

Section 7

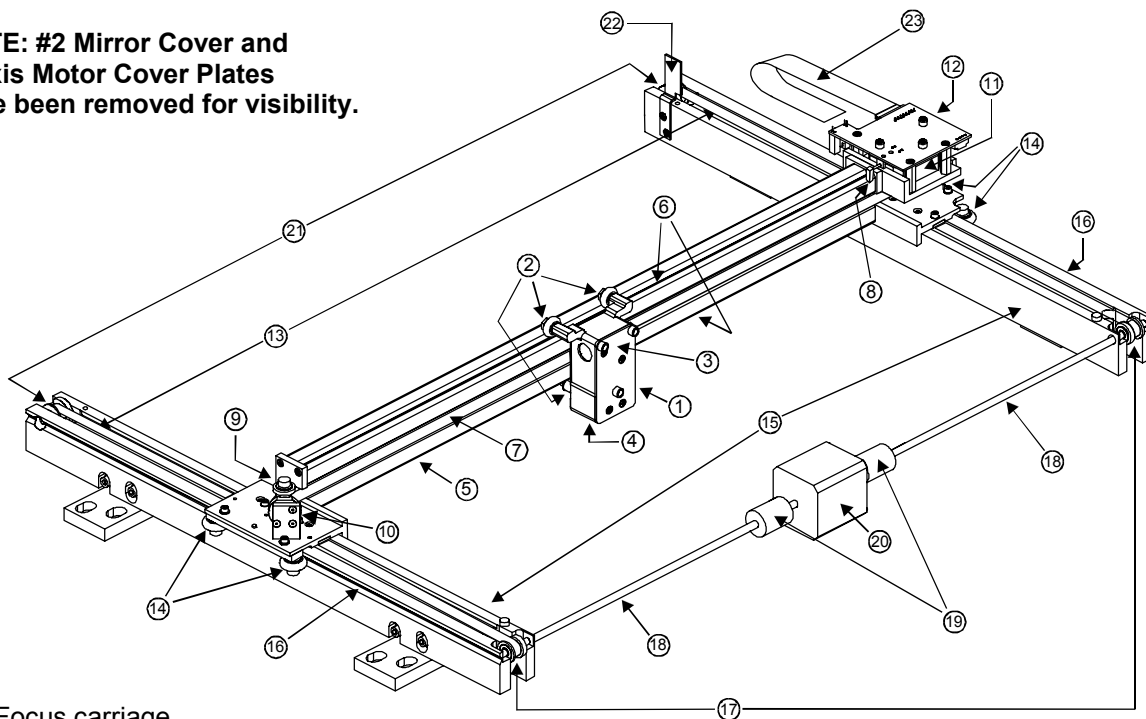
Basic Maintenance



Keeping the laser system clean will ensure the highest quality engraving. The frequency of cleaning will depend entirely on the type of material being engraved, the performance of your exhaust system, the operating environment, and the amount of laser system usage over a given period of time. Dirt or debris that is allowed to build up on the motion system components will cause uneven or rough engraving, or loss of engraving position as well as premature component failure. Smoke or dirt buildup on the optics can cause damage to them, loss of laser power, or premature failure of these components. Use good judgment and keep in mind that a clean machine is the best performing machine. Always turn the laser engraving system OFF and unplug it before performing any cleaning procedures.

Motion System Components Diagram

NOTE: #2 Mirror Cover and X-axis Motor Cover Plates have been removed for visibility.



- 1) Focus carriage
- 2) X-axis bearing (3)
- 3) #3 mirror (inside cover plate)
- 4) Focus lens (inside cover plate)
- 5) X-axis rail (arm)
- 6) X-axis bearing track (2)
- 7) X-axis belt
- 8) X-axis home sensor flag
- 9) X-axis idler pulley
- 10) #2 mirror and holder
- 11) X-axis motor and drive gear
- 12) X-Y home sensor board (upper flex board)
- 13) Y-axis belt (2)
- 14) Y-axis bearing (4) (2 on right side Y-axis rail, 2 on left side Y-axis rail)
- 15) Y-axis rail (2)(one right side and one left side)
- 16) Y-axis rail bearing track (2) (one on right side, one on left side)
- 17) Y-axis drive gear (2) (one on right side, one on left side)
- 18) Y-axis shaft (2) (one on right side, one on left side)
- 19) Y-axis shaft flex coupler (one on right side, one on left side)
- 20) Y-axis motor
- 21) Y-axis idler pulley (2) (one on right side, one on left side)
- 22) Y-axis home sensor flag
- 23) Flex cable

Cleaning and Maintenance Supplies

- Soap solution mixture of 1 tablespoon (2 cl) liquid soap and 1 quart (liter) of water in a spray bottle
- Window cleaner
- Paper towels
- Cotton cloth
- Denatured alcohol (**NOT** to be used on any painted surface, plastic, or the Top Window)
- Acetone (can be used on the engraving table but nowhere else)

CAUTION

When using acetone or denatured alcohol, please follow the instructions on the printed label of these materials for safe handling procedures.

- Cotton swabs (supplied)
- Lens cleaner (supplied)
- Vacuum cleaner
- Set of Allen wrenches sized from .050 to 3/16 inch

System Cleaning and Maintenance

Motion System

- Turn off and unplug the laser system.
- Open the top door and thoroughly remove all loose dirt and debris from inside the machine with a vacuum cleaner.
- Clean the engraving table surface with either a soap solution, or alcohol or acetone, and paper towels. **NEVER** pour or spray any solution directly into the laser system. Always dampen your paper towel or cloth outside of the machine with the cleaning solution and then wipe down the parts you are cleaning with the dampened cloth.
- Clean X-rail and the Y-rails by using either the cotton swabs or paper towels, and alcohol or soap solution. Pay close attention to the bearing tracks since any debris left to build up in these bearing tracks will cause the bearings to wear and the engraving quality to become rough.
- After the rails and tracks are cleaned, use a clean swab or paper towel, and alcohol to clean all of the bearings by holding the swab against each bearing and moving the motion system by hand to roll the bearings against the swab. There are seven bearings in the system, three (3) on the focus carriage, two (2) on the left side of the X-rail, and two (2) on the right side of the X-rail.

The Main Enclosure

- Clean the top window with a cotton cloth or paper towel and window cleaner. The top window is made out of glass; therefore, **DO NOT** use abrasive cleaning clothes because they will scratch the glass. Also, **DO NOT** use abrasive chemicals as these chemicals will damage the glass. Only use cleaners compatible with glass.
- Use a soft cloth or paper towels and the soap solution to clean the enclosure. **DO NOT** use alcohol, acetone, or any other harsh chemical, as this will damage the paint.

Optics

A visual inspection of the #2 and #3 mirrors, beam window, and focus lens should be performed at least once a day.

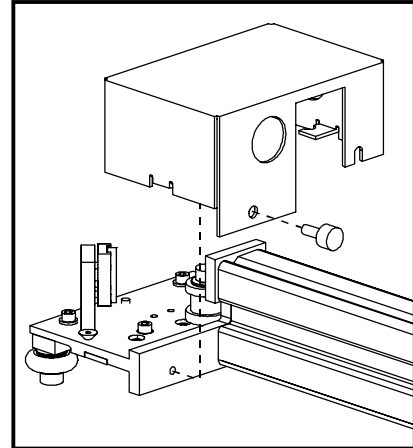
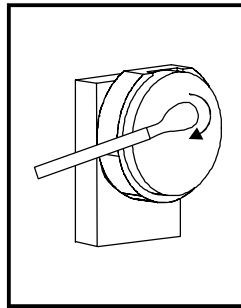


DO NOT clean an optic that is visually clean. Excessive cleaning can damage the optic. To prevent contamination, wash your hands thoroughly before cleaning any optic. **NEVER** touch any optic with your fingers. The acids from your skin can destroy the optical coatings. **NEVER** clean any optic right after engraving or cutting because the optic may be hot and the cool lens cleaning solution may thermally shock the optic and crack it.

#2 Mirror

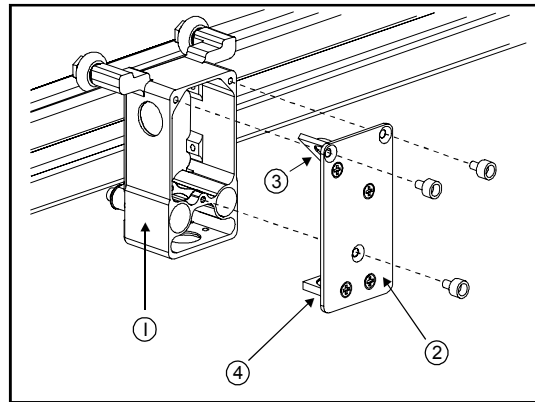
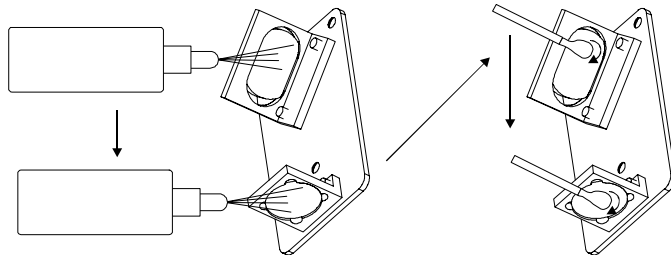
To gain access to the #2 mirror, the mirror cover must be removed. Remove the thumbscrew and slide the cover to the right and then lift the cover straight up.

Inspect the #2 mirror and clean it only if there is debris present. To clean the #2 mirror with a cotton swab, moisten the cotton swab with the lens cleaning solution supplied with the laser system. **DO NOT** use other types of cleaners or solutions. Gently roll the cotton swab across the mirror once. **DO NOT** drag the swab or roll it back and forth as this can scratch the mirror. If the mirror did not come clean, use a fresh cotton swab and repeat the procedure. Do not be concerned about small pieces of lint that come off of the cotton swab. They will be vaporized as soon as the laser hits it. You can cause more damage to the mirror by trying to remove the lint than by leaving it alone.



#3 Mirror and Focus Lens

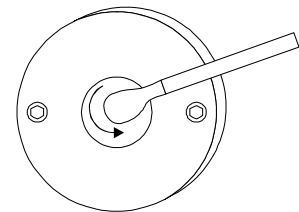
To gain access to the #3 mirror (3) and the focus lens (4), hold the front cover (2) with one hand, and remove the three thumbscrews with the other hand. Pull the front cover straight out. The #3 mirror and the focus lens are both mounted to the front cover.

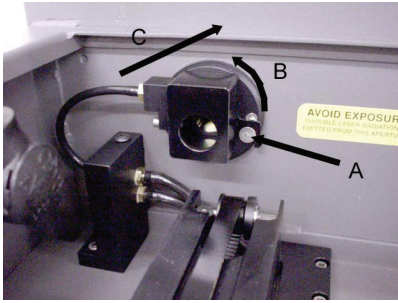


Tilt the front cover enough to enable you to apply the lens cleaning solution directly to the #3 mirror and to the focus lens. Flood the reflective surface of the #3 mirror with the solution. If heavy debris is present, let the solution soak in for a minute. Roll a fresh cotton swab across the mirror in one direction. Use a fresh swab for each pass. Be gentle when cleaning the optic to avoid scratching the surface. Repeat this procedure for the focus lens but make sure you clean both sides of the lens.

Beam Window

The beam window is where the laser beam enters into the engraving area. It is located in the upper left hand corner of the engraving area against the back wall and is yellow in color. It is only necessary to clean the front side of the beam window. Do not remove the optic to clean it; simply clean it in the same manner as the #2 mirror.

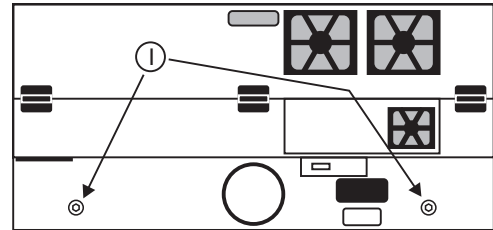




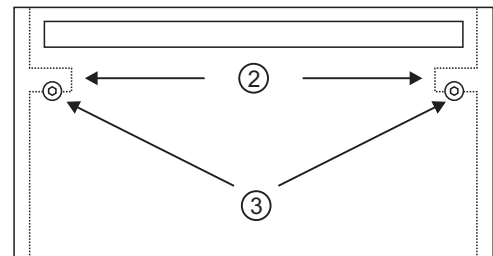
If your system is equipped with Air Assist, using your fingers, rotate the beam window cover counter-clockwise (B) and then off at a 45-degree angle (C). If the beam window cover is stuck use a 1/16 Allen wrench to loosen or remove the screw (A) and try again. Set the cover off to the side and clean the optic, if necessary. Reinstall the beam window cover opposite of removal being careful not to scratch the optic.

Exhaust Plenum Cleaning (PLS3.60 and PLS 4.60)

- Power the laser system and UCP on.
- Using the Z-axis controls, raise the Z-axis table as high as possible. Power the system OFF.
- Locate and remove the two button head screws (1) found on the back of the laser system.
- Open the front door. Using both hands, reach in and grab exhaust plenum. Lift the plenum straight up until the tabs (2) of the plenum clear the two flat head screws (3) they are resting on. Tilt the bottom of the plenum towards you and remove it from the system. Using your soap and water solution, clean the inside of plenum as well as the inside rear wall of the Laser System.
- Installation is opposite of removal. Make sure that the plenum tabs rest on the two flat head screws.



Back View

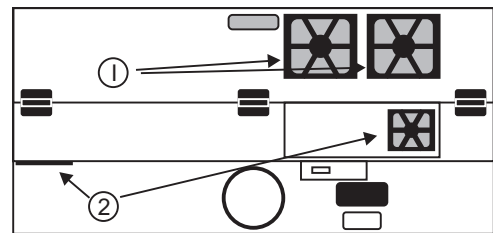


Inside Front View

NOTE: The PLS6.60's and PLS6.120D's exhaust plenums are removed in the same fashion but these two laser systems come with two exhaust plenums.

Cooling Fan Filters (PLS3.60 and PLS 4.60)

This air-cooled laser system will require periodic cleaning of the cooling fan filters. Since ambient air is used to cool the laser cartridge, the air must be filtered before it enters the inside of the laser system. Dirt or dust contamination may reduce the cooling fan's ability to keep the laser cartridge, as well as the CPU and power supply, from overheating. An overheated laser cartridge will lose laser power during engraving and will eventually shut down completely.



Back View

The cooling fan filters are located on the back of the laser system. To service the filters, first turn OFF and unplug the laser system. There are two large filters (1) and two small filters (2). To remove the filter(s), simply snap off the black cover and remove the foam element. Wash the element in a soap and water solution, dry, and re-install.

NOTE: The PLS6.60 AND PLS6.120D has a total of 6 filters. Four large and one small filter(s) located on the back, and one large filter located on the side near the power switch.



NEVER OPERATE THE LASER SYSTEM WITH THE COOLING FAN FILTERS REMOVED. This can permanently damage the laser system. Damage to the laser system, from this kind of abuse **IS NOT** covered under warranty.

Adjustments and Lubrication

There are no periodic adjustments normally required. The bearings in the motion system will self adjust to take up any clearances as they begin to wear. The belts are fiber reinforced and will not stretch under normal use so that periodic tension adjustment is not necessary. Optical alignment is not necessary because the laser and the #2 mirror are fixed.

All bearings in the system are sealed and do not require lubrication. **DO NOT** lubricate the tracks that the bearings ride in. The only lubrication that may be required is the screw threads for the table lifting mechanism. After some time, contaminants can adhere to the lubricant, which can cause the engraving table to bind up or sound squeaky. If this is the case, wipe off the contaminated grease with a soft cloth dampened with alcohol and apply fresh white lithium grease to the screw threads. **NEVER SPRAY ANY DEGREASING SOLUTIONS DIRECTLY ONTO THE THREADS.** Run the table up and down to work in the fresh grease. Repeat if necessary.

Maintenance Schedule

Since the maintenance requirements of the laser system is dependent on the type of material being run, the quantity of material being removed, the hours of operation, and the quality of the exhaust blower, it must be user defined.

As a starting point, we recommend the following schedule:

- As necessary
 - Engraving table
 - Main enclosure
 - Top door window
- Every 8 hours of engraving
 - Clean X-axis and Y-axis bearings
 - Clean X-axis and Y-axis rails and bearing tracks
 - Clean X-axis belt.
 - Check beam window, #2 mirror, #3 mirror, and focus lens for debris. Clean **ONLY** if dirty.
- Every month
 - Clean cooling fan filters
 - Clean and re-lubricate Z-axis lead screws
 - Check for X-axis and Y-axis belt wear – replace as necessary
 - Check and/or clean X-axis and Y-axis drive gears
 - Check for X-axis and Y-axis bearing wear – replace as necessary
 - Inspect system for loose screws and mechanical parts – tighten if necessary
- Every 6 months
 - Exhaust plenum

If you are noticing a considerable buildup of debris on the optics and the motion system, clean the system at more frequent intervals. If your system has remained relatively clean, you can extend your cleaning intervals. Keep in mind that a clean machine is a better performing machine and can extend the life of the parts as well as reduce the possibility of down time. If you have any questions about maintaining the laser system, please contact our Technical Support Department.

