) Put the grease fitting back on.

Rubber belts:

The rubber belts should be checked for appropriate tension at least every six months. You should expect the two side belts to be the same tension and should be tensioned at the same maintenance schedule. These side belts work together to move the gantry from front to rear. If one belt is tensioned more often than another, then that belt could become stretched more than the other. It is difficult to describe how tight the belts should be, but there should not be a slack, sagging, or flapping. If the belt appears to be worn on one side, check the bearing alignment or damage to the matching bearings. 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.

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5.3. Add or Change Water and Clean the Water Tank.

The water cooling system is built in for this machine. It is a sealing system. It is not necessary to add or change water. We suggest the user change water and clean the water tank every 6 months. When discharged the left water in the water tank, you have to unscrew the two bolts beside the water tank, and then pull the water tank out, you'll find the water outlet. Use a spanner to unscrew the cap of the outlet, you could discharge the water. After that, please clean the tank with fresh water, and fasten the cap of the water outlet. After that, install back the water tank and add fresh purified water accordingly. Here are some illustration photos.

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water outlet

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5.4. Storage of the laser:

Clean, dry, warm location with No vibration.

Use a dehumidifier:

Humidity can cause the metal parts of the laser machine to rust. All metal is expected to rust. One unexpected metal surface is the laser mirrors. It is best to try to control the humidity level in the laser work area. Clean the mirrors and check for this oxidation as a possible problem. Replace mirrors that do not meet your expectation of performance.

Make a maintenance schedule:

The easiest way to follow a cleaning schedule is to buy a calendar and write on the dates that you want to do the maintenance. Some maintenance is needed on a regular basis while other cleaning could be an immediate requirement after a disaster. Just know that avoiding the maintenance of your laser could result such that the laser doesn't work right ...or doesn't work at all.

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Common Faults Analysis

No.	Phenomena of Malfunction	Analysis method	Solution
1	Open the machine but no movement	Check power supply of machine connects well or not	Make all power supply electrify again
		Mainboard parameter is right or not	Correct the parameters according to software operating manual
2	Working with nonstop laser	Mainboard parameter is right or not	Correct the laser parameters according to software operating manual
3	Desultory light when working	Check water circulation is swimmingly or not	Clean water tank, water pump and water pipe
		Voltage is stable or not	Add regulator for the laser machine
4	Self-test abnormal when starting	Mainboard parameter is right or not	Correct the X and Y axis direction ,limit position parameters according to software operating manual
5	After output data ,machine no action	Check whether the data port choice is correct.	Choose correct port
		Check whether turn on the machine	Turn on the machine
		Check whether connected ground wire for the machine	Connect ground wire
		check whether installed the USB driver	install the USB driver
6	No laser when working	Check whether optical path is bias	Adjust the optical path
		Check whether the cooling water is running	Ensure the water is running
7	Can't detect the laser equipment	The computer or USB communication problem	Change computer or USB line