

BOSSLASER™

Operator's Manual for LS Series
for RDWorks/LaserWORKS v8

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The LED Keypad



Introduction to the Keys

- **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;

Introduction to the Main Interface

When the system is powered on, the screen will show as illustrated in **Figure 7**

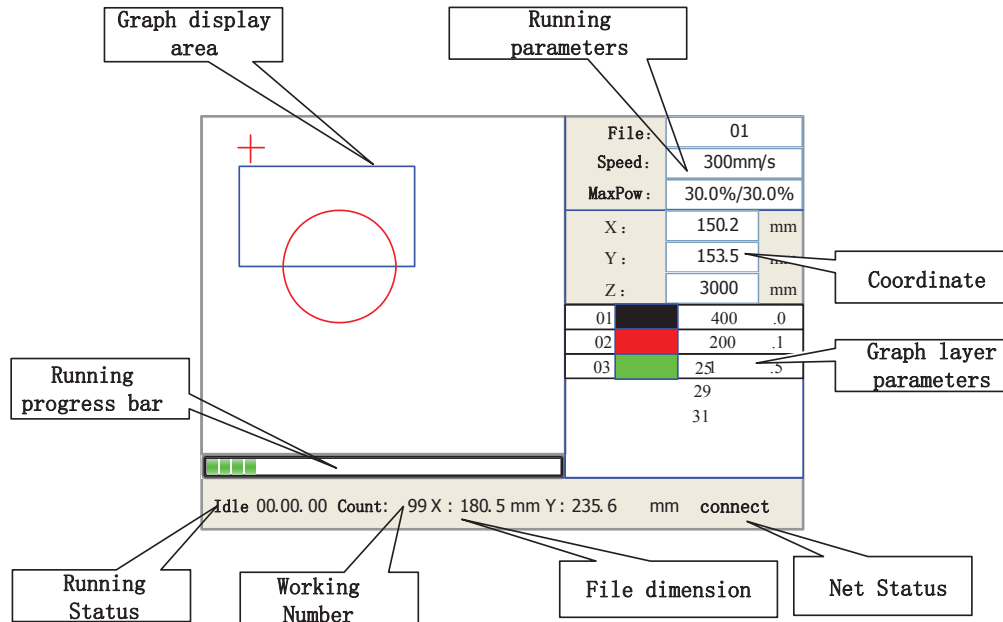


Figure 7. Screen display upon powering up.

- **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.

Speed key

Push the "Speed" key when the screen is on the main interface, as shown in **Figure 8**

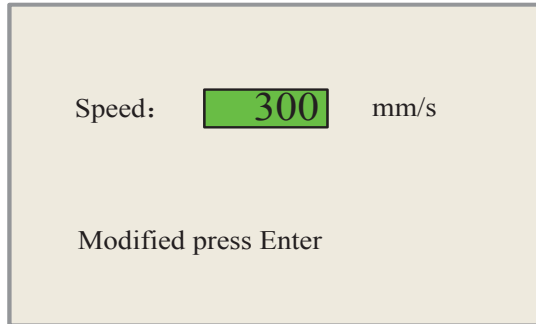


Figure 8. Display screen for Speed key.

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.

Max/Min power keys

Push the "Max Power" or the "Min Power" keys when the screen is on the main interface, shown in **Figure 9a-b**

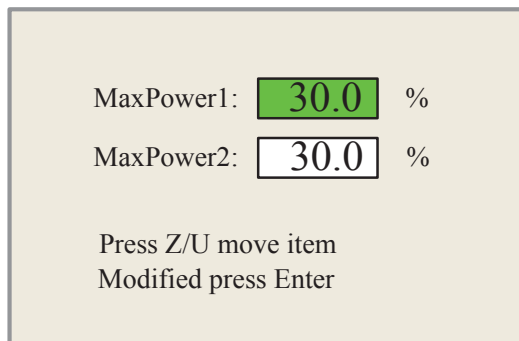


Figure 9a. Max power display screen.

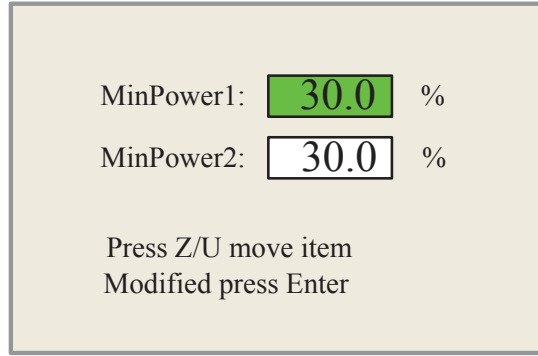


Figure 9b. Min power display screen.

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.

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 in **Figure 10**

01		
02		
03		

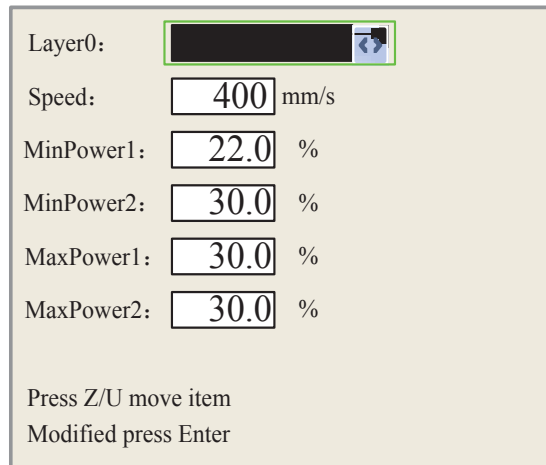


Figure 10. Layer parameters as seen on main interface.

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.

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 in **Figure 11**):

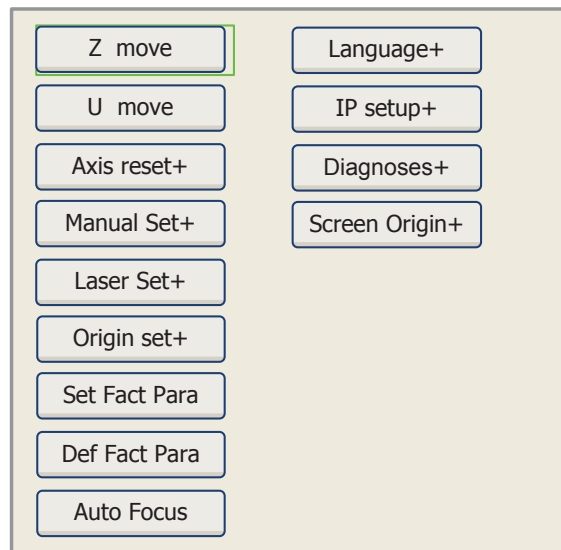


Figure 11. Z/U interface display.

Push “Y+/-” keys to move the green block to the anticipant 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.

Axis reset+

When the green block is on this item, push the "Enter" key to show as below in **Figure 12**:



Figure 12. Axis reset display.

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.

Manual set+

When the green block is on this item, push the "Enter" key to show as below in **Figure 13**:

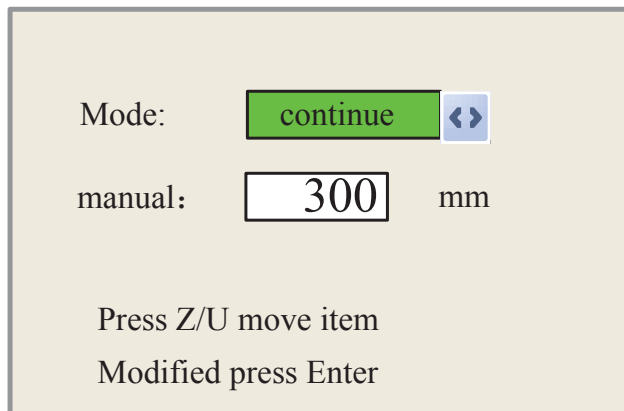


Figure 13. Manual set display screen (Jog set).

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 anticipated 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.

Laser set+

When the green block is on this item, push the "Enter" key to show as below in **Figure 14**:

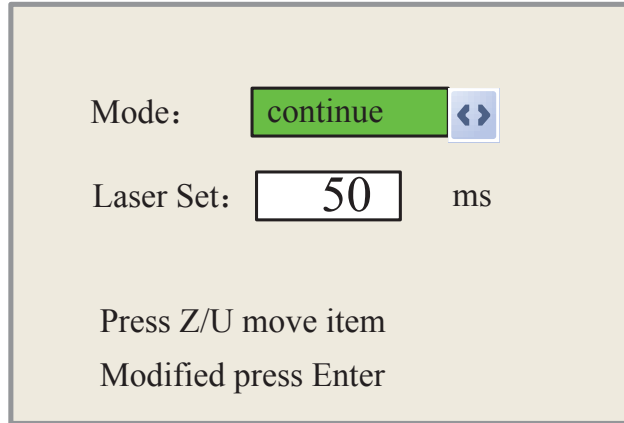


Figure 14. Laser set display screen.

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 anticipant 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.

Origin set+

When the green block is on this item, push the "Enter" key to show as below in **Figure 15**:

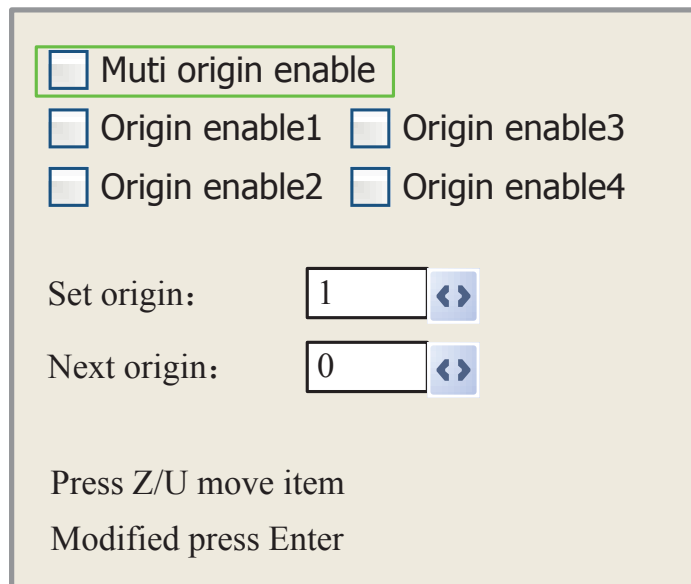


Figure 15. Origin set display screen.

Push “Z/U” key to move the green block to the anticipant 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 Enable 1/2/3/4:** 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 axes 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.

Auto Focus

When the cursor stops at “Auto Focus”, press the Enter key to search for the focus (When there is z axes, and the z axes reset function is enabled, the auto focusing is valid); press the Esc key to return the prior menu.

Language

The item “Language” helps you to select a appropriate langue which is displayed on the pane (illustrated in **Figure 16**):



Figure 16. Language options display screen.

IP Setup

When the green block is on this item, push the “Enter” key to show as below in **Figure 17**:

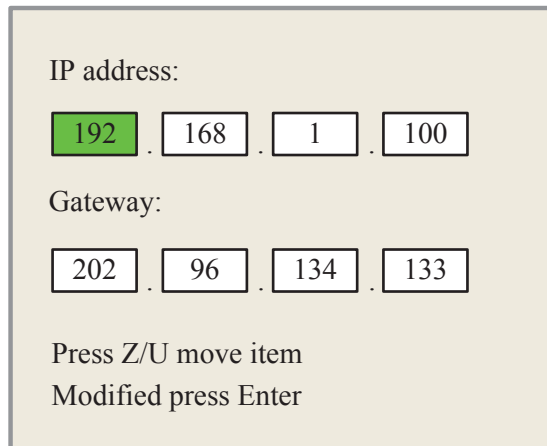


Figure 17. IP Setup display screen.

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.

File Key

Memory File

On the main interface, if "File" key is pressed, it will show as below in **Figure 20**:

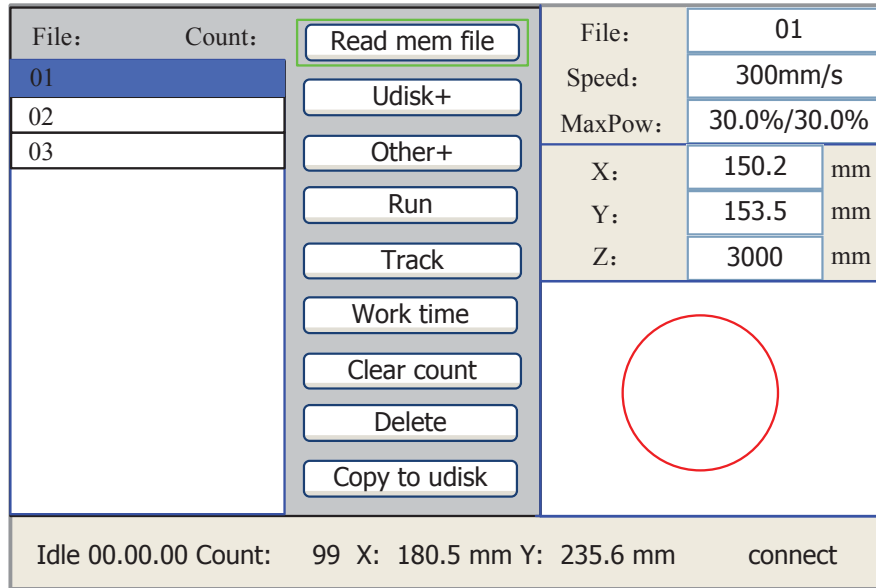


Figure 20. Memory file display.

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:** More operations of the memory files; **(Shown in Figure 21)**
- **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;

If the "Other" entry is pressed, the system will show as below in **Figure 21**:

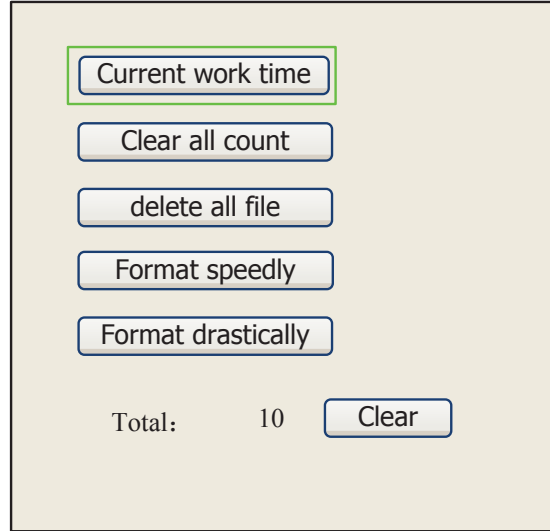


Figure 21. "Other" function display screen.

- **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:** A function that formats memory drastically and then deletes all files in memory.
- **Total:** The total running times of all the files.

U Disk File

If the "Udisk" entry in **Figure 20** is pressed, the system will show as **Figure 22**, and the operation method is all the same as **Figure 20**.

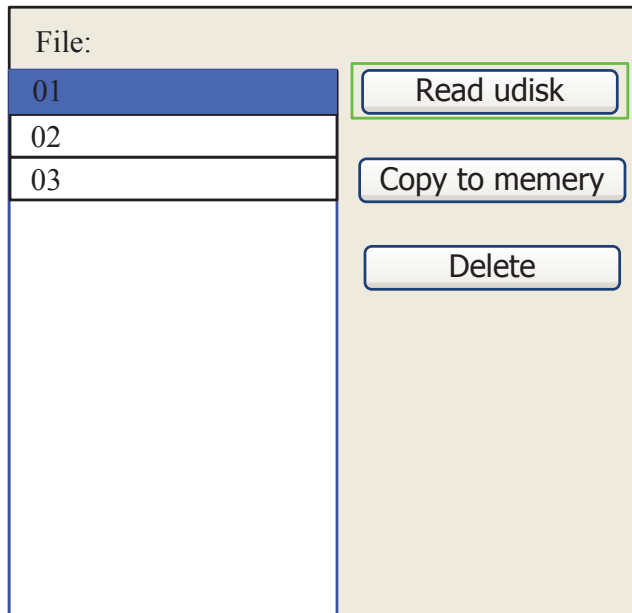
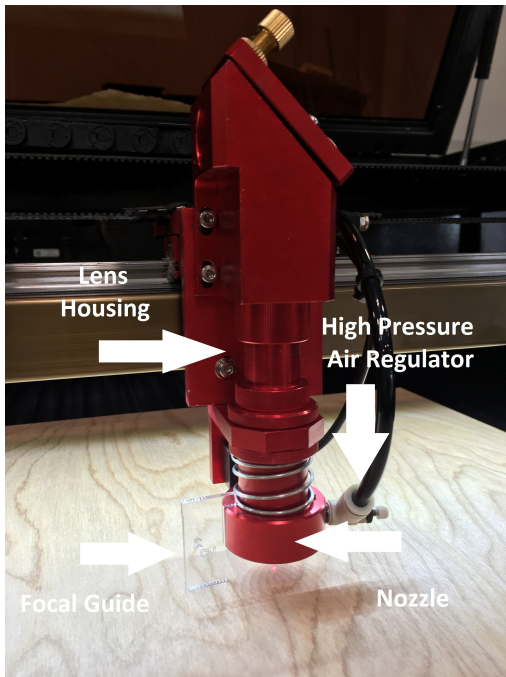


Figure 22 Udisk display screen.

- **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;

How to Focus the Lens

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



important, and fortunately, very easy. In **Figure 23**, you can see the three components associated with correctly focusing the laser head. The **focal guide**, supplied with every laser, is placed upon the material used for the current job. The Z axis is moved by pressing the up or down arrow until the top of the focal guide lines up with the joint where the **lens housing** and bottom nozzle meet. That's it. Your laser is now focused. That's the science of focusing, now the art of focusing is simply adjusting in small increments up or down for different effects. As you get comfortable in the use of your laser these variables can be experimented with for all kinds of interesting results.

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.

Figure 23. Components of the laser head assembly.

Using the Auto-Focus Option

The **auto-focus feature**, standard on all LS/HP Industrial models that offer a Z-axis, is a fast and easy way to get the material in perfect focus.

Place material on the working area and press the Z/U button on the LED pad as shown on **Page 8** (LED Control Panel). Make sure the nozzle of the lens housing is positioned above the material you wish to cut/engrave.

In this position, press the Z/U button, cycle down the menus until you see **Auto Focus**, select it and the Z-axis will automatically travel up until your material touches the nozzle of the lens housing, then back down to the perfect focal point. That's it. Simple and fast. You are now focused and ready to etch/cut.

The probe can be easily adjusted through the software to work with 2" lens or above.

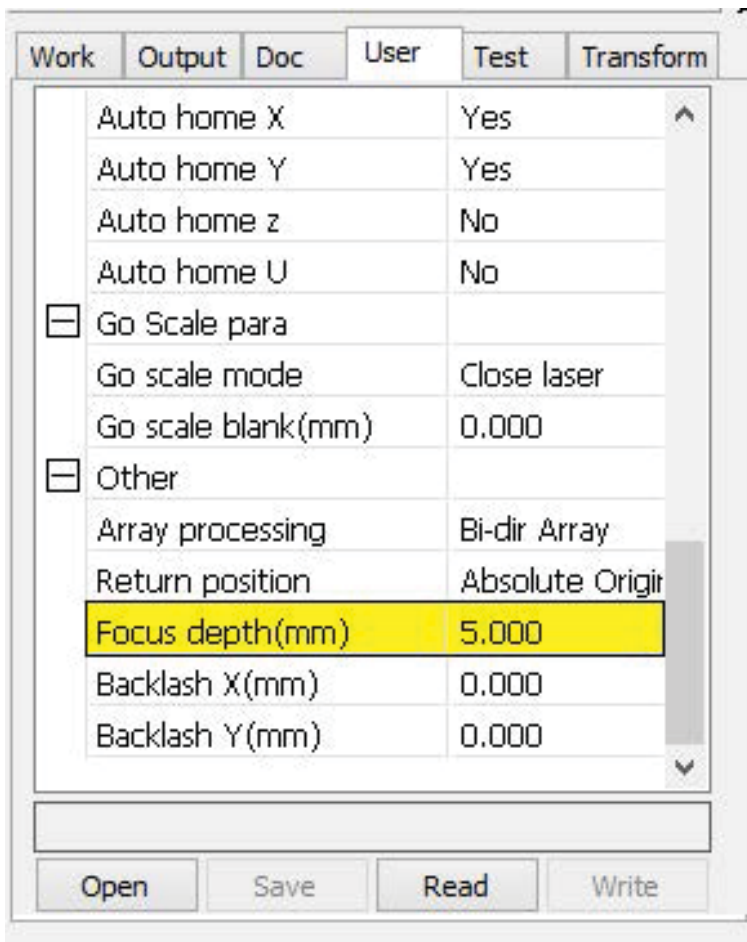
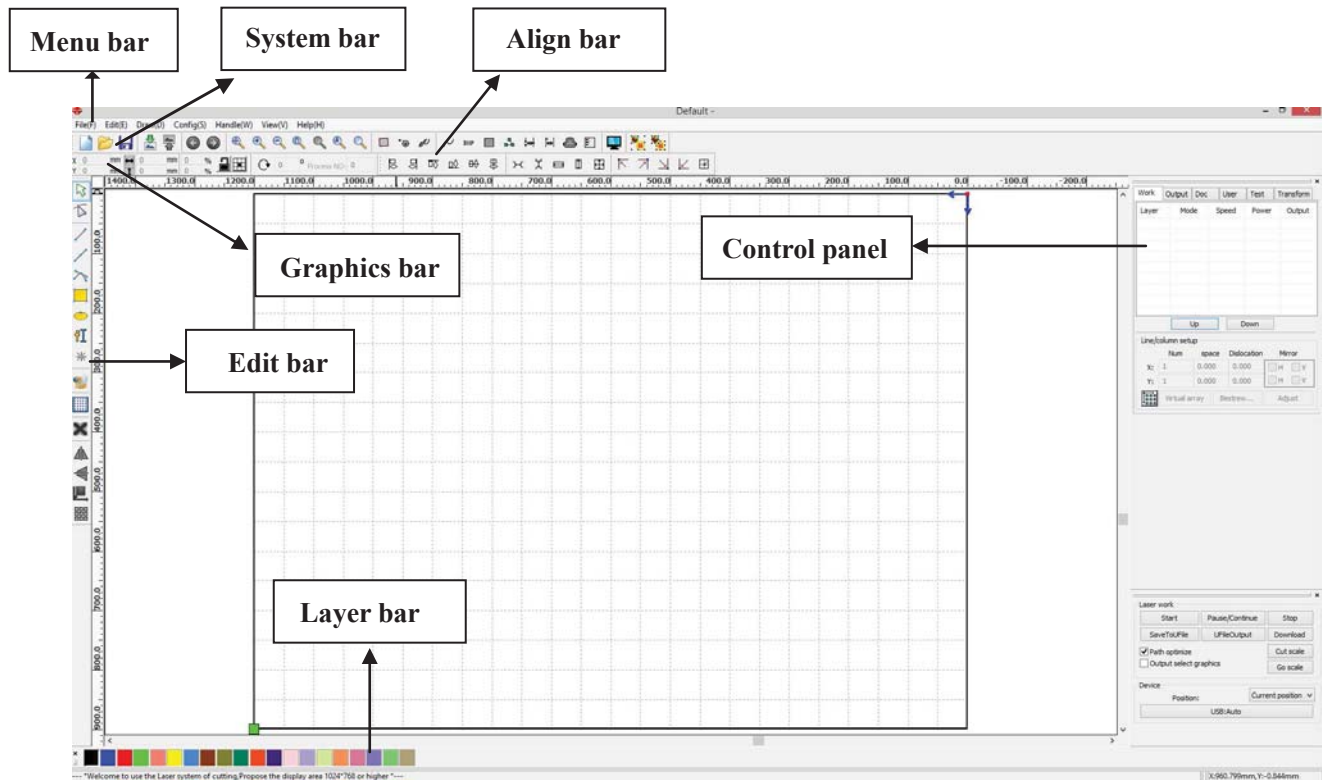


Figure 24. Focusing display for auto-focus offset.

Under the User Parameters Tab (located in the Control Panel of LaserWORKS v8.), as illustrated in **Figure 24**, locate the Focus depth (mm) and change this value until focus is perfect and using your focal guide for accuracy. The setting above is 5.00 mm. Each lens is different. We set here at the factory to match your lens. Should the probe placement move or your change lenses this offset bounce back number will need to be adjusted.

Introduction to LaserWORKS

Main Interface of LaserWORKS



The functions of the various components of the interface are as follows.

Menu Bar: The main functions of the software are implemented through the Menu Bar. Commands executed through the Menu Bar include some of the most basic functions, including Document, Edit, Draw, Setting, Processing, View, and Help.

System Bar: Some of the most commonly used command buttons chosen from the menu are placed on the System bar.

Graphics Bar: Basic graphic attributes as graphic location, size, scale, and number processing as accessed through the graphics bar.

Edit Bar: The default location of the edit bar is on the left of the work area. Tools that the user uses frequently can be placed in the edit bar to increase ease and flexibility of operation.

Align Bar: Used to align selected objects.

Layer Bar: Used to change the layering of selected objects.

Control Panel: Used to complete laser processing of multiple tasks, including the setting of layer parameters, axis control, processing, and so on.

Setting Laser Scan Parameters

The input panel for setting laser scanning parameters (in **Figure 25**) is brought up by double clicking on the colored layer in the **Work** tab in the layer settings.

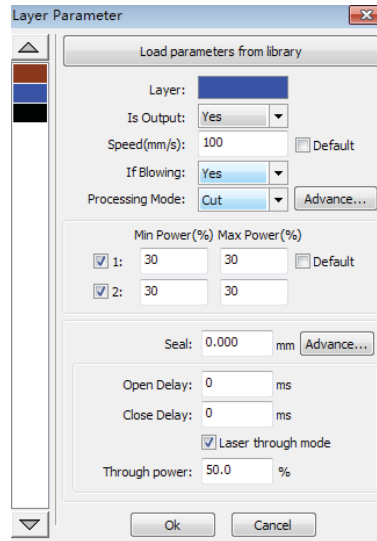


Figure 25. Laser scanning parameter display.

Layer: The software can distinguish between different layers of processing and their parameters

Is Output: This parameter has two settings, yes and no. If set to **Yes**, the corresponding layer will be output, whereas a **No** setting will result in the layer not being processed

Speed: The corresponding processing method of processing speed. Note that when a smooth cut is paramount, slower processing should be used; faster processing causes the trajectory of the cut to be more erratic. If **Default** box is checked, the speed set on the **Control Panel** on your machine will be the speed at which the file is ran.

Recommended Maximum "Scan" (Engraving) Speed:

LS Series 1416s = 375 mm/s

LS Series 1630s = 400 mm/s

LS/HP Industrial 2436s = 500 mm/s

LS/HP Industrial 3655s = 600 mm/s

"Cut" speeds will vary depending on whether the material is going to be cut all the way through or lightly marked on.

If Blowing: This setting takes note of whether the external fan is operating. If it is enabled, by clicking it, then this layer will open the fan if the user has created a "can" for the fan (if no can has been created, clicking this function has no effect). **This should be always set to YES at all times.**

Processing Mode: This setting controls how the corresponding layer is processed. If the current layer is a vector layer (i.e., color layer), it includes three choices: **Scan** = Engraving, **Cut** = Cutting, and **Dot** = Dotted. If the current layer is a BMP layer (bitmap image), the **Scan** mode is only available.

Laser 1, Laser 2: These settings corresponding to the motherboard laser signals 1 and 2. Note that laser 2 is meaningless if your machine only has one laser tube.

Minimum power and maximum power: The power of the values range from 0 to 100, with 100 being maximum laser power and 0 being minimum.

The minimum and maximum power should be set to the same values for a synchronous adjustment (consistent). If **Default** box is checked, the Min. & Max. power set on the **Control Panel** on your machine will operate using the power specified in the file.

Power and delay setting dialog box.

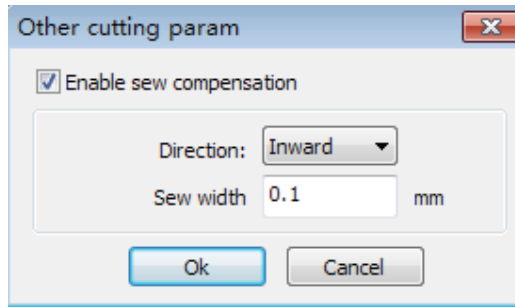
Seal: Closed cutting graphics do not require the use of sealing compensation, but unclosed graphics can be closed by means of it. If, however, the sealing is misplaced, there is no compensation. Either clearance optimization or backlash compensation can be used, depending on user preferences

Open Delay: The delay at which the laser is turned on. This is a button for a time / medallion latency

Close Delay: The delay at which the laser is turned off. Light off through wear / light off delay time

Laser through mode: If checked, follows the % at which the **Through power** is set in respect to the power set in the layer parameters or control panel.

Through power: Percentage at which the power is set to at the initial state of the job.



Cutting parameters

[Enable sew compensation]: Caused by laser cutting seam size of the graphics and graphic deviation of actual cutting out. Seam width compensation **only applies to closed graphics**.

[Sew Direction]: According to the actual need to set up, such as cutting a circle. If you want to keep the circle from being cut off, you should set the direction of compensation outward, if want to keep the hole, should set the direction of compensation inward.

[Sew width]: This sets the laser cutting seam width

Laser Scanning Parameters Setting

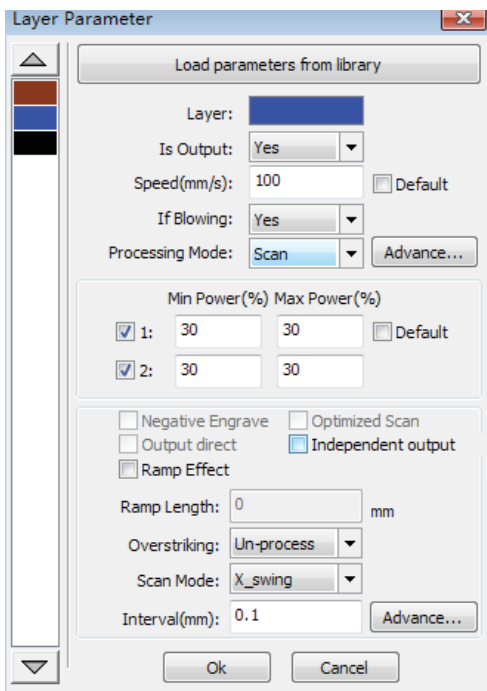


Figure 26a

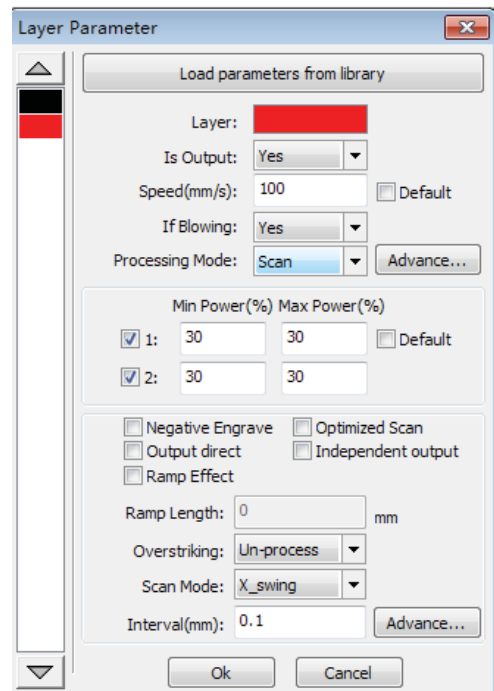


Figure 26b

In **Figure 26a** are vector scanning parameters, while **Figure 26b** contains settings for scanned bitmap parameters. Vector data do not support scanning the color carving, optimization scanning, or direct output.

Optimal scanning. Choose optimal scanning to automatically adjust the scan to the scanning interval for best effect. Otherwise, the user settings of the scanning interval scan pattern are applied. It is generally advisable to choose "optimal scanning."

Output direct. As referred to the image (Grayscale Bitmap), higher power will be associated with deep/dark colors, on the other hand, for shallow/light colors will have lower power outputs.

Scan mode: There was four different scanning modes: X_unilateralism, X_swing, Y_unilateralism and Y_swing

X_unilateralism: The scanning pattern of a back and forth motion in a horizontal direction, in which the laser is pulsing/shooting from left to right OR right to left (uni-directional).

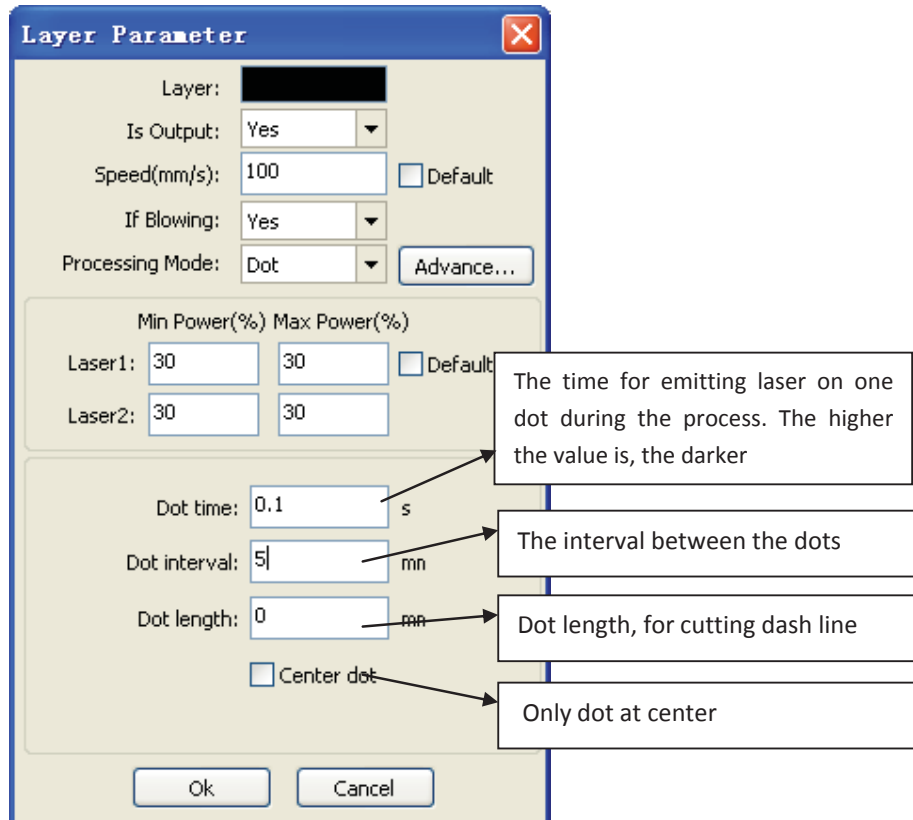
X_swing: Refers to the optical horizontal direction in the back and forth scanning of graphics, in which the laser is pulsing/shooting from left to right AND right to left (bi-directional).

Y_unilateralism: The scanning pattern of a back and forth motion in a vertical direction, in which the laser is pulsing/shooting from up and down OR down and up (uni-directional).

Y_swing: Refers to the optical vertical direction in the back and forth scanning of graphics, in which the laser is pulsing/shooting from up and down AND down and up (bi-directional).

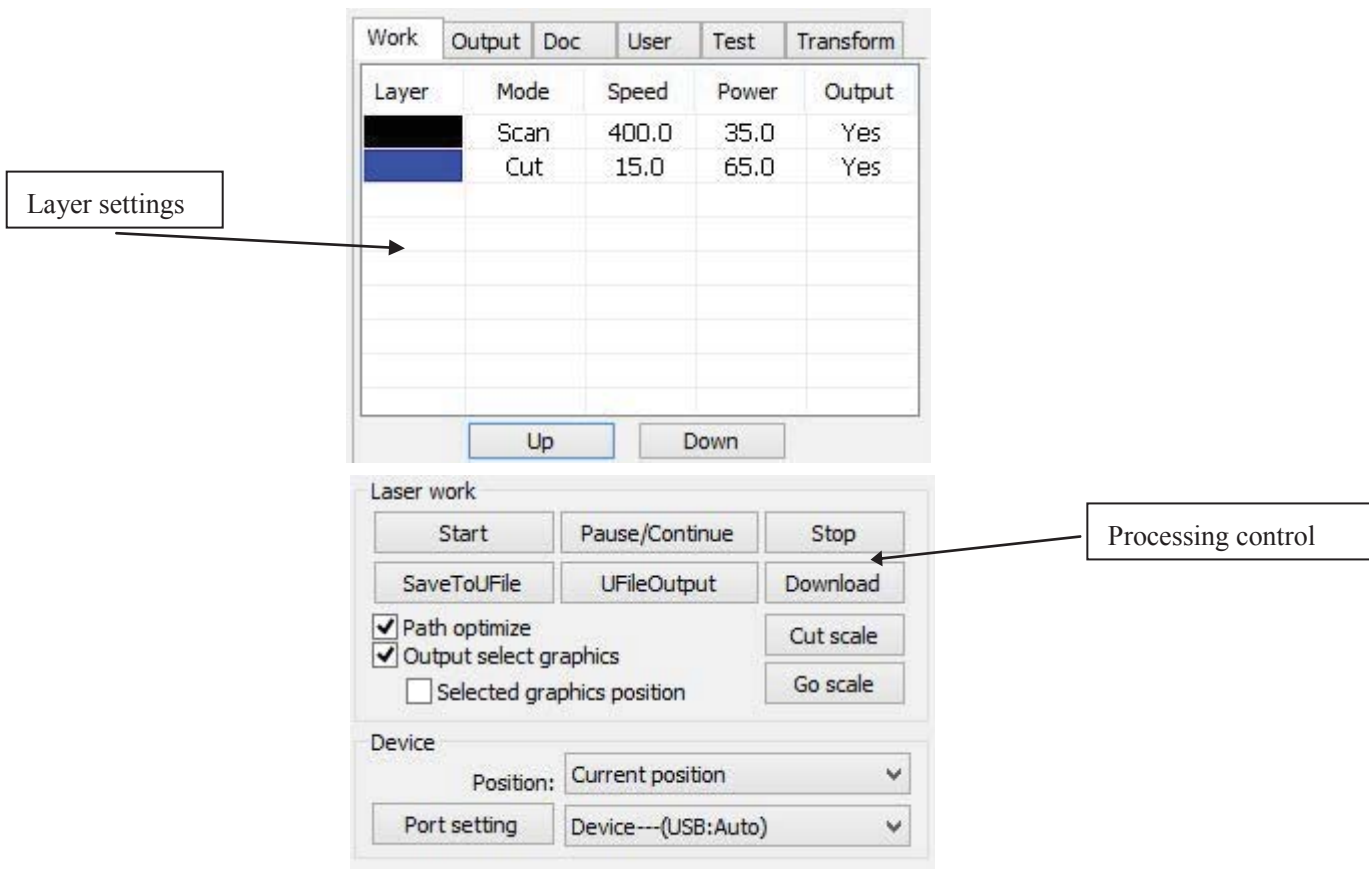
Interval (mm): Refers to the optical scan and its distance under a line. The smaller the interval, the more deeply the graphics are scanned, and vice versa. Suggestions: For vector layers (i.e. color layers), the scanning interval should be set to 0.1 mm or less. For a tuu layer (i.e., a BMP layer), the scanning interval should be set to 0.1 mm or above.

Laser Dot Parameters Setting



Layer parameter input screen for dot mode.

Sending files to the laser using LaserWORKS



Input screen for sending files to the machine using LaserWORKS.

Save To UFile: Clicking this button saves the current file as an RD file which can be used for offline processing. The file can be copied to another memory board for full offline operation. **Use this option to export your file(s) to a USB flash drive, then to import into your machine.**

Download: Clicking this button downloads the file to the memory of the controller, where the user can start it through the machine panel. **Use this option to send your file(s) directly to your machine.**

Output select graphics

If **Output select graphics** is checked, only the selected graphics will be outputted to the machine. If **Selected graphics position** is checked, the selected graphics will be outputted, in position of your machine's worktable, to the position set in the software.

Now that you have the file sent to your machine. Go on the LED control panel, press **File** and locate your file that you sent to the machine. While it is highlighted, you should see the preview of your image that reflects that file. Once you have that, press **Enter** on the file and you are ready to go!

See the FULL software manual of LaserWORKS for more in-depth features!

Lens Replacement

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 concave and one convex. **When reinstalling, the convex side always faces the laser path, away from the working platform.** As illustrated in **Figure 42**, the lens assembly consist of 2 main parts, the lens tube (also known as the lens housing) and nozzle, then 3 parts inside the lens tube. The lens, washer and slotted ring nut.

To remove lens for replacement or cleaning, loosen the friction set screw on the main lens housing holding the lens tube in place. After loosening set screw the lens tube should slide out of the housing. Separate the lens tube from the nozzle like the illustration shown in **Figure 42**.

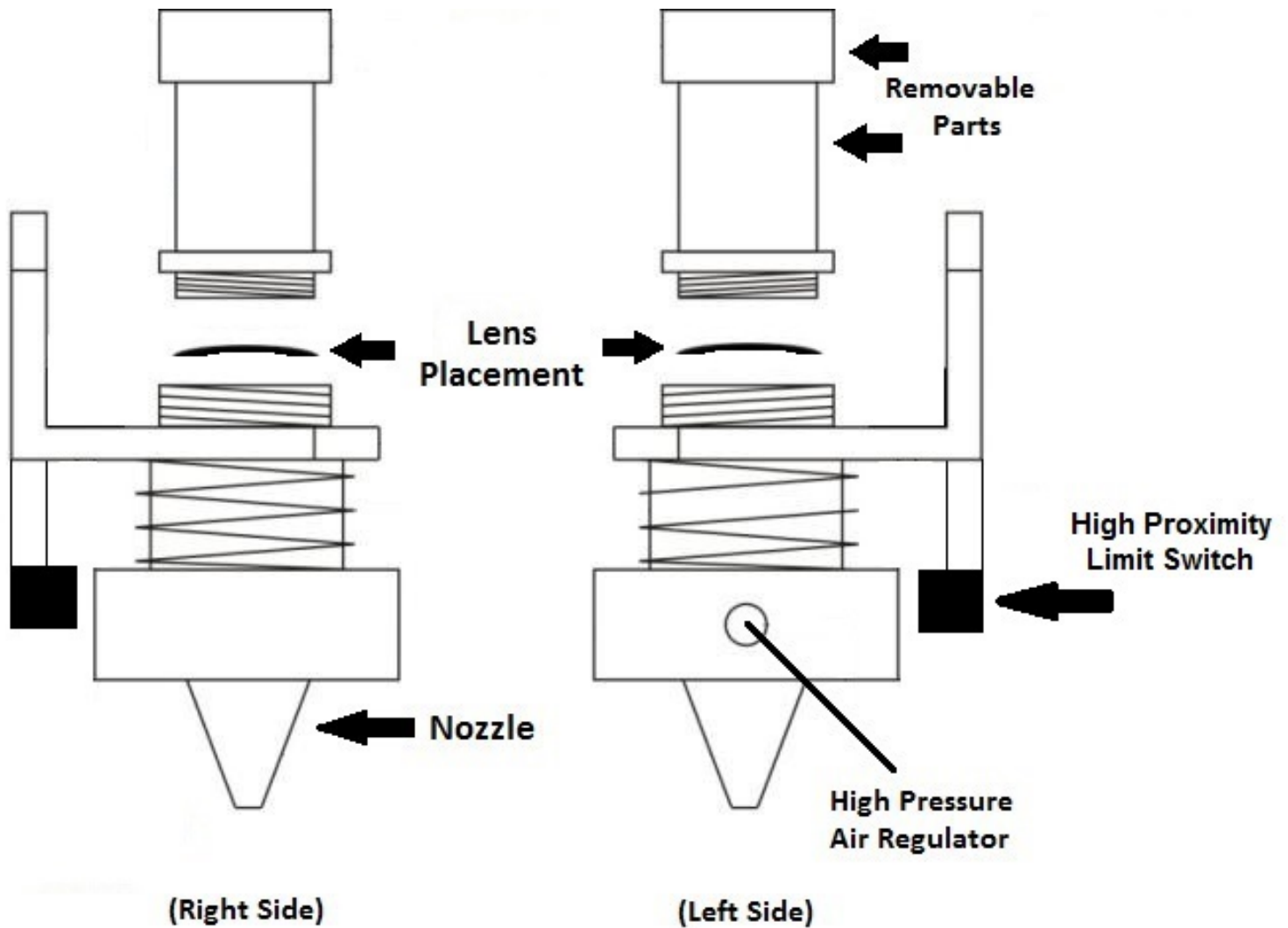


Your laser tool box came with a tool for removing the slotted ring nut. The tool looks more like a scraper than a screw driver. Its width is designed to fit inside the lens tube and fill the slots. Be careful not to let the blade tip slip and scratch the lens.



Once the slotted ring is out, using a pencil with eraser, insert the eraser end into the laser tube and push out the lens. Both lens and washer will fall out the large end.

42. Lens assembly.



At this point the lens can be replaced or cleaned. Different size lens can be inserted as well, just be aware that a 4" lens has a different focus point than a 2" lens. The beam width increases with focal length and may require a nozzle with a larger opening.

Handle the lens carefully, using a lens cleaner/wipes to clean both sides of the lens. Lens paper works well and should show a brown residue after cleaning.

Make sure to place the concave side down towards the working platform when reassembling, convex side always faces the laser beam. **Rubber O-ring first, then the lens and 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.

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 as the cleaning solvent. Use a lens tissue or cotton tipped swabs (Q-Tips) to apply the solvent. Lens 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 as the cleaning solvent. Use a lens tissue or cotton tipped swabs (Q-Tips) to apply the solvent. Lens wipes with alcohol-free solution will also do the trick. Do not scrape the mirror. Use the solvent to dissolve the dirt from the mirror's 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

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:

This lens is located inside the output end of the laser tube. It should be cleaned at least once every *three* months. **You must be very careful when cleaning this lens.** It cannot be removed from the laser tube. As with the other lenses and mirrors, Q-tips and isopropyl alcohol or lens wipes with alcohol-free solution can be used. Be gentle. Ideally, it will only be necessary to remove dust or film contamination from humidity, smoke, or fumes. **Do not scratch this lens; it is not replaceable.**

Linear rails:

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 white lithium grease. The linear rails should be cleaned and examined once a month to prevent the laser head not to move. The surface of the metal should always have white lithium grease 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 where the home switch is located. If you see a dirty line, then clean the rails off and apply fresh white lithium grease.

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). We recommend using white lithium grease and applying that onto the linear rails and inside the linear bearings.

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.

Air filters:

Please consult your user appropriate user manual(s) for cleaning or replacing the air filters. Air filters work best when air is able to move through them and catch the specs of dust, fumes, and other debris in the air. If a filter is too dirty, then the air pressure will be adversely reduced. It can be very important to get the bad smells out of the room. Some off-gases from the laser cutting process can be caustic, nauseating, volatile, corrosive, or even deadly. It is best to use multiple stages of filters to catch the particles of different size.

Incline Portion of Table & Collection Tray(s):

It is **HIGHLY recommended** that these areas must be clean of debris before, between and after usage of the machine. Doing so will help prevent any accidental hazards that may cause (ex. fire/excessive smoke) the machine to be damaged.

Nuts/Bolts:

If concerned about these items rusting, then you should apply a thin coating of silicone base grease. One application per year should be enough.

Coolant:

Firstly, automotive antifreeze should not be used as a laser coolant. The best coolant is deionized water. In the absence of deionized water, distilled water can be used. Tap water should be a much later resort. The coolant should always be clean and clear. It is a common problem for the coolant to become infested with mold. This often looks like a murky green water with algae build up on the inner walls of the hoses. The solution is a multi-step process.

1. Flush out the bad water
2. Add fresh water with 20 percent bleach. Cycle the bleach-water for 30 minutes. Flush this water out also.
3. Switch the inlet and outlet hoses and flush with more water. This should dislodge mold from inside the laser tube.
4. The flow safety sensor could also be full of mold. The best solution is to take it apart and clean with a soft brush or pipe cleaners. Make sure to re-assemble the sensor correctly and without leaks. It is possible that harsh cleaners could creep into the sensor electronics and cause permanent damage.

Storage of the laser:

Clean, dry, warm location with no vibration. Make sure there are **NO MATERIAL(S) LEFT** on the worktable when the machine is not in use.

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.

Troubleshooting

Laser not coming on

First make sure power receptacle the laser is plugged into has working power. Plug in some other device, like a lamp or power drill and check for power.

Check the simple stuff first.

- Is the emergency kill button pressed?
- Is the key turned to the on position?

Machine coming on but not firing

The laser has several protection modes built in to prevent possible injury or machine damage.

Problems with any of these systems will prevent the laser from actually firing, although the head will still move around like the machine is working fine.

- Check the water supply. If the laser does not detect water flowing through the tube the laser will not fire, so make sure either your CW-3000/5000 water chiller is on.
- Make sure all doors are closed. All our machines come with interlocks to prevent operation in the advent lid or doors are open

X or Y Slop Over Error / Frame Over Error

When running the **Frame** and/or **START-PAUSE** button, the Slop/Frame error message will appear only if the object(s)/image(s) being executed on the worktable is overextending (too big and/or not enough space on the worktable to be done)

The file/job keeps starting at the same spot every time

In most cases, this happens when the "**ORIGIN**" was accidentally selected. To cancel the origin, press the **Z/U** button and cycle through the options until you see **Axis Reset+**. Select it and then highlight over the **XY axis reset**. Once that is selected, the laser head will go to it's home position and now the origin has been cancelled. To change the origin position, just move the laser head to your desired location, then press the **ORIGIN** button again to set the origin.