MODEL G0911, G0912, G0913, & G0914
39" X 63" CO_2 LASER CUTTERS
OWNER'S MANUAL

(For models manufactured since 05/21)

(G0911 Shown Here)

Meets FDA Safety Standards

#KS21997 PRINTED IN CHINA V1.09.22

******Keep for Future Reference******

⚠ WARNING!

This manual provides critical safety instructions on the proper setup, operation, maintenance, and service of this machine/tool. Save this document, refer to it often, and use it to instruct other operators.

Failure to read, understand and follow the instructions in this manual may result in fire or serious personal injury—including amputation, electrocution, or death.

The owner of this machine/tool is solely responsible for its safe use. This responsibility includes but is not limited to proper installation in a safe environment, personnel training and usage authorization, proper inspection and maintenance, manual availability and comprehension, application of safety devices, cutting/sanding/grinding tool integrity, and the usage of personal protective equipment.

The manufacturer will not be held liable for injury or property damage from negligence, improper training, machine modifications or misuse.

⚠ WARNING!

Some dust created by power sanding, sawing, grinding, drilling, and other construction activities contains chemicals known to the State of California to cause cancer, birth defects or other reproductive harm. Some examples of these chemicals are:

- **Lead from lead-based paints.**
- **Crystalline silica from bricks, cement and other masonry products.**
- **Arsenic and chromium from chemically-treated lumber.**

Your risk from these exposures varies, depending on how often you do this type of work. To reduce your exposure to these chemicals: Work in a well ventilated area, and work with approved safety equipment, such as those dust masks that are specially designed to filter out microscopic particles.

Table of Contents

INTRODUCTION

Contact Info

We stand behind our machines! If you have questions or need help, contact us with the information below. Before contacting, make sure you get the **serial number** and **manufacture date** from the machine ID label. This will help us help you faster.

Grizzly Technical Support
1815 W. Battlefield
Springfield, MO 65807
Phone: (570) 546-9663
Email: techsupport@grizzly.com

We want your feedback on this manual. What did you like about it? Where could it be improved? Please take a few minutes to give us feedback.

Grizzly Documentation Manager
P.O. Box 2069
Bellingham, WA 98227-2069
Email: manuals@grizzly.com

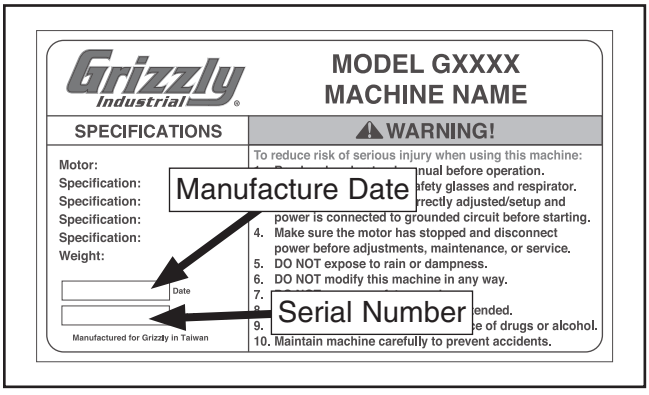
Manual Accuracy

We are proud to provide a high-quality owner's manual with your new machine!

We made every effort to be exact with the instructions, specifications, drawings, and photographs in this manual. Sometimes we make mistakes, but our policy of continuous improvement also means that **sometimes the machine you receive is slightly different than shown in the manual**.

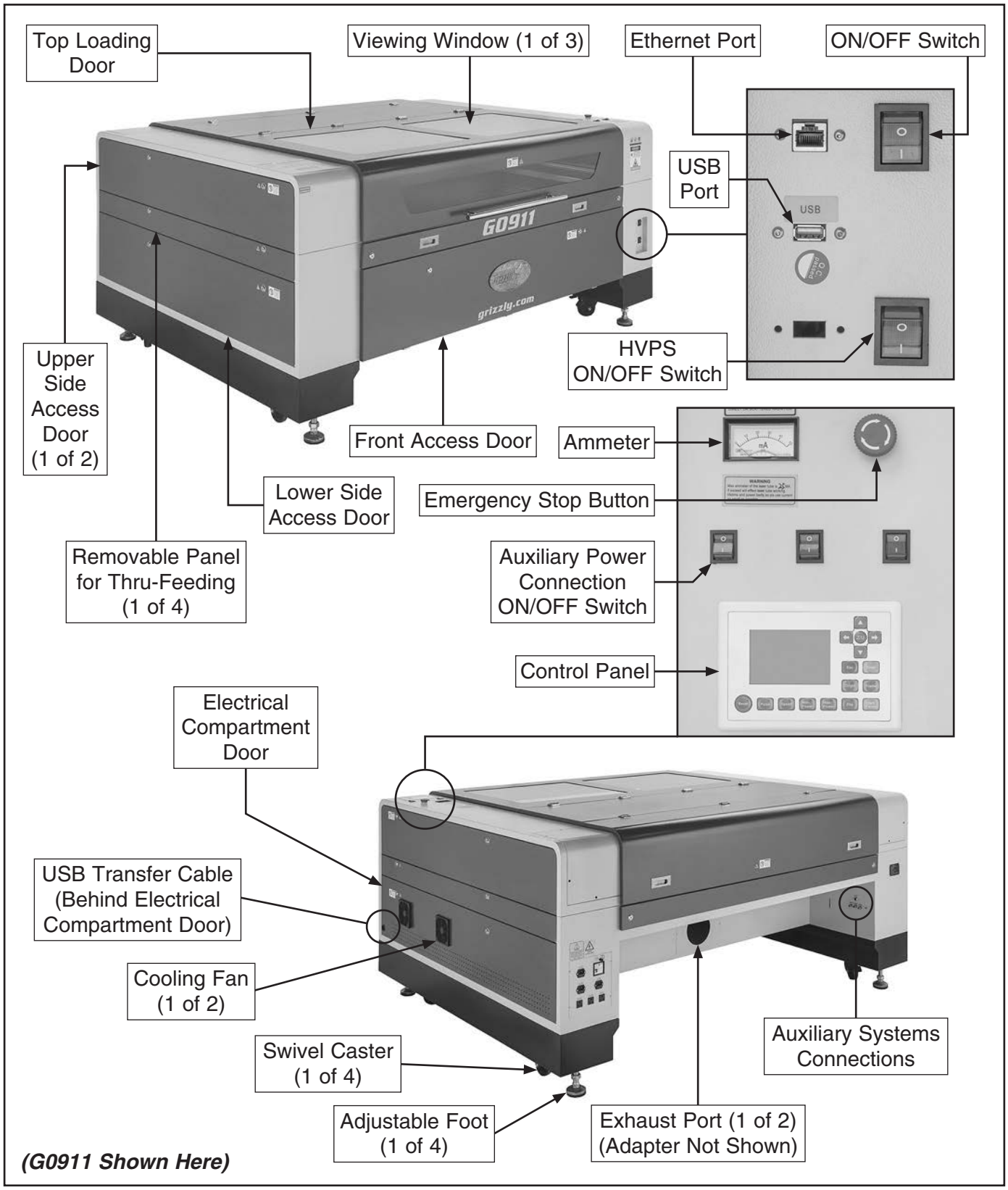
If you find this to be the case, and the difference between the manual and machine leaves you confused or unsure about something, check our website for an updated version. We post current manuals and manual updates for free on our website at **www.grizzly.com**.

Alternatively, you can call our Technical Support for help. Before calling, make sure you write down the **manufacture date** and **serial number** from the machine ID label (see below). This information is required for us to provide proper tech support, and it helps us determine if updated documentation is available for your machine.



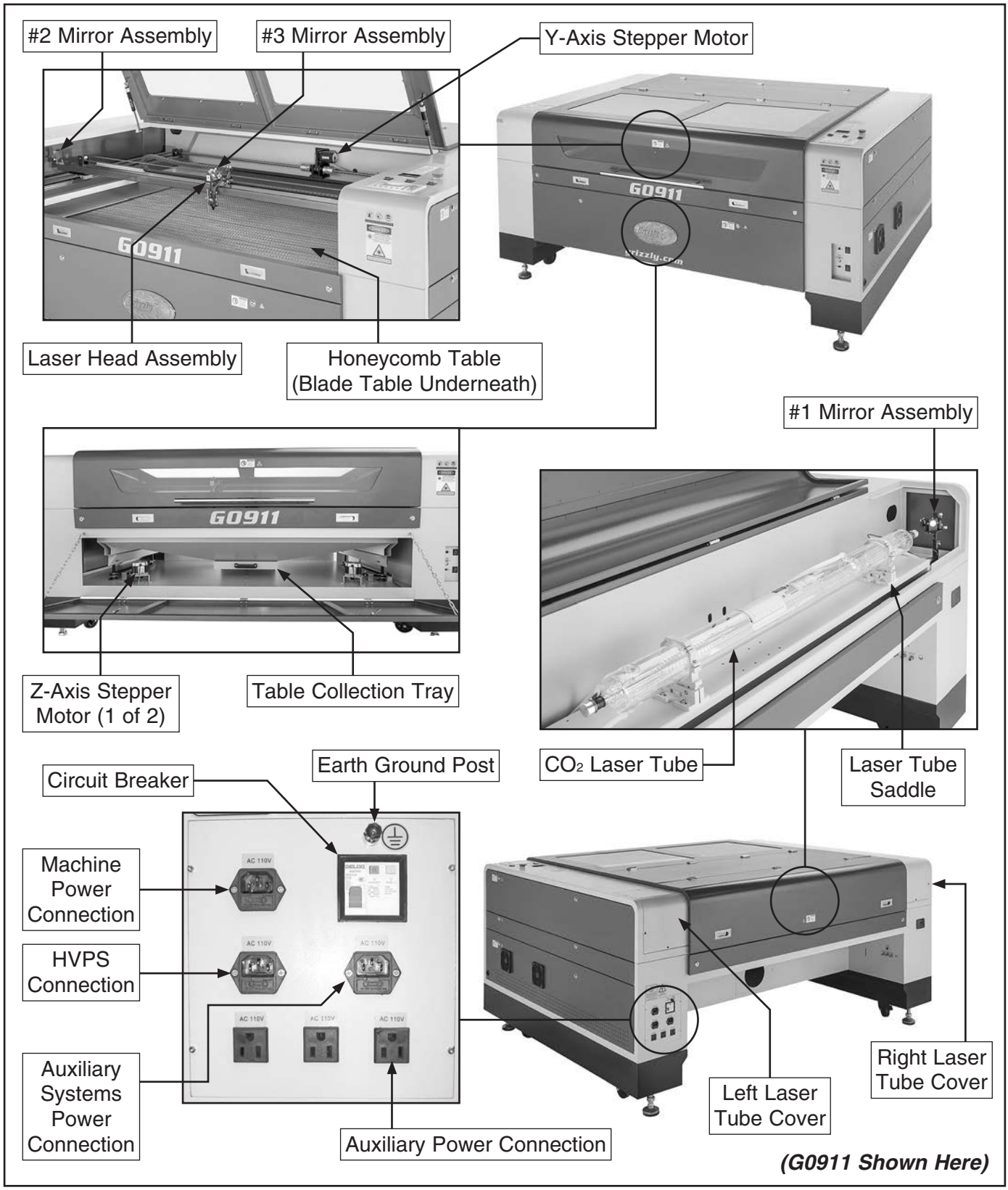
Identification

Become familiar with the names and locations of the controls and features shown below to better understand the instructions in this manual.



(G0911 Shown Here)

Identification (Cont.)



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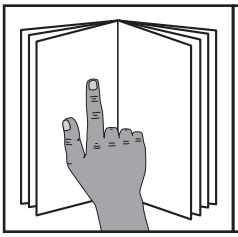
Controls & Components



⚠WARNING

To reduce your risk of serious injury, read this entire manual BEFORE using machine.

Refer to the following figures and descriptions to become familiar with the basic controls and components of this machine. Understanding these items and how they work will help you understand the rest of the manual and minimize your risk of injury when operating this machine.

Control Panel

The control panel (see **Figure 1**) is used for controlling machine operations and allows access to direct commands and selectable menu functions. Refer to **Command Tree** on **Page 95** for an extended map of menu features.

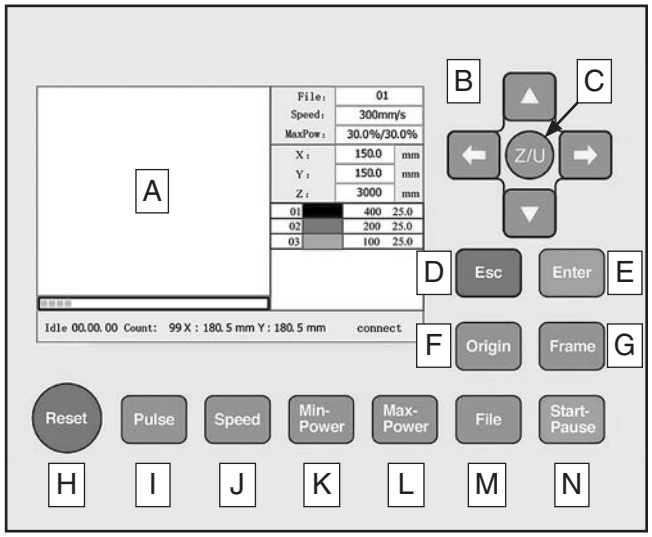


Figure 1. Control panel.

A. Screen Display: Visual interface between user and current machine state.

B. Arrow Nav Buttons: Navigate through menu items or manually move laser head.

C. Z/U Button: Shows operational menu interface when machine is idle.

D. Esc Button: Exits selected command or stops currently running operation.

E. Enter Button: Opens currently highlighted command.

F. Origin Button: Designates current physical location of laser head assembly as origin.

G. Frame Button: Instructs laser head to trace working envelope of current operation according to designated location of origin.

H. Reset Button: Restarts machine.

I. Pulse Button: Powers laser for a fraction of a second to assist with laser alignment or general troubleshooting purposes.

J. Speed Button: Sets speed of current working layer or arrow nav button movement.

K. Min-Power Button: Sets minimum laser power of current working layer.

L. Max-Power Button: Sets maximum laser power of current working layer.

M. File Button: Shows file management interface when machine is idle.

N. Start-Pause Button: Starts or pauses current operation.

Additional Controls

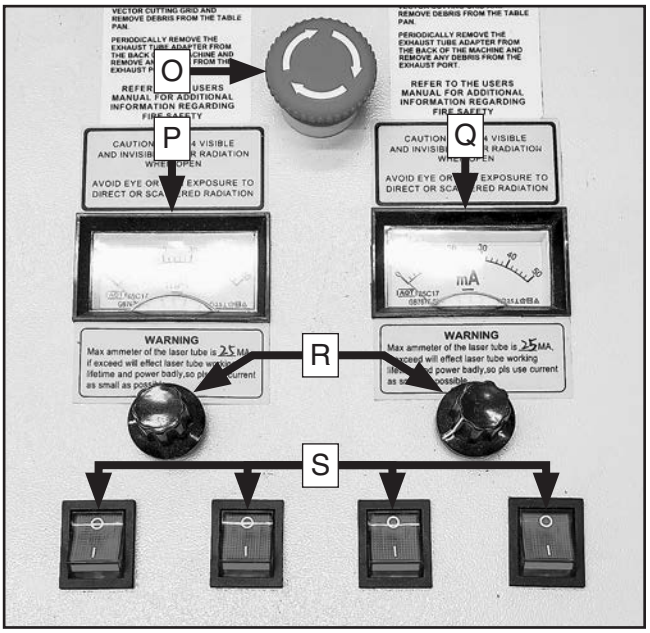


Figure 2. Location of additional controls (G0913/G0914 shown).

O. Emergency Stop Button: Disables power to machine. To reset, twist button clockwise until it pops out.

P. Primary Ammeter: Displays current used by primary laser tube in milliamperes (mA).

Q. Secondary Ammeter (G0913/G0914): Displays current used by secondary laser tube in milliamperes (mA).

R. Power Setting Dials (G0913/G0914): Provide power adjustment of laser tubes during operation.

S. Auxiliary Power Connection ON/OFF Switches: Turn auxiliary power connections on rear of machine ***ON*** or ***OFF***.

Note: *The Model G0911 and G0912 have (3) switches that control (3) auxiliary power connections. The Model G0913 and G0914 have (4) switches that control (4) auxiliary power connections.*

Power Components

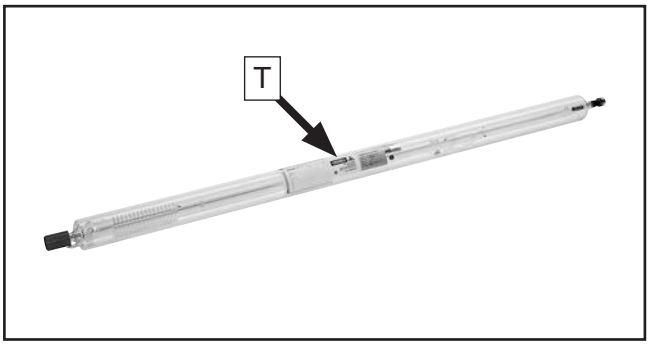


Figure 3. Laser tube (removed from machine for clarity).

T. CO_2 Laser Tube: CO_2 gas-filled laser tube rated for 100W (G0911/G0913) or 130W (G0912/G0914) output. Operates at 10,600 nm (10.6 µm) infrared wavelength.

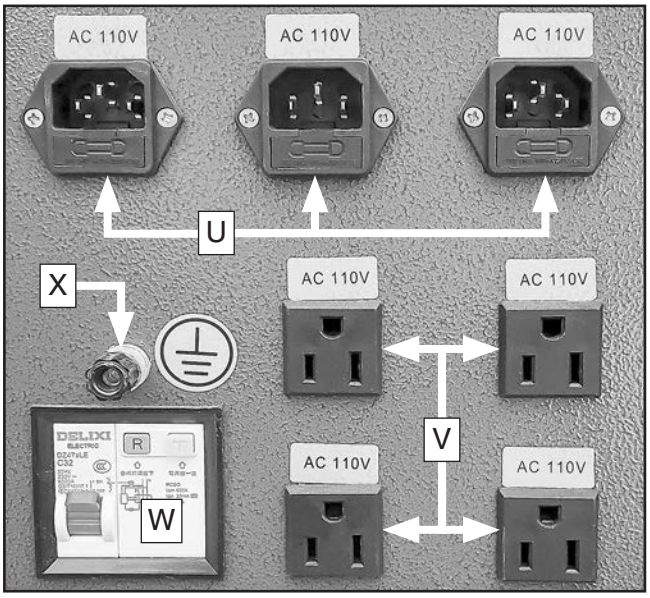


Figure 4. Power connections (G0913/G0914 shown).

U. Power Connections: Receptacles with 10A fuses for connecting machine, high voltage power supply, and auxiliary systems to power.

V. Auxiliary Power Connections: Connect auxiliary systems to power.

W. Circuit Breaker: Provides overload protection for machine electrical system. To reset, place ON/OFF switch in OFF position, then flip circuit breaker switch.

X. Earth Ground Post: Dissipates static electricity generated during operation.

Machine Interface

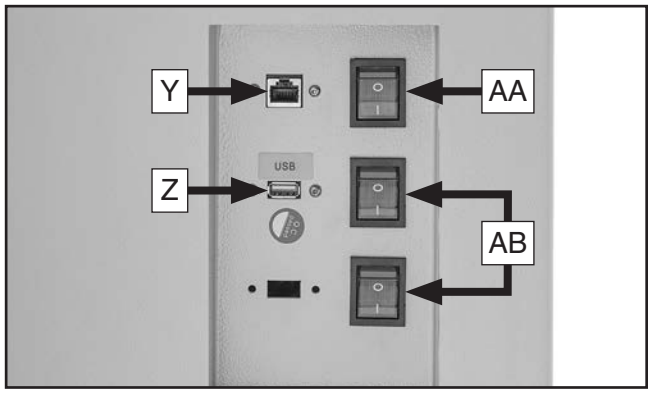


Figure 5. Machine interface components (G0913/G0914 shown).

Y. Ethernet Port: Dedicated ethernet port for transferring files to machine over a network.

Z. USB 2.0 Port: Dedicated USB port for transferring files to machine.

AA. ON/OFF Switch: Turns machine ***ON*** or ***OFF***.

AB. HVPS ON/OFF Switches: Turn high voltage power supplies ***ON*** or ***OFF***.

Auxiliary Systems Connections

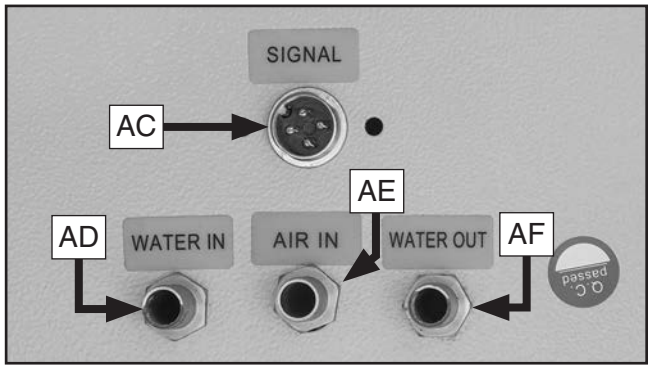


Figure 6. Auxiliary systems connection panel (G0911/G0912 shown).

AC. Water Chiller Signal Connector: Provides flow and temperature alarms when connected to water chiller.

AD. Water Inlet Fitting: Supply connection for water chiller system.

AE. Air Inlet Fitting: Supply connection for air pump.

AF. Water Outlet Fitting: Return connection for water chiller system.

Auxiliary Systems

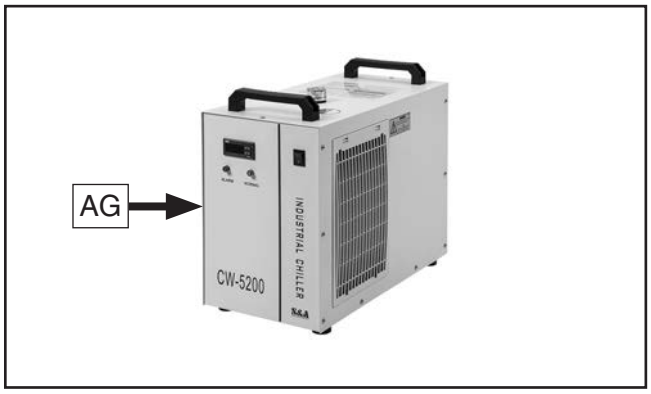


Figure 7. Water chiller system.

AG. Water Chiller: Cools laser tube by continuously circulating water through internal loop of supply and return hoses.

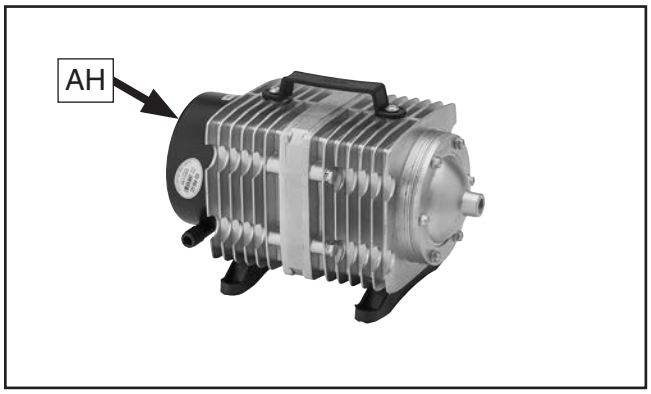


Figure 8. Diaphragm-style air pump.

AH. Air Pump: Blows debris and fumes away from point of laser burn using air produced by diaphragm-style pump.

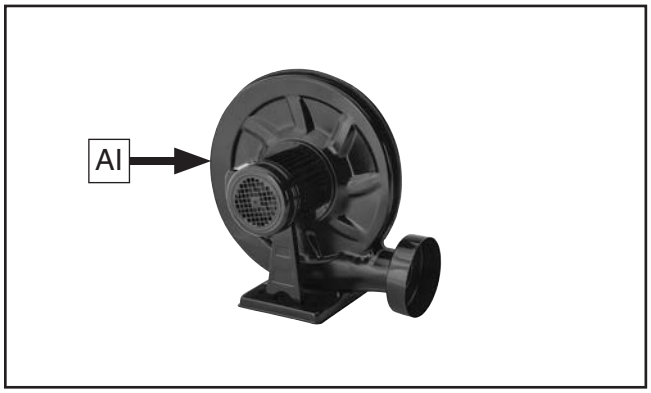


Figure 9. Centrifugal-style extraction fan.

AI. Extraction Fan: Vents debris, gases, and fumes created during laser operations from machine interior using negative airflow produced by centrifugal-style impeller.

Glossary of Terms

The following is a list of common definitions, terms, and phrases used throughout this manual as they relate to this CNC laser and laser cutting in general. Become familiar with these terms for assembling, adjusting, or operating this machine. Your safety is **VERY** important to us at Grizzly!

Anode: The positive (+) terminal, electrode, or element of an electron tube or electrolytic cell.

Axis: Direction of movement. On a typical three-axis machine, axes are X (left to right), Y (front to back) & Z (up and down). Axis directions are described as positive or negative. On this machine, negative movement is defined as movement towards the front (Y), left (X), and downward (Z) portion of the working envelope.

CAD (Computer Aided Design): CAD software is used to create a digital model of a project.

CAM (Computer Aided Manufacturing): CAM software converts CAD models into a toolpath defined by code that CNC machines interpret.

Cathode: The negative (-) terminal, electrode, or element of an electron tube or electrolytic cell.

CNC (Computer Numerical Control): Automated operation of a machine by a computer program via written instructions.

ESD (Electrostatic Discharge): A sudden flow of electricity between two electrically charged objects caused by contact, an electrical short, or dielectric breakdown.

Focal Length: The distance from the focal point of a lens or mirror to the corresponding principal plane.

Frame Slop: Machine error code that indicates travel exceeds working envelope of X- and Y-axes.

Home Position: Machine designated zero point on all axes.

Name Over Lap: Machine error code which indicates file with same name is detected in destination memory location.

Origin: User designated zero point for a workpiece from which laser will reference positioning of all cutting/engraving.

Profile Toolpath: A toolpath that cuts around or along the profile of a set of vectors. Typically used to cut out the shape of a design.

Right-Hand Rule: A rule that uses the shape of the right hand to establish the standard orientation of vector quantities normal to a plane.

Soft Limits: Axis limits imposed by workspace boundaries based on controller settings and the location of home.

Stepper Motor: An electric motor (typically DC) that moves in precise steps when pulses are received. Has very accurate positioning and speed control.

Thermal Lens Effect: When energy from a laser beam passing through a sample is absorbed, causing heating of the sample along the beam path.

Toolpath: User-defined route that the laser follows to cut or engrave a workpiece.

Track/Frame: Machine command which verifies toolpath boundaries of loaded image do not exceed available working envelope of workpiece.

Working Envelope: Total area that laser tip can travel within that does not exceed physical machine boundaries.

XSlop Over: Machine error code that indicates travel exceeds working envelope of X-axis.

YSlop Over: Machine error code that indicates travel exceeds working envelope of Y-axis.

MACHINE DATA SHEET

Customer Service #: (570) 546-9663 · To Order Call: (800) 523-4777 · Fax #: (800) 438-5901

MODEL G0911, G0912, G0913, & G0914
39" X 63" CO2 LASER CUTTERS

Model Number	G0911	G0912	G0913	G0914
Product Dimensions				
Weight	1676 lbs.		1722 lbs.	
Width (side-to-side) x Depth (front-to-back) x Height	91 x 66-1/2 x 42-1/2 in.			
Footprint (Length x Width)	63 x 83 in.			
Shipping Dimensions				
Container Type	Wood Crate			
Content	Machine			
Weight	1876 lbs.		1922 lbs.	
Length x Width x Height	99 x 74 x 50 in.			
Machine Electrical				
Power Requirement	110V, Single-Phase, 60 Hz			
Full-Load Current Rating	10.7A			
Minimum Circuit Size	15A			
Connection Type	Cord & Plug			
Power Cord Included	Yes			
Power Cord Length	72 in.			
Power Cord Gauge	14 AWG			
Plug Included	Yes			
Included Plug Type	5-15			
Switch Type	Ruida Control Panel			
Water Chiller Electrical				
Power Requirement	110V, Single-Phase, 60 Hz			
Full-Load Current Rating	6.5A			
Extraction Fan Electrical				
Power Requirement	110V, Single-Phase, 60 Hz			
Full-Load Current Rating	6.8A			
Air Pump Electrical				
Power Requirement	110V, Single-Phase, 60 Hz			
Full-Load Current Rating	1.5A			

Model Number	G0911	G0912	G0913	G0914
X-Axis Motor				
Frame Size	NEMA 23			
Amps	5.8A			
Speed	0–1600 RPM			
Type	Stepper (Brushless, Permanent Magnet)			
Power Transfer	Belt			
Step Resolution	1.2º Per Step			
Y-Axis Motor				
Frame Size	NEMA 23			
Amps	5.8A			
Speed	0–1600 RPM			
Type	Stepper (Brushless, Permanent Magnet)			
Power Transfer	Belt			
Step Resolution	1.2º Per Step			
Z-Axis Motor				
Frame Size	NEMA 34			
Amps	3.8A			
Speed	0–1000 RPM			
Type	Stepper (Brushless, Permanent Magnet)			
Power Transfer	Belt			
Step Resolution	1.8º Per Step			
Laser Information				
Type	Sealed CO_2 Laser Tube			
Wattage	100W	130W	100W	130W
Wavelength	10,600 nm			
Focus	Automatic			
Cooling System	Distilled Water			
Cutting Information				
Cutting Area	39 x 63 in.			
Cutting Speed	0–24,000mm/min. (945 in./min.)			
Minimum Cutting Thickness	0.5mm (0.02 in.)			
Maximum Cutting Thickness	20mm (0.8 in.)			
Minimum Cutting Width	1mm (0.04 in.)			
Maximum Cutting Width	2mm (0.08 in.)			
Maximum Cutting Height	7 in.			
Repeat Position Accuracy	+/-0.05mm (+/-0.002 in.)			
Number of Laser Heads	1		2	
Table Information				
Table Length	1000mm (39-3/8 in.)			
Table Width	1610mm (63-3/8 in.)			
Table Thickness	178mm (7 in.)			
Table Adjustment	Motorized			

Model Number	G0911	G0912	G0913	G0914
Construction Materials				
Table	Steel			
Cabinet	Steel			
Gantry	Aluminum			
Paint Type/Finish	Enamel			
Other Related Information				
Number of Exhaust Ports	2			
Exhaust Port Size	6 in.			
Included Design Software	RDWorks			
Other Specifications				
Country of Origin	China			
Warranty	1 Year			
Approximate Assembly & Setup Time	2 Hours			
Serial Number Location	Machine ID Label			
ISO 9001 Factory	Yes			
Certification	FDA Material Processing Laser Product			
Features				
Ruida LCD Control Panel				
Leadshine Stepper Motors				
HIWIN Linear Guideways				
II-VI Optical Lenses				
Wireless Networking Connectivity				
RDWorks Laser Cutting/Engraving Software				
USB 2.0 Port				
Auxiliary Power Receptacles for Air Pump and Water Chiller				
Accessories				
Water Chiller for Cooling Laser Tube				
Extraction Fan for Fume Removal from Laser Compartment				
Air Pump for Removing Debris During Operations				
(3) Flexible Exhaust Ducts 6" x 60"				
Exhaust Port Adapter				
Honeycomb Table				
USB Flash Drive 512MB				
Toolbox w/Setup Accessories				

SECTION 1: SAFETY

For Your Own Safety, Read Instruction Manual Before Operating This Machine

The purpose of safety symbols is to attract your attention to possible hazardous conditions. This manual uses a series of symbols and signal words intended to convey the level of importance of the safety messages. The progression of symbols is described below. Remember that safety messages by themselves do not eliminate danger and are not a substitute for proper accident prevention measures. Always use common sense and good judgment.

⚠DANGER **Indicates an imminently hazardous situation which, if not avoided, WILL result in death or serious injury.**

⚠WARNING **Indicates a potentially hazardous situation which, if not avoided, COULD result in death or serious injury.**

⚠CAUTION **Indicates a potentially hazardous situation which, if not avoided, MAY result in minor or moderate injury. It may also be used to alert against unsafe practices.**

NOTICE **Alerts the user to useful information about proper operation of the machine to avoid machine damage.**

Safety Instructions for Machinery

⚠WARNING

OWNER'S MANUAL. Read and understand this owner's manual BEFORE using machine.

TRAINED OPERATORS ONLY. Untrained operators have a higher risk of being hurt or killed. Only allow trained/supervised people to use this machine. When machine is not being used, disconnect power, remove switch keys, or lock-out machine to prevent unauthorized use—especially around children. Make your workshop kid proof!

DANGEROUS ENVIRONMENTS. Do not use machinery in areas that are wet, cluttered, or have poor lighting. Operating machinery in these areas greatly increases the risk of accidents and injury.

MENTAL ALERTNESS REQUIRED. Full mental alertness is required for safe operation of machinery. Never operate under the influence of drugs or alcohol, when tired, or when distracted.

ELECTRICAL EQUIPMENT INJURY RISKS. You can be shocked, burned, or killed by touching live electrical components or improperly grounded machinery. To reduce this risk, only allow qualified service personnel to do electrical installation or repair work, and always disconnect power before accessing or exposing electrical equipment.

DISCONNECT POWER FIRST. Always disconnect machine from power supply BEFORE making adjustments, changing tooling, or servicing machine. This prevents an injury risk from unintended startup or contact with live electrical components.

EYE PROTECTION. Always wear ANSI-approved safety glasses or a face shield when operating or observing machinery to reduce the risk of eye injury or blindness from flying particles. Everyday eyeglasses are NOT approved safety glasses.

⚠WARNING

WEARING PROPER APPAREL. Do not wear clothing, apparel or jewelry that can become entangled in moving parts. Always tie back or cover long hair. Wear non-slip footwear to reduce risk of slipping and losing control or accidentally contacting cutting tool or moving parts.

HAZARDOUS DUST. Dust created by machinery operations may cause cancer, birth defects, or long-term respiratory damage. Be aware of dust hazards associated with each workpiece material. Always wear a NIOSH-approved respirator to reduce your risk.

HEARING PROTECTION. Always wear hearing protection when operating or observing loud machinery. Extended exposure to this noise without hearing protection can cause permanent hearing loss.

REMOVE ADJUSTING TOOLS. Tools left on machinery can become dangerous projectiles upon startup. Never leave chuck keys, wrenches, or any other tools on machine. Always verify removal before starting!

USE CORRECT TOOL FOR THE JOB. Only use this tool for its intended purpose—do not force it or an attachment to do a job for which it was not designed. Never make unapproved modifications—modifying tool or using it differently than intended may result in malfunction or mechanical failure that can lead to personal injury or death!

AWKWARD POSITIONS. Keep proper footing and balance at all times when operating machine. Do not overreach! Avoid awkward hand positions that make workpiece control difficult or increase the risk of accidental injury.

CHILDREN & BYSTANDERS. Keep children and bystanders at a safe distance from the work area. Stop using machine if they become a distraction.

GUARDS & COVERS. Guards and covers reduce accidental contact with moving parts or flying debris. Make sure they are properly installed, undamaged, and working correctly BEFORE operating machine.

FORCING MACHINERY. Do not force machine. It will do the job safer and better at the rate for which it was designed.

NEVER STAND ON MACHINE. Serious injury may occur if machine is tipped or if the cutting tool is unintentionally contacted.

STABLE MACHINE. Unexpected movement during operation greatly increases risk of injury or loss of control. Before starting, verify machine is stable and mobile base (if used) is locked.

USE RECOMMENDED ACCESSORIES. Consult this owner's manual or the manufacturer for recommended accessories. Using improper accessories will increase the risk of serious injury.

UNATTENDED OPERATION. To reduce the risk of accidental injury, turn machine ***OFF*** and ensure all moving parts completely stop before walking away. Never leave machine running while unattended.

MAINTAIN WITH CARE. Follow all maintenance instructions and lubrication schedules to keep machine in good working condition. A machine that is improperly maintained could malfunction, leading to serious personal injury or death.

DAMAGED PARTS. Regularly inspect machine for damaged, loose, or mis-adjusted parts—or any condition that could affect safe operation. Immediately repair/replace BEFORE operating machine. For your own safety, DO NOT operate machine with damaged parts!

MAINTAIN POWER CORDS. When disconnecting cord-connected machines from power, grab and pull the plug—NOT the cord. Pulling the cord may damage the wires inside. Do not handle cord/plug with wet hands. Avoid cord damage by keeping it away from heated surfaces, high traffic areas, harsh chemicals, and wet/damp locations.

EXPERIENCING DIFFICULTIES. If at any time you experience difficulties performing the intended operation, stop using the machine! Contact our Technical Support at (570) 546-9663.

Additional Safety for CNC Laser Cutters/Engravers

⚠WARNING

Severe eye injury or blindness can occur from looking directly into laser beam, or staring at laser contact point for more than a few seconds. Touching hot machine parts and workpieces can cause serious skin burns. To reduce these risks, operator and bystanders MUST completely heed the warnings below.

EYE INJURIES. Operator and bystanders MUST wear ANSI-approved eye protection rated for use with a Class 4 laser when machine is operating. DO NOT look directly into laser beam, or stare at laser contact point for more than a few seconds, or severe eye injury or blindness may result.

AVOID SKIN BURNS. NEVER put hands in or near path of laser. Material cut by a laser can be hot. ALWAYS wear leather gloves when handling processed material. Allow machine to cool before starting any adjustment or service/maintenance procedure.

FIRE HAZARD. Laser beam produces extremely high temperatures and significant amounts of heat as material is cut. DO NOT process materials that are highly flammable or explosive. Keep flammable materials well away from machine during operations. If materials do catch fire during operations, extinguish immediately. ALWAYS keep a properly maintained fire extinguisher nearby.

REFLECTIVE MATERIALS. DO NOT process materials with reflective surfaces. These materials will redirect the laser beam, exposing operator and bystanders to serious injury, and causing damage to mechanical and electrical components inside machine.

UNATTENDED MACHINE. DO NOT leave machine unattended during operation. Materials may catch fire during operation. Fires MUST be extinguished immediately to prevent personal injury or property damage.

SAFETY DEVICES. DO NOT modify or disable safety devices on machine. Laser is designed to shut off if cover is opened. Severe injury may occur if operator or bystanders come into contact with laser beam during operation.

SAFE OPERATING LOCATION. DO NOT place machine where it can be exposed to rain or moisture. Exposure to water creates a shock hazard and will reduce life of machine.

POWER DISCONNECT. To reduce risk of electrocution or injury from unexpected startup, make sure machine is turned OFF and disconnected from power before starting any inspection, adjustment, or service/maintenance procedure.

PROPERLY MAINTAIN MACHINE. Keep machine in proper working condition to help ensure all safety components function as intended. Perform routine inspections and all necessary maintenance indicated in owner's manual. Never operate machine with damaged or worn parts.

⚠WARNING

Like all machinery there is potential danger when operating this machine. Accidents are frequently caused by lack of familiarity or failure to pay attention. Use this machine with respect and caution to decrease the risk of operator injury. If normal safety precautions are overlooked or ignored, serious personal injury may occur.

⚠CAUTION

No list of safety guidelines can be complete. Every shop environment is different. Always consider safety first, as it applies to your individual working conditions. Use this and other machinery with caution and respect. Failure to do so could result in serious personal injury, damage to equipment, or poor work results.

Additional Safety for Toxic Fumes Generated by Laser Cutting

⚠WARNING

Long-term respiratory damage, toxicity, cancer, or birth defects can occur from inhaling fumes, vapors, and particulates generated while cutting substrates without adequate ventilation, exhaust, and fume extraction. All users must be properly trained on the potential hazards, control measures, manufacturer's operating procedures, use of personal protective equipment (PPE), emergency procedures, and safety precautions for CNC laser operations. To reduce these risks, operator and bystanders MUST completely heed the warnings below.

TOXIC MATERIALS. Exposure to certain types of fumes can result in serious, potentially deadly health effects. To reduce this risk, research toxicity of material types you work with, and always seek to minimize/eliminate exposure to yourself and others. Obtain the Safety Data Sheet (SDS) from material manufacturer BEFORE operations, and never knowingly engrave or cut a workpiece that has been treated with or contains material that releases toxic byproducts when heated.

TOXIC FUMES. Cutting or engraving metals and plastics give off highly toxic fumes, vapors, and air particulates containing zinc, lead, beryllium, cadmium, mercury, fluorine, hexavalent chromium, chlorine gas, and many others. These fumes and air contaminants can damage the machine and harm your health. If the fume extractor or extraction fan is malfunctioning, immediately stop operations and correct the issue.

ADEQUATE VENTILATION. Only use CNC lasers in spaces with adequate ventilation. Some materials can produce vapors and fumes that may irritate the nose, throat, and respiratory tract, or cause suffocation. Only operate CNC lasers with a fully functioning extraction fan and fume extractor. Use additional personnel to monitor operator from outside the operating area in the event of equipment failure.

EXTRACTION FAN. To effectively extract fumes and particulates from the machine during operations, use an extraction fan rated for a minimum of **200 CFM** (Cubic Feet per Minute) at 6" static pressure.

FUME EXTRACTION. CNC lasers must be equipped with a fume extractor that uses MERV 15+ or HEPA filters. NEVER modify fume extractor or bypass safety features. Only operate fume extractor with all filters and covers in place during operation. If any filter is missing or has been replaced with a non-specification filter, the fume extractor will not properly filter contaminated air and will be unsafe to use.

INSPECTIONS/MAINTENANCE. Always inspect exhaust ducting and fume extractor for leaks prior to operations. Repair or replace defective components before starting.

FILTER CLEANING/DISPOSAL. Filters must be changed regularly according to the frequency of use, or as specified by the manufacturer. When servicing filters, make sure operator and any bystanders are wearing Personal Protective Equipment (PPE). When vacuuming filters and cabinet, only use a shop vacuum that is equipped with a MERV 15+ or HEPA filter, or dangerous particulates may be spread throughout the area and contaminate the air. Wrap all waste filters in air-tight plastic bags, then mark and dispose of according to current laws and regulations.

EXPERIENCING DIFFICULTIES. Keep in mind that CNC laser hazards are intensified in a confined space. If you are experiencing difficulties performing the intended operation, stop using the equipment, and contact the Occupational Safety and Health Administration (OSHA) at (800) 321-6742, or online at **www.osha.gov** to find out how to design and maintain the best overall CNC laser toxic fume extraction system for your needs.

SECTION 2: POWER SUPPLY

Availability

Before installing the machine, consider the availability and proximity of the required power supply circuit. If an existing circuit does not meet the requirements for this machine, a new circuit must be installed. To minimize the risk of electrocution, fire, or equipment damage, installation work and electrical wiring must be done by an electrician or qualified service personnel in accordance with all applicable codes and standards.

⚠WARNING

Electrocution, fire, shock, or equipment damage may occur if machine is not properly grounded and connected to power supply.

Full-Load Current Rating

The full-load current rating is the amperage a machine draws at 100% of the rated output power. On machines with multiple motors, this is the amperage drawn by the largest motor or sum of all motors and electrical devices that might operate at one time during normal operations.

Model G0911–G0914 at 110V ..... 10.7 Amps
Water Chiller at 110V ..... 6.5 Amps
Extraction Fan at 110V ..... 6.8 Amps
Air Pump at 110V ..... 1.5 Amps

The full-load current is not the maximum amount of amps that the machine will draw. If the machine is overloaded, it will draw additional amps beyond the full-load rating.

If the machine is overloaded for a sufficient length of time, damage, overheating, or fire may result—especially if connected to an undersized circuit. To reduce the risk of these hazards, avoid overloading the machine during operation and make sure it is connected to a power supply circuit that meets the specified circuit requirements.

Circuit Information

A power supply circuit includes all electrical equipment between the breaker box or fuse panel in the building and the machine. The power supply circuit used for this machine must be sized to safely handle the full-load current drawn from the machine for an extended period of time. (If this machine is connected to a circuit protected by fuses, use a time delay fuse marked D.)

⚠CAUTION

For your own safety and protection of property, consult an electrician if you are unsure about wiring practices or electrical codes in your area.

Note: *Circuit requirements in this manual apply to a dedicated circuit—where only one machine will be running on the circuit at a time. If machine will be connected to a shared circuit where multiple machines may be running at the same time, consult an electrician or qualified service personnel to ensure circuit is properly sized for safe operation.*

G0911–G0914 Circuit Requirements

This machine is prewired to operate on a power supply circuit that has a verified ground and meets the following requirements:

Nominal Voltage 110V, 115V, 120V
Cycle ..... 60 Hz
Phase ..... Single-Phase
Power Supply Circuit ..... 15 Amps
Plug/Receptacle ..... 5-15 (Included)

Water Chiller, Extraction Fan, & Air Pump Circuit Requirements

The auxiliary systems are prewired to operate on a power supply circuit that has a verified ground and meets the following requirements:

Nominal Voltage 110V, 115V, 120V
Cycle ..... 60 Hz
Phase ..... Single-Phase
Power Supply Circuit ..... 15 Amps
Plug/Receptacle ..... 5-15 (Included)

Grounding Requirements

This machine MUST be grounded. In the event of certain malfunctions or breakdowns, grounding reduces the risk of electric shock by providing a path of least resistance for electric current.

This machine is equipped with a power cord that has an equipment-grounding wire and a grounding plug. Only insert plug into a matching receptacle (outlet) that is properly installed and grounded in accordance with all local codes and ordinances. DO NOT modify the provided plug!

Laser machines generate strong electrical fields that can charge the machine housing with micro voltages. These voltages must be allowed to dissipate through a separate, physical earth ground connection (see **Figure 10**) than what is provided by the power cord.

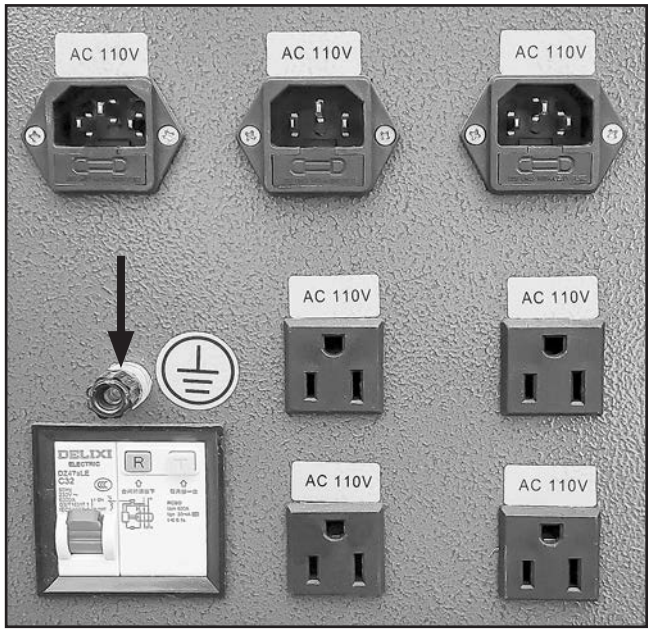


Figure 10. Earth ground post location (G0913/G0914 shown).

Resistance to ground of a single-made electrode is **25 Ohms or less**. Refer to an electrician for guidance and testing, if required.

NOTICE

Choose a location where the physical earth ground can be made with an anti-static grounding rod (not included) for communication and digital equipment.

WARNING

Serious injury could occur if you connect machine to power before completing setup process. DO NOT connect to power until instructed later in this manual.

Improper connection of the equipment-grounding wire can result in a risk of electric shock. The wire with green insulation (with or without yellow stripes) is the equipment-grounding wire. If repair or replacement of the power cord or plug is necessary, do not connect the equipment-grounding wire to a live (current carrying) terminal.

Check with a qualified electrician or service personnel if you do not understand these grounding requirements, or if you are in doubt about whether the tool is properly grounded. If you ever notice that a cord or plug is damaged or worn, disconnect it from power, and immediately replace it with a new one.

Extension Cords

We do not recommend using an extension cord with this machine. If you must use an extension cord, only use it if absolutely necessary and only on a temporary basis.

Extension cords cause voltage drop, which can damage electrical components and shorten motor life. Voltage drop increases as the extension cord size gets longer and the gauge size gets smaller (higher gauge numbers indicate smaller sizes).

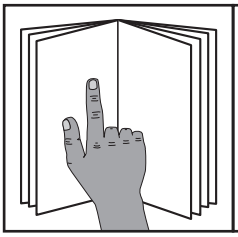
Any extension cord used with this machine must be in good condition and contain a ground wire and matching plug/receptacle. Additionally, it must meet the following size requirements:

G0911–G0914 Requirements
Minimum Gauge Size ..... 14 AWG
Maximum Length (Shorter is Better) ..... 50 ft.

Water Chiller/Extraction Fan Requirements
Minimum Gauge Size ..... 14 AWG
Maximum Length (Shorter is Better) ..... 50 ft.

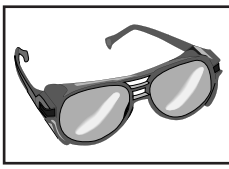
Air Pump Requirements
Minimum Gauge Size ..... 16 AWG
Maximum Length (Shorter is Better) ..... 50 ft.

SECTION 3: SETUP



⚠WARNING

To reduce your risk of serious injury, read this entire manual BEFORE using machine.



⚠WARNING

Wear safety glasses during the entire setup process!

⚠WARNING

HEAVY LIFT!

Straining or crushing injury may occur from improperly lifting machine or some of its parts. To reduce this risk, use a forklift (or other lifting equipment) rated for weight of this machine.

Needed for Setup

The following items are needed, but not included, for the setup/assembly of this machine.

Description	Qty
• Additional Person	1
• Safety Glasses (for each person)	1
• Class 4 Laser Eye Protection (for each person during **Test Run**)	1
• Forklift (rated for 2300 lbs.)	1
• Power Drill w/Phillips Bit #2 (for crate)	1
• Crowbar (for crate)	1
• Level	1
• Adjustable Wrench	1
• Utility Knife	1
• Flashlight	1
• Fume Extractor (**Page 46**)	1
• Scrap Iron or Steel	As Needed
• Scrap Wood	As Needed
• Distilled Water	3 Gal.

Unpacking

This machine was carefully packaged for safe transport. When unpacking, separate all enclosed items from packaging materials and inspect them for shipping damage. ***If items are damaged, please call us immediately at (570) 546-9663.***

IMPORTANT: Save all packaging materials until you are completely satisfied with the machine and have resolved any issues between Grizzly or the shipping agent. *You MUST have the original packaging to file a freight claim. It is also extremely helpful if you need to return your machine later.*

To prevent machine damage to sensitive parts and ensure your safety: prior to assembly, it is mandatory that the installer read, understand, and apply best practices and safeguards. It is also highly recommended that the operator is included in the assembly process because some day-to-day operational adjustments are linked to areas being assembled.

- Use a flashlight to inspect hidden machine areas for any stray packing materials, zip-ties on belts, and any debris that could catch fire or jam mechanisms during operation.
- Only make adjustments when instructed.
- DO NOT touch or wipe mirrors. If a mirror needs to be cleaned, refer to **Cleaning Laser Optics** on **Page 52**.
- While assembling machine, familiarize yourself with machine component locations and recognize their purpose.
- DO NOT use any type of power tool on *machine* to avoid overtightening fasteners.
- DO NOT overtighten factory-installed fasteners and components that are associated with laser system, or misalignment and component damage may occur.

Inventory

The following is a list of items shipped with your machine. Before beginning setup, lay these items out and inventory them.

If any non-proprietary parts are missing (e.g. a nut or a washer), we will gladly replace them; or for the sake of expediency, replacements can be obtained at your local hardware store.

NOTICE

If you cannot find an item on this list, carefully check around/inside the machine and packaging materials. Often, these items get lost in packaging materials while unpacking or they are pre-installed at the factory.

Crate Inventory (Figure 11)	Qty
A. CNC Laser Cutter/Engraver	1
B. Primary Laser Tube	1
C. Secondary Laser Tube (G0913/G0914)	1
D. Honeycomb Table	1
E. Water Chiller	1
F. Water Tubing 5/16" x 68"	2
G. Water Chiller Power Cord	1
H. Water Chiller Signal Cord	1
I. Collapsible Ducting 6" x 24"	1
J. Flexible Ducting 6" x 60"	3
K. Exhaust Port Adapter 6"	1

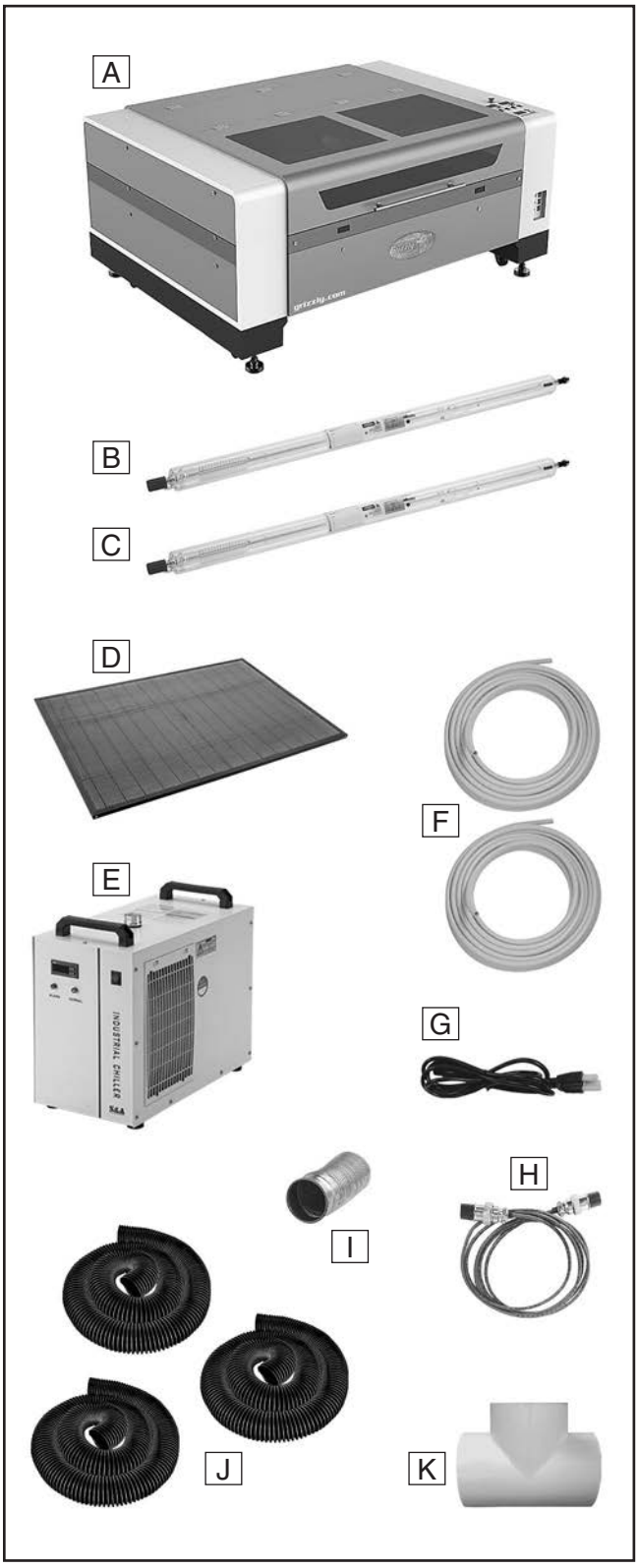


Figure 11. Crate inventory.

Box 1 Inventory (Figure 12)	Qty
L. Extraction Fan	1
M. Air Pump	1
N. Air Tubing ½" x 56"	1
O. Straight Barbed Fitting ½" NPT	1

Toolbox Inventory (Figure 13)	Qty
P. Toolbox	1
Q. Software Installation Discs	2
R. Laser Cutting Depth Gauge	1
S. Mirror Alignment Gauge	1
T. Power Cords 72"	3
U. USB Flash Drive 512MB	1
V. Focus Gauge	1
W. Adjustable Airflow Adapter	1
X. Laser Beam Alignment Gauge	1
Y. Hex Wrenches 2, 2.5, 3, 5mm	1 Ea.
Z. Flat Head Screwdriver ⅛"	1
AA. Hose Clamps 6"	6
AB. Proximity Switch (Spare)	1
AC. Locking Door Keys	4
AD. Optics Cotton Rolls	2
AE. Light Emitting Diodes (Spare)	2
AF. Optics Disassembly Tool (Small)	1
AG. Optics Disassembly Tool (Large)	1

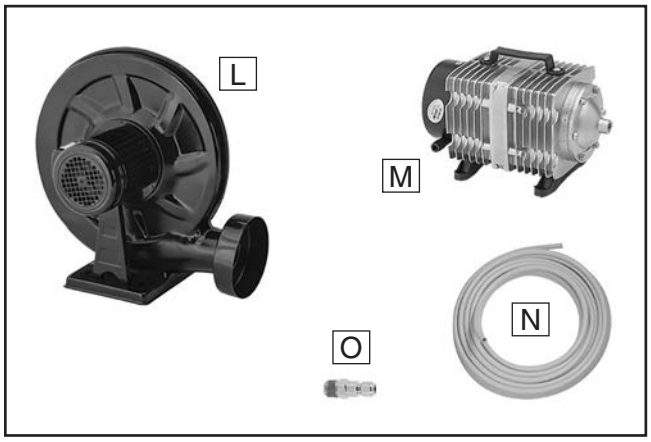


Figure 12. Box 1 inventory.

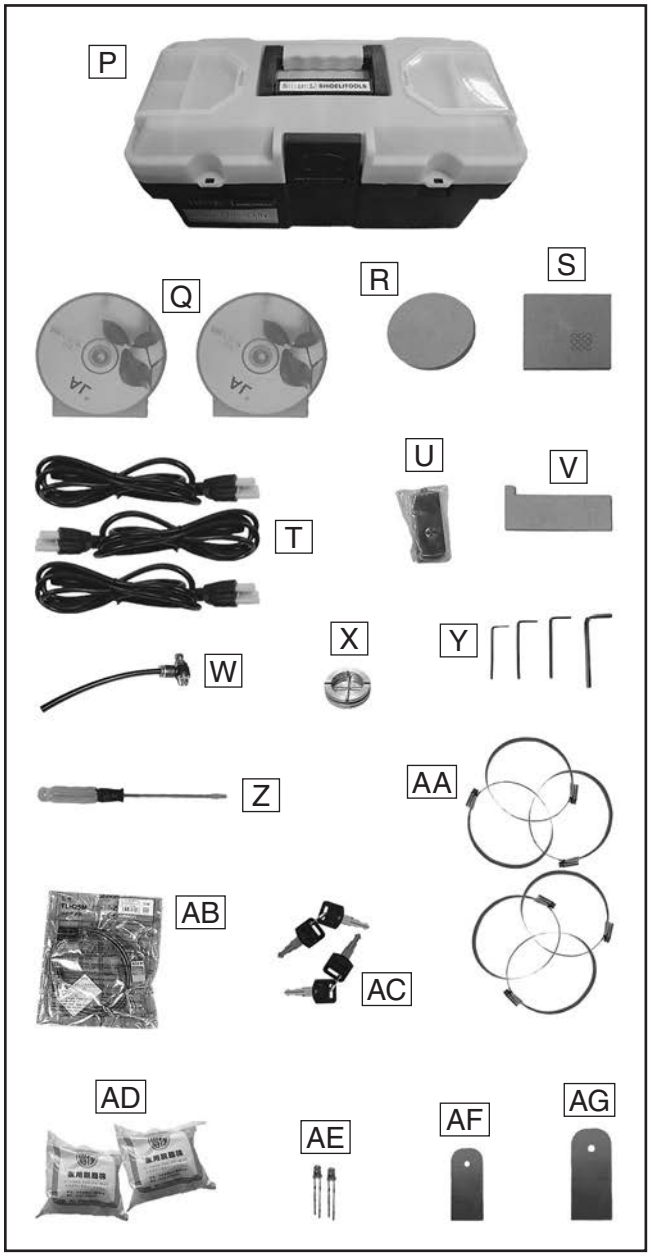


Figure 13. Toolbox inventory.

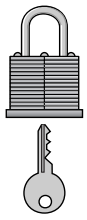
Site Considerations

Weight Load

Refer to the **Machine Data Sheet** for the weight of your machine. Make sure that the surface upon which the machine is placed will bear the weight of the machine, additional equipment that may be installed on the machine, and the heaviest workpiece that will be used. Additionally, consider the weight of the operator and any dynamic loading that may occur when operating the machine.

Space Allocation

Consider the largest size of workpiece that will be processed through this machine and provide enough space around the machine for adequate operator material handling or the installation of auxiliary equipment. With permanent installations, leave enough space around the machine to open or remove doors/covers as required by the maintenance and service described in this manual. **See below for required space allocation.**



⚠CAUTION

Children or untrained people may be seriously injured by this machine. Only install in an access restricted location.

Physical Environment

The physical environment where the machine is operated is important for safe operation and longevity of machine components. For best results, operate this machine in a dry environment that is free from excessive moisture, hazardous chemicals, airborne abrasives, or extreme conditions. Extreme conditions for this type of machinery are generally those where the ambient temperature range exceeds 41°–104°F; the relative humidity range exceeds 20%–95% (non-condensing); or the environment is subject to vibration, shocks, or bumps.

Electrical Installation

Place this machine near an existing power source. Make sure all power cords are protected from traffic, material handling, moisture, chemicals, or other hazards. Make sure to leave enough space around machine to disconnect power supply or apply a lockout/tagout device, if required.

Lighting

Lighting around the machine must be adequate enough that operations can be performed safely. Shadows, glare, or strobe effects that may distract or impede the operator must be eliminated.

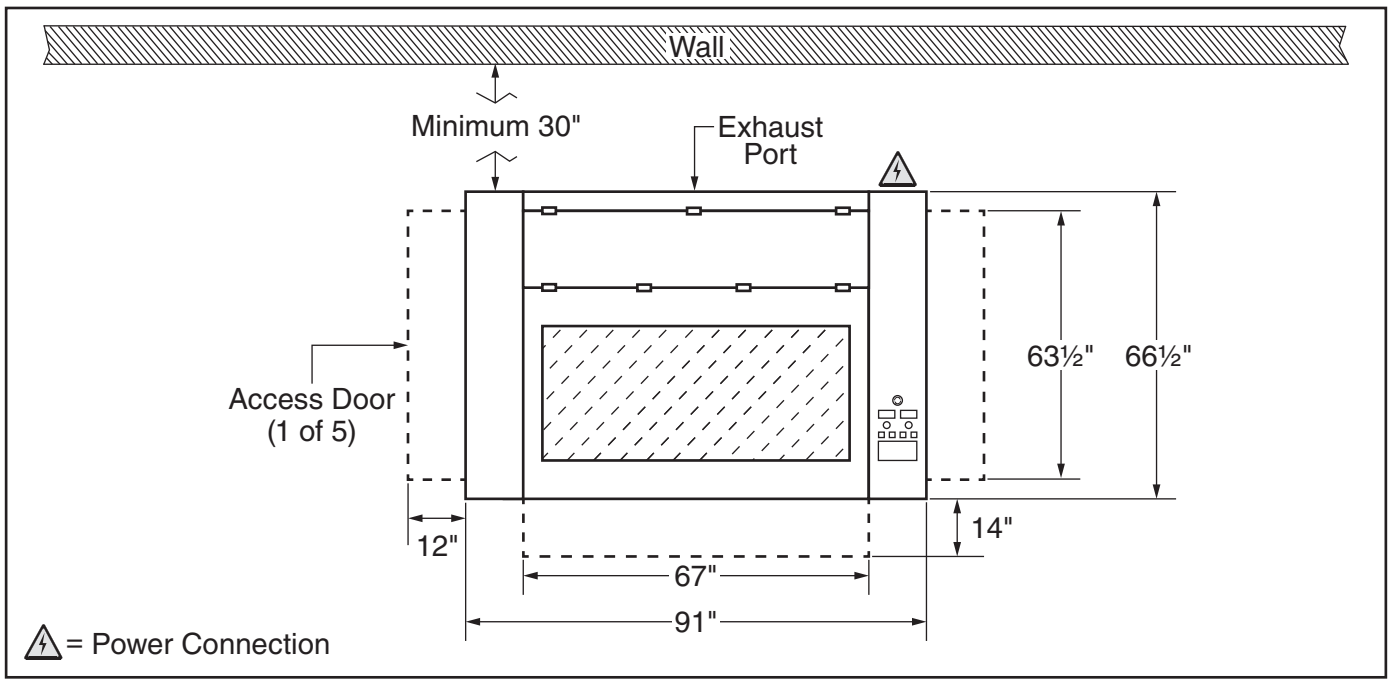


Figure 14. Model G0911–G0914 minimum working clearances.

Lifting & Placing

⚠WARNING

HEAVY LIFT!

Straining or crushing injury may occur from improperly lifting machine or some of its parts. To reduce this risk, use a forklift (or other lifting equipment) rated for weight of this machine.

DO NOT attempt to lift or move this machine without using the proper lifting equipment (such as a forklift) or the necessary assistance from other people. Each piece of lifting equipment must be rated for **at least 2300 lbs.** to support dynamic loads that may be applied while lifting. Refer to **Needed for Setup** on **Page 18** for complete list of needed equipment for setup and installation.

Verify location meets the following conditions:

- Adequate ventilation so machine does not fill an enclosed area with toxic fumes from cutting certain types of materials.
- Immediate access to auxiliary systems for verifying operation and ease of maintenance.

To lift and place machine:

1. Using forklift and assistance from an additional person, move crate to machine work site location.
2. Remove crate top and sides, components inside crate, and blocks near machine base.

   Note: *To reduce weight, remove honeycomb table, blade table, and any loose parts from cabinet. Table components are not permanently mounted and require no tools to remove or install.*
3. Lift machine with forklift just enough to clear pallet, then move pallet out of the way.
4. Lower machine and proceed to **Leveling** on this page.

Leveling

Leveling machinery helps precision components remain straight and flat during the lifespan of the machine. The table of a machine may slowly twist over time, causing inadequate workpiece cutting and variations in engraving quality.

To level machine:

1. Place level on table and align to either X- or Y-axis.
2. Loosen hex nut on each adjustable foot threaded bolt, then rotate fixed nut until measured axis is level (see **Figure 15**).

   Note: *Rotate fixed nut clockwise to raise machine, and counterclockwise to lower machine.*

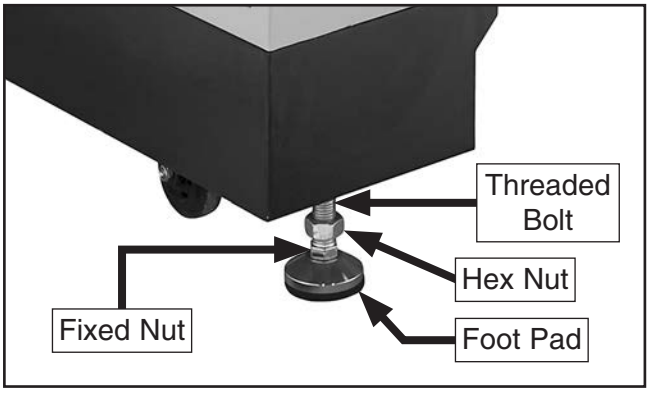


Figure 15. Adjustable foot components.

3. Align level on table to opposite axis. Repeat **Step 2** as needed.
4. Tighten hex nut on each adjustable foot threaded bolt against machine base to secure position.

Installing Laser Tube

Each CO_2 gas-filled laser tube is supported by two soft-mount saddles and straps. Each tube has four connection points: two for water inlet/outlet hoses, and two for electrical connections.

On new machines, the laser tube(s) must be installed before additional setup procedures can be completed. Perform **Steps 1–10** of **Installing Laser Tube** on **Page 68** before proceeding to **Installing Water Chiller System** on this page.

Installing Water Chiller System

The water chiller system should be located away from any area where freezing temperatures may occur. This includes locations where winter power outages allow work areas to drop below freezing. In cold environments, the low water temperature alarm will activate when water temperature falls below 50°F (10°C). To prevent water from freezing, add 50/50 *non-corrosive* anti-freeze to the water chiller reservoir.

IMPORTANT: Always use anti-freeze that is listed as *non-corrosive* to prevent water hoses from prematurely deteriorating.

In hot locations where ambient temperatures can rise over 100°F (37°C), you may be required to purchase a dedicated refrigeration-style water cooler, have bags of ice readily available and replaced, or incorporate additional water chilling equipment in the same loop. The water temperature MUST be kept below 122°F (50°C) for proper laser operation and maximum tube life.

The work area must be properly cleaned to prevent contaminants from being drawn into the water chiller and restricting airflow to the radiator. Keep the water chiller a minimum of 12" away from all obstructions.

IMPORTANT: WATER IN and WATER OUT fittings for the auxiliary systems are NOT reversible. Correct hose orientation is required (see **Figure 16** for typical water chiller system setup).

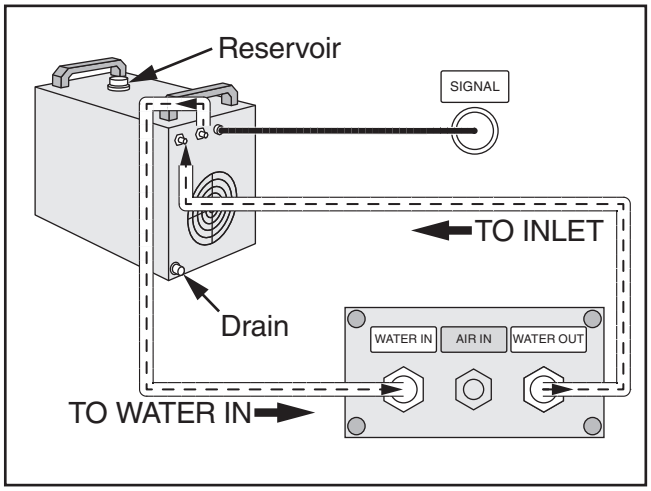


Figure 16. Typical water chiller system setup.

To install water chiller system:

1. Remove any dust caps or plugs (if equipped) from lines and fittings on auxiliary systems connections, laser tube(s), and water chiller.

2. Install water tubing onto water chiller INLET and OUTLET fittings, then connect signal cord to ALARM OUTPUT receptacle (see **Figure 17**).

   Note: *Water chiller for Model G0913 and G0914 has one set of INLET/OUTLET fittings for each laser tube.*

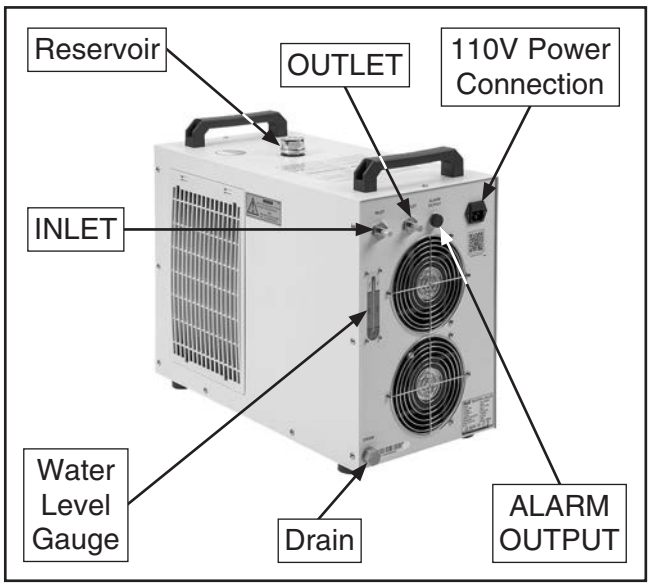


Figure 17. Water chiller connections.

3. Connect opposite end of OUTLET hose to auxiliary systems WATER IN fitting (see **Figure 18**).

4. Connect opposite end of INLET hose to auxiliary systems WATER OUT fitting (see **Figure 18**).

5. Connect signal cord to SIGNAL receptacle on machine (see **Figure 18**).

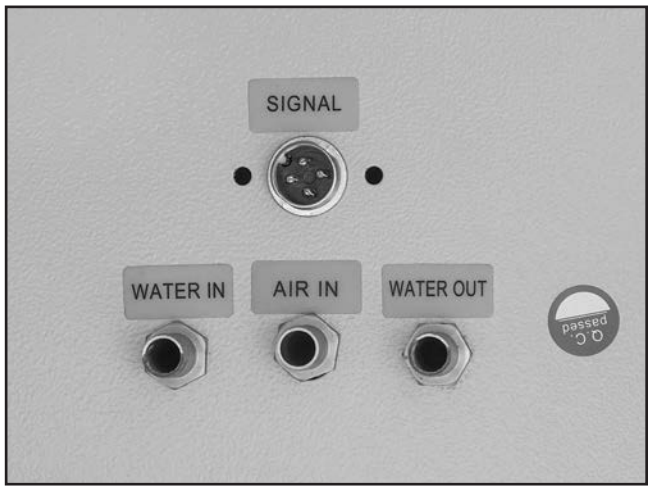


Figure 18. Water and air fittings for auxiliary systems connections (G0911/G0912 shown).

6. Fill water chiller reservoir with 1½ gallons of distilled water.

   IMPORTANT: The cooling system requires distilled water to prevent scaling and contaminant build-up. Water quality and effective cooling directly contribute to the operational life of the laser tube.

7. Connect power cord to 110V power connection on water chiller (see **Figure 19**).

8. Connect water chiller system to power and turn ***ON***. Allow water to cycle for one minute and continue filling reservoir with distilled water until water level is in green area on water level gauge (see **Figure 19**).

   Note: *Water chiller can be connected to auxiliary power connection on rear of machine.*

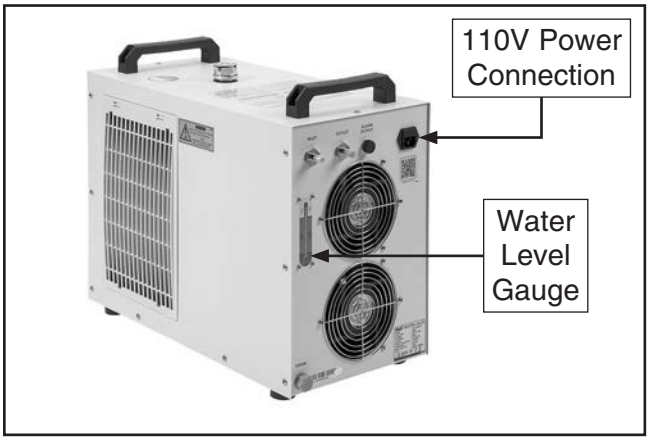


Figure 19. Water level gauge location.

9. Open laser tube access door and verify large air bubbles have released from laser tube (see **Figure 20**).

   Note: *If needed, loosen laser tube saddle straps then slowly rotate laser tube while slightly raising tube at cathode-end to release persistent air bubbles.*

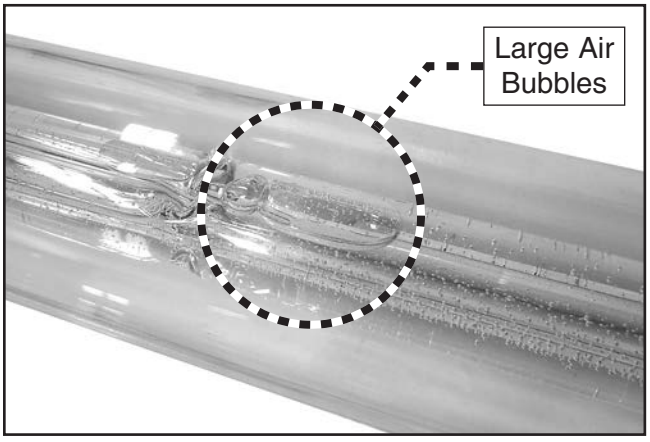


Figure 20. Air bubbles present in laser tube.

Installing Air Pump

The air pump is designed to blow air directly on the laser focal point. Place the air pump away from areas where dust can be drawn in through the inlet port.

Note: *A barbed fitting on the inlet port can be fitted with a hose to draw air from an alternate source, if required.*

The pump has cooling fins to release heat during operation and should NEVER be located inside of an unventilated compartment, or any area where temperature will increase from pump operation.

To install air pump:

1. Thread barbed fitting into air pump outlet port and tighten (see **Figure 21**).

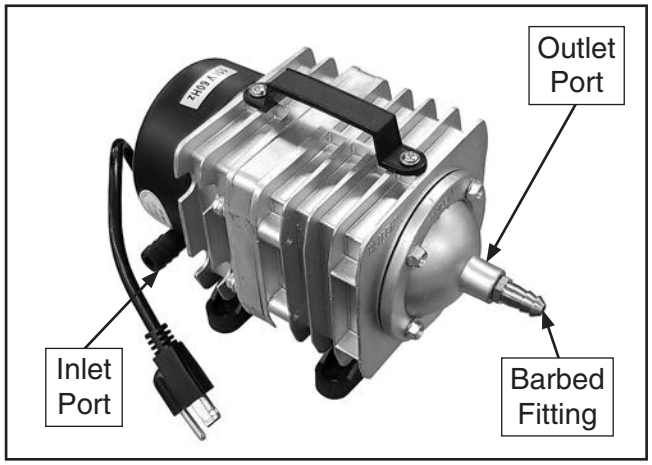


Figure 21. Air pump components.

2. Install air pump tubing onto outlet port barbed fitting and connect to auxiliary systems AIR IN fitting (see **Figure 18** on **Page 24**).

3. Place air pump, electrical cord, and hoses in a location that prevents tripping hazards, hose kinks, and abrasive damage.

   Note: *The air pump generates vibrations and should be secured to prevent pump from "walking" during operation.*

4. Connect air pump to power supply.

   Note: *Air pump can be connected to auxiliary power connection on rear of machine.*

Installing Extraction Fan

The extraction fan vents debris and fumes created during laser operations using a centrifugal-style fan. The extraction fan should be mounted in a fixed location that reduces vibration, and the inlet and outlet ducting should be secured at each end to prevent separation. Extending ducting over six feet, or adding multiple elbow connections is NOT recommended due to reduced extraction efficiency.

The extraction fan *does not* remove residual odors from the machine when not in use. If materials have an unpleasant odor while being cut, consider re-locating the machine to an area with greater ambient ventilation.

If mandated by local fire codes, a spark arrester may have to be incorporated into the extraction system. One example of this is when the outlet duct is connected to a vented container partially filled with water. Inside the vented container, one or more baffles are used to direct smoke and embers toward the water, which will then naturally rise up and outward from a vent on top of the container.

IMPORTANT: The machine and extraction fan are only to be used for laser cutting operations. DO NOT use machine as a downdraft table for sanding or other operations.

⚠WARNING

Gases and fumes generated by laser machines are hazardous to your health. It is your responsibility to install a dedicated and rated fume extractor if toxic gases or fumes are produced during laser cutting operations.

⚠WARNING

Dust and embers from laser machines present a fire hazard. DO NOT direct exhaust ports anywhere combustible materials exist, or combine laser extraction fan with woodworking dust collection systems.

NOTICE

If extraction outlet ducting is routed outside, install a metal screen on duct opening to prevent invasive animals from nesting in extraction system.

Minimum CFM at Exhaust Port: 200 CFM
DO NOT confuse this CFM recommendation with the rating of the fume extractor. To determine the CFM at the exhaust port, you must consider these variables: (1) CFM rating of the fume extractor, (2) hose type and length between air filters (MERV 15+, HEPA, Carbon, etc.) and the machine, (3) number of branches or wyes, and (4) amount of other open lines throughout the system. Explaining how to calculate these variables is beyond the scope of this manual. Consult an expert or purchase a dedicated CNC laser "how-to" book.

To install extraction fan:

1. Insert exhaust port adapter into upper and lower exhaust ports on rear of machine and secure with (1) 6" hose clamp on upper exhaust port (see **Figure 22**).

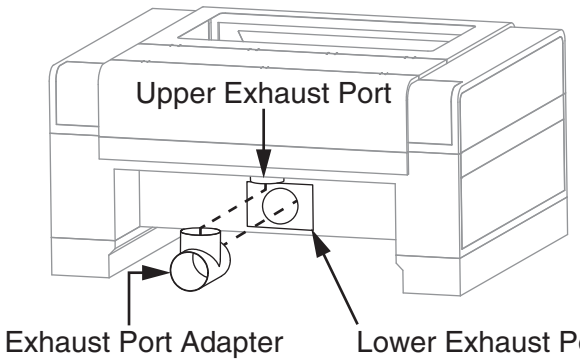


Figure 22. Installing exhaust port adapter.

2. Place extraction fan, electrical cord, and ducting in a location that prevents tripping hazards, duct kinks, and abrasive damage.

   Note: *Ensure ducting is kept as straight as possible for maximum efficiency.*

3. Use (2) 6" hose clamps to connect and secure one end of ducting to exhaust port adapter on machine, then connect and secure other end of ducting to inlet port of extraction fan (see **Figure 23**).

4. Use (1) 6" hose clamp to connect and secure remaining ducting to extraction fan outlet port (see **Figure 23**).

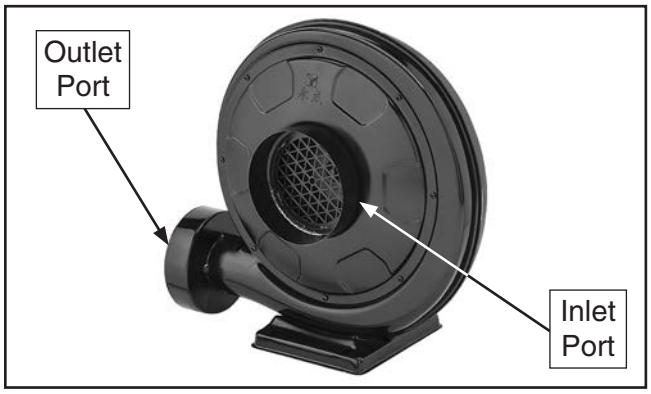


Figure 23. Extraction fan inlet and outlet ports.

5. Route and connect ducting to fume extractor that utilizes a MERV 15+ or HEPA filter (see **Additional Safety for Toxic Fumes Generated by Laser Cutting** on **Page 15**). Secure ducting to fume extractor using (1) 6" hose clamp.

6. Secure extraction fan in accessible location where ducting can be removed and cleaned during maintenance.

NOTICE

Grizzly Industrial recommends connecting extraction fan to a dedicated power circuit independent from the Model G0911–G0914 to prevent interrupting power.

7. Connect extraction fan to an available 110V grounded power source separate from Model G0911–G0914 power connection circuit.

   IMPORTANT: Extraction fan has a high current draw and may be required to operate on separate circuit from the Model G0911–G0914. Always refer to a certified electrician for electrical circuit requirements, if needed.

Test Run

Once assembly is complete, test run the machine to ensure it is properly connected to power and safety components are functioning correctly.

If you find an unusual problem during the test run, immediately stop the machine, disconnect it from power, and fix the problem BEFORE operating the machine again. The **Troubleshooting** table in the **SERVICE** section of this manual can help.

⚠WARNING

Serious injury or death can result from using this machine BEFORE understanding its controls and related safety information. DO NOT operate, or allow others to operate, machine until the information is understood.

⚠WARNING

DO NOT start machine until all preceding setup instructions have been performed. Operating an improperly set up machine may result in malfunction or unexpected results that can lead to serious injury, death, or machine/property damage.

The Test Run consists of verifying the following: 1) Auxiliary systems power up and run properly, 2) stepper motors run correctly and machine properly homes, 3) proximity and limit switches function correctly, 4) top loading door interlock switches operate properly, and 5) Emergency Stop button functions correctly.

Items Needed	**Qty**
Additional Person	1
Class 4 Laser Eye Protection (for each person)	1
Scrap Iron or Steel	As Needed
Scrap Wood	As Needed

To test run machine:

1. Clear all setup tools away from machine.

2. Press Emergency Stop button in.

3. Connect machine, high voltage power supply (HVPS), and auxiliary systems power cords by inserting power cord female end into matching receptacle on rear of machine.

4. Connect machine, high voltage power supply, and auxiliary systems to power by inserting power cord plugs into matching receptacles.

5. Twist Emergency Stop button clockwise until it springs out (see **Figure 24**).

Figure 24. Resetting Emergency Stop button.

6. Turn all auxiliary power connection ON/OFF switches ***ON***. Verify all auxiliary systems power ***ON*** and operate correctly.

7. Turn ON/OFF switch and HVPS ON/OFF switch on front of machine ***ON***.

8. Verify machine starts up and runs smoothly without any unusual problems or noises.

   — Screen display will show system status information (see **Figure 25**), and after one audible *beep*, laser head assembly will home to upper right corner of table before moving to origin (or position of last cut).

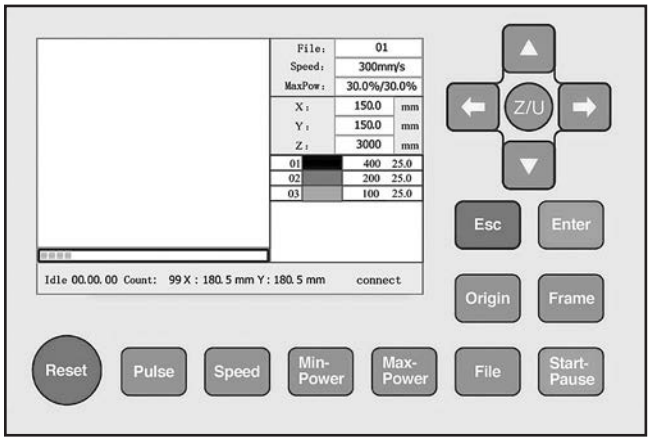


Figure 25. Screen display during start-up.

9. Open top loading door and locate X- and Y-axis proximity switches, and top loading door interlock switches (see **Figure 26**).

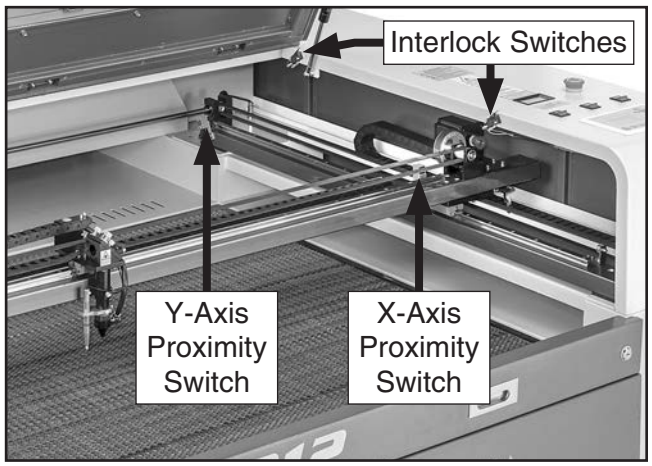


Figure 26. Location of upper safety switch components.

10. Touch X-axis proximity switch target (see **Figure 27**) with scrap piece of iron or steel.

Note: *Proximity switches have red indicator light that will illuminate when the proximity switch is activated.*

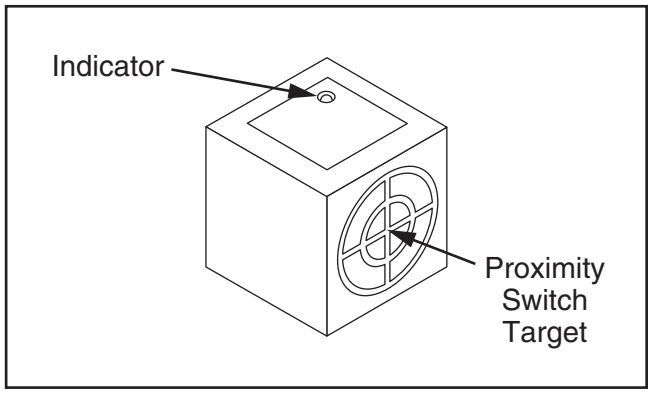


Figure 27. Typical proximity switch components.

11. With proximity switch activated, press left and right arrow nav buttons (⬅ and ➡) on control panel to test movement of laser head assembly.

— If laser head assembly *does not* move, proximity switch is functioning correctly.

— If laser head assembly *does* move, disconnect machine from power. Proximity switch safety feature is not working. Call Grizzly Tech Support before replacing proximity switch.

12. Repeat **Steps 10–11** on Y-axis proximity switch using up and down arrow nav buttons (▼ and ▲) on control panel to verify proper operation.

13. Open front access door and locate Z-axis limit switch (see **Figure 28**).

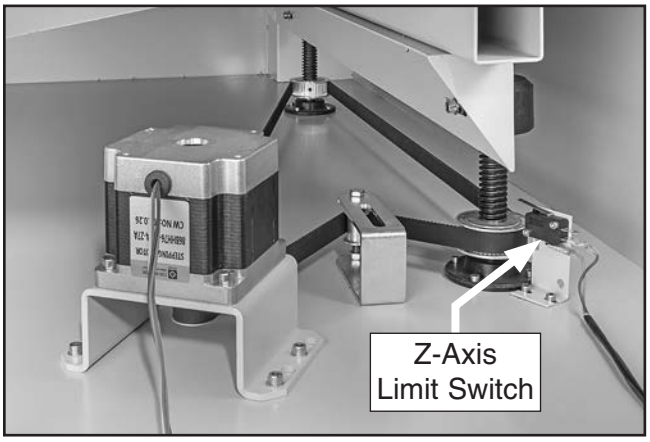


Figure 28. Location of Z-axis limit switch.

14. Press Z/U button on control panel to access Z/U menu, then use arrow nav buttons to highlight "Z move".

15. Have an additional person verify Z-axis limit switch is functioning correctly by pushing in switch lever until audible "click" is heard (see **Figure 29**).

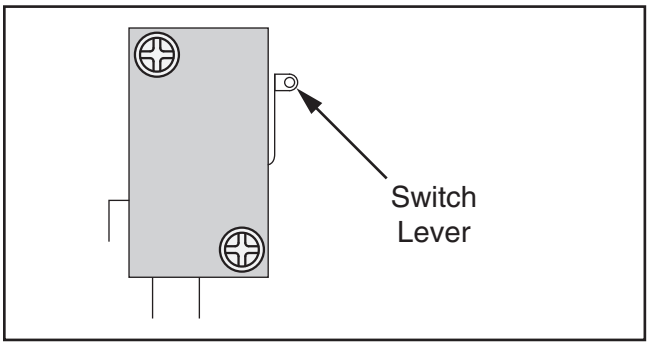


Figure 29. Example of typical limit switch lever.

16. With limit switch activated, press left and right arrow nav buttons (⬅ and ➡) on control panel to test movement of table.

— If table *does not* move, limit switch is functioning correctly.

— If table *does* move, disconnect machine from power. Limit switch safety feature is not working. Call Grizzly Tech Support before replacing limit switch.

17. Place scrap piece of wood under laser head assembly prior to testing pulse function.

⚠DANGER

Operator and bystanders MUST wear ANSI-approved eye protection rated for 10,600 nm (10.6 µm) wavelength CLASS 4 infrared lasers when machine is operating. NEVER look directly into laser beam or stare at laser contact point, or severe eye injury or blindness will occur!

18. Put on Class 4 laser eye protection rated for 10,600 nm (10.6 µm) infrared wavelength lasers (see **Figure 30**).

Figure 30. Example of Class 4 laser eye protection.

19. With top loading door still open, press Pulse button on control panel to attempt test fire of laser.

— If laser *does not* briefly pulse ***ON***, the top loading door interlock switches are functioning correctly.

— If laser *does* briefly pulse ***ON***, disconnect machine from power. Top loading door interlock switches safety feature is NOT working. Call Grizzly Tech Support before replacing interlock switches.

NOTICE

Control panel may audibly beep during pulse function, but *is not* an indication that the laser is firing. Visually inspect scrap wood placed under laser head assembly to see if laser has fired.

20. Press Emergency Stop button to turn machine ***OFF***.

21. WITHOUT resetting Emergency Stop button, try to start machine by pressing ON/OFF switch. Machine should not start.

— If machine *does not* start, safety feature of Emergency Stop button is working correctly. Congratulations! Test Run is complete.

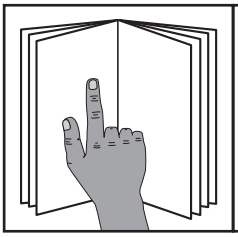
— If machine *does* start, immediately turn it ***OFF*** and disconnect power. Safety feature of Emergency Stop button is not working properly and must be replaced before further using machine. Call Grizzly Tech Support before replacing Emergency Stop button and operating machine.

SECTION 4: OPERATIONS

Operation Overview

The purpose of this overview is to provide the novice machine operator with a basic understanding of how the machine is used during operation, so the machine controls/components discussed later in this manual are easier to understand.

Due to the generic nature of this overview, it is **not** intended to be an instructional guide. To learn more about specific operations, read this entire manual, seek additional training from experienced machine operators, and do additional research outside of this manual by reading "how-to" books, trade magazines, or websites.



⚠WARNING

To reduce your risk of serious injury, read this entire manual BEFORE using machine.

⚠WARNING

DO NOT start machine until all preceding setup instructions have been performed. Operating an improperly set up machine may result in malfunction or unexpected results that can lead to serious injury, death, or machine/property damage.

NOTICE

If you are not experienced with this type of machine, WE STRONGLY RECOMMEND that you seek additional training outside of this manual. Read books/magazines or get formal training before beginning any projects. Regardless of the content in this section, Grizzly Industrial will not be held liable for accidents caused by lack of training.

To complete a typical operation, the operator performs the following:

1. Creates artwork using desired design software, prepares artwork for cutting/engraving using RDWorks software, and exports *.RD* file for upload (**Page 31**).
2. Inspects auxiliary systems (water chiller, air pump, and extraction fan) before every use.
3. Turns machine and auxiliary systems ***ON***, then verifies systems are operational.
4. Transfers design to machine and loads file for cutting/engraving (**Page 35**).
5. Selects and installs appropriate table for operation.
6. Verifies workpiece is suitable for cutting/engraving.
7. Places workpiece between table and laser head assembly.
8. Sets laser focal length (**Page 37**).
9. Sets origin by pushing Origin button on control panel.
10. Verifies working envelope by performing "Track" function (**Page 38**).
11. Verifies total operation time by performing "Work time" function (**Page 39**).
12. Puts on Class 4 laser eye protection and wears it while operating machine.
13. Begins laser operations (**Page 42**).
14. Removes workpiece and scrap material from cabinet once operations are completed.
15. Turns machine and auxiliary systems ***OFF***.
16. Cleans and prepares machine for additional operations.

Preparing Artwork in RDWorks Software

The Model G0911–G0914 uses RDWorks software to format artwork into numerical code that the laser uses to cut or engrave a design. The following procedure will guide you through basic RDWorks controls, importing artwork into RDWorks, and exporting it to an *.RD* format file for transferring to the machine.

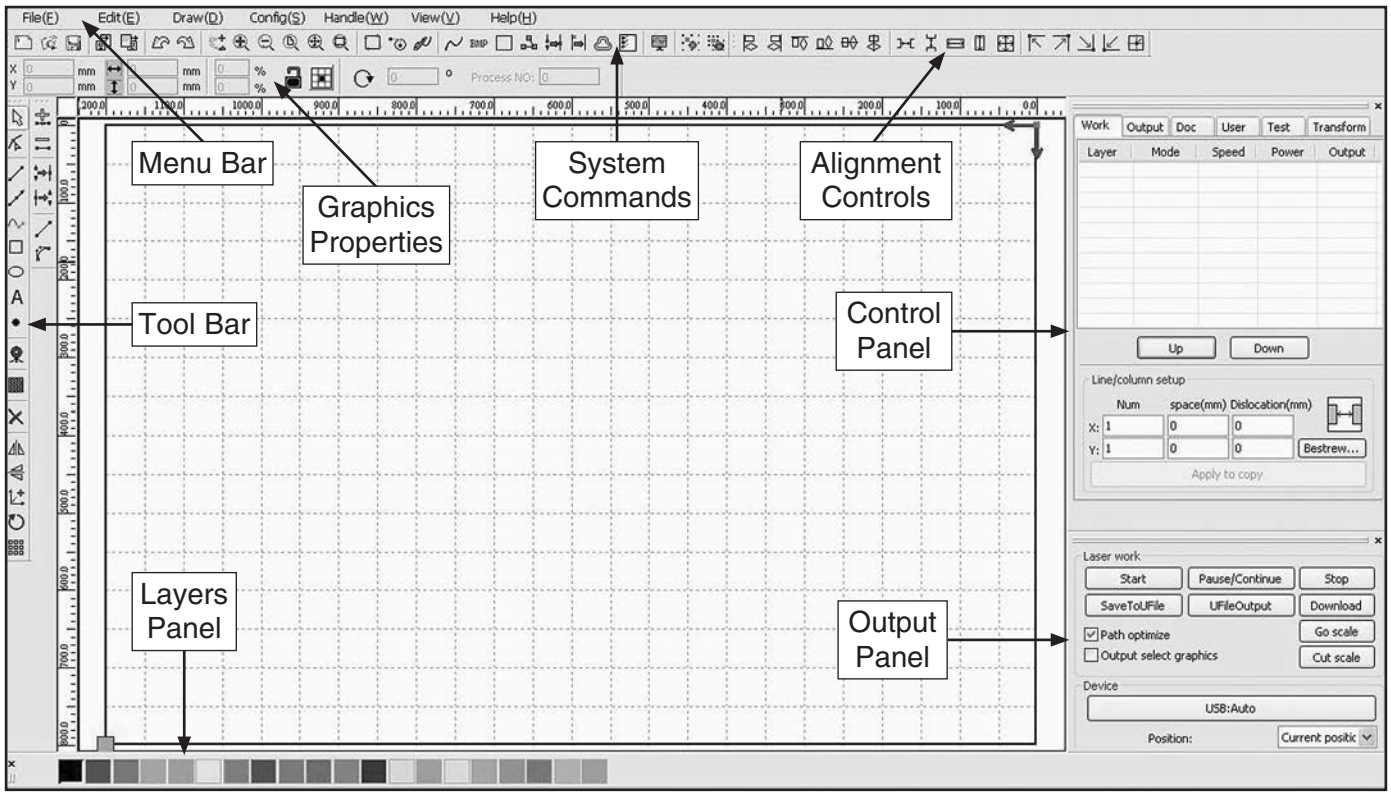


Figure 31. RDWorks software main interface.

Menu Bar: Location of main software functions. Includes: File, Edit, Draw, Config, Handle, View, and Help.

Graphics Properties: Contains basic attributes of graphics operations, including location, size, scale, and reference points.

System Commands: Commonly used command buttons derived from Menu Bar.

Alignment Controls: Used for aligning objects and optimizing type settings.

Control Panel: Contains settings for toolpath layers, cut types, feeds, and cutting speeds.

Output Panel: Contains settings for saving files and transferring files over a network.

Layers Panel: Assigns layer properties to an object based on color codes.

Tool Bar: Location of frequently-used tools for artwork design and editing.

Importing Artwork

For a complete guide to all of the capabilities of the RDWorks software, refer to the **RDWorks V8 User Manual** on the installation disc included with your machine.

Supported File Formats

- **Vector** .....dxf, ai, plt, dst, and dsb
- **Bitmap** ..... bmp, jpg, gif, png, and mng

To import artwork into RDWorks:

1. On RDWorks main interface, select "File" in menu bar, then select "Import" from drop-down list.

2. Navigate to desired file and select it. File will now be highlighted (see **Figure 32**).

   Note: *Check "Preview" to see preview image of selected file.*

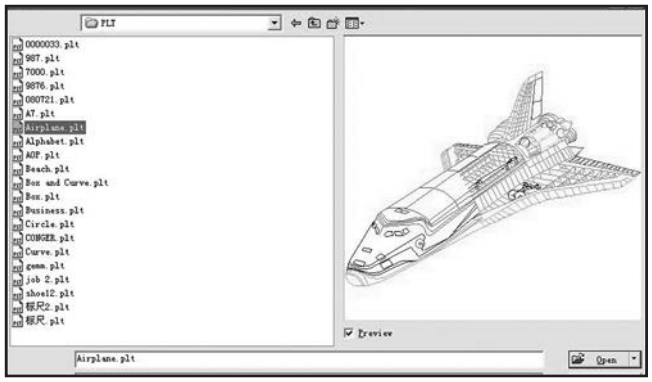


Figure 32. Selecting file to import.

3. Select "Open" to import selected file.

   Note: *Vector files will automatically import as separate layers. DST/DSB will be imported onto currently selected layer.*

4. Imported file will be displayed in RDWorks main interface. Proceed to **Preparing Artwork** on this page.

Preparing Artwork

The Model G0911–G0914 accepts *.RD* files saved using the included RDWorks software. The file can be saved to a USB flash drive, or transferred to the machine over a local area network.

Before saving, all layer operating parameters must be input into the RDWorks control panel. These parameters are used by the Model G0911–G0914 to control laser power, work speed, and many other settings. Imported files are assigned default layer parameters which must be adjusted to match operational requirements.

Items Needed

USB Flash Drive (Included w/Machine)..... 1
USB Transfer Cable (Included w/Machine) 1
Ethernet Cable..... 1

To prepare artwork:

1. Select "Work" tab located in top section of control panel (see **Figure 33**).

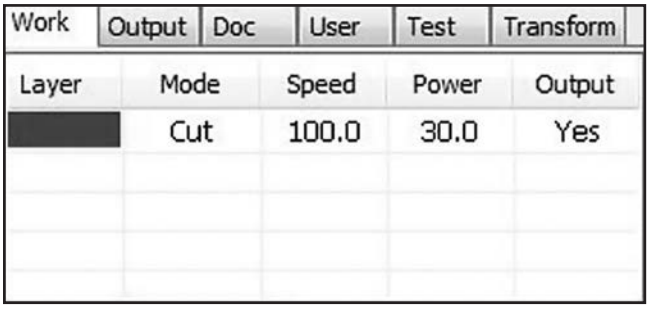


Figure 33. Control panel "Work" tab selected.

2. Double-click layer to open "Layer Parameter" dialog box (see **Figure 34**).

3. Set "Is Output" to "Yes" (see **Figure 34**).

   Note: *Setting layer output to "No" will prevent that layer from being cut/engraved.*

4. Set desired cutting/engraving speed in mm/s (see **Figure 34**).

   Note: *Slower speeds will create darker engravings and deeper cuts on workpiece (see **Cutting/Engraving Tips** on **Page 40** for more details). This setting can be changed during operation on Model G0911–G0914's control panel.*

5. Set "If Blowing" to "Yes" (see **Figure 34**).

   IMPORTANT: *This setting enables external extraction fan to be turned **ON** (Yes) or **OFF** (No) when selected layer is running and should always be set to "Yes" for safest operation.*

6. Set "Processing Mode" to "Cut" or "Scan" as desired (see **Figure 34**).

   Note: *Choose "Cut" mode for outline burns through a workpiece, or "Scan" mode for fill layers used in engraving.*

7. Set "Min Power (%)" and "Max Power (%)" as desired (see **Figure 34**).

   Note: *On Models G0913 and G0914, set "Min Power (%)" and "Max Power (%)" for secondary laser tube next to #2 checkbox.*

   Tip: *Test scrap workpiece material with lower power settings (below 20%) and slowly increase power to determine best setting for workpiece material (see **Cutting/Engraving Tips** on **Page 40** for more details). This setting can be changed during operation on Model G0911–G0914's control panel.*

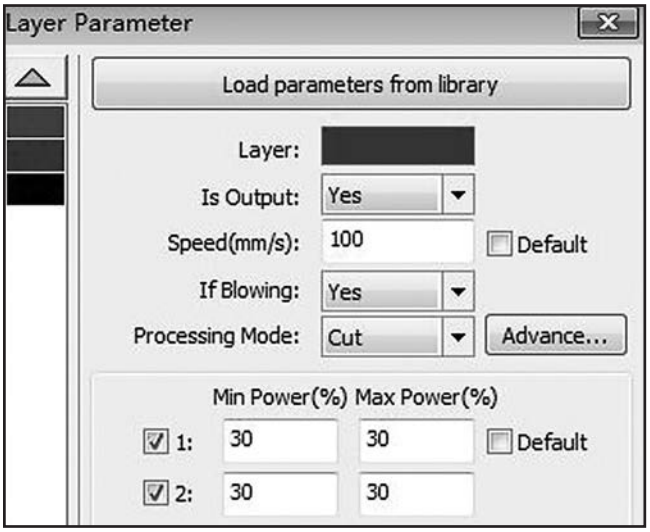


Figure 34. Layer Parameter dialog box.

8. Select "Ok" at bottom of dialog box to return to control panel.

   — If saving to included USB flash drive, proceed to **Saving .RD File to USB Flash Drive** on **Page 34**.

   — If saving directly to machine using USB transfer cable, proceed to **Saving .RD File to Machine w/USB Transfer Cable** on **Page 34**.

   — If saving directly to machine using an ethernet cable (not included), proceed to **Saving .RD File Using Ethernet Cable** on **Page 35**.

Saving .RD File to USB Flash Drive

1. Change "Device" setting of output panel to "USB:Auto" (see **Figure 35**).

2. Insert USB flash drive into an open USB port on your personal computer.

3. Select "SaveToUFile" (see **Figure 35**), navigate to USB flash drive, and select "Save."

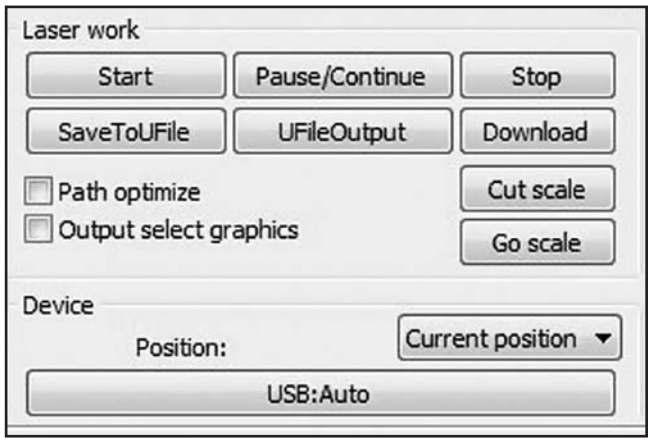


Figure 35. Output panel controls.

4. Safely remove USB flash drive from personal computer.

5. Proceed to **Transferring .RD File w/USB Flash Drive** on **Page 35**.

Saving .RD File to Machine w/USB Transfer Cable

1. Connect machine to personal computer running RDWorks with USB transfer cable located in electrical compartment.

2. Turn machine ***ON*** and wait for startup procedure to complete.

3. In RDWorks output panel, select "USB:Auto" to open "Device Ports" dialog box (see **Figure 36**).

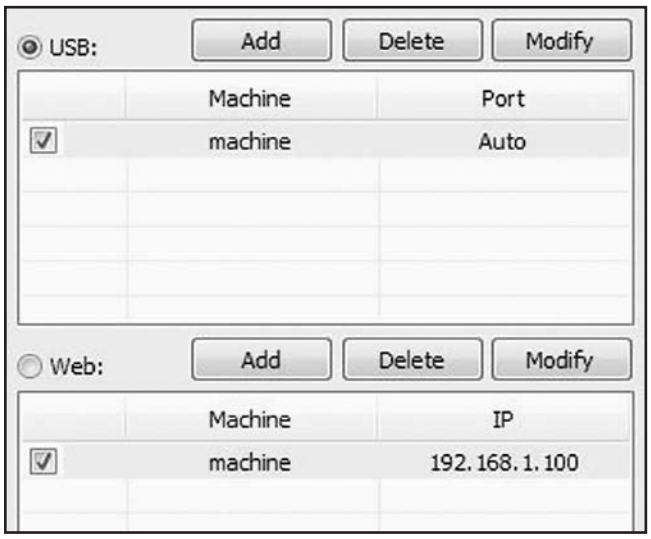


Figure 36. Device port dialog box.

4. Select "USB" and click "Add" button to open USB Port Setting dialog box (see **Figure 37**).

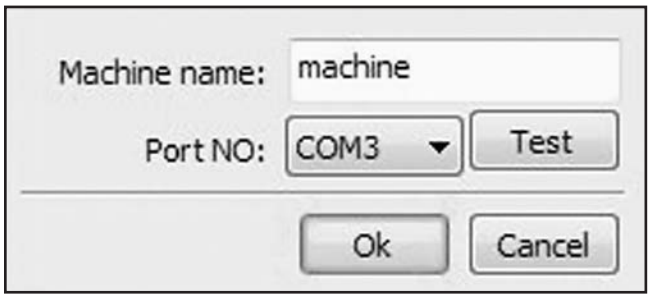


Figure 37. USB port setting dialog box.

5. Designate machine name and change port number to Auto, then click "Ok".

   Note: *Press "Test" button to verify USB connection has been established.*

6. Click "Ok" to return to output panel (see **Figure 35**).

7. Select "Download", and then proceed to **Loading .RD File From Machine Memory** on **Page 36**.

Saving .RD File Using Ethernet Cable

1. Connect ethernet cable to machine ethernet port, then connect opposite end of cable to a personal computer running RDWorks.

2. Turn machine ***ON*** and wait for startup procedure to complete.

3. In RDWorks output panel, select "USB:Auto" to open "Device Ports" dialog box (see **Figure 36** on **Page 34**).

4. Select "Web" and click "Add" button to open IP Address Setting dialog box (see **Figure 38**).

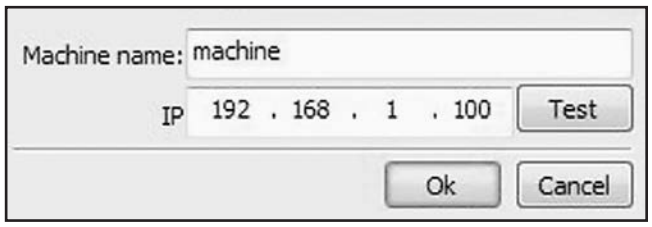


Figure 38. Example of IP address setting dialog box.

5. Designate machine name and enter IP address of machine as determined by network connection, then click "Ok".

   Note: *Press "Test" button to verify network connection has been established.*

6. Click "Ok" to return to output panel (see **Figure 35** on **Page 34**).

7. Select "Download", and then proceed to **Loading .RD File From Machine Memory** on **Page 36**.

Transferring Artwork

Before operations on the Model G0911–G0914 can begin, a *.RD* file must be created using the included RDWorks design software, and then either transferred from a flash drive to machine memory, or sent over a local area network.

While navigating through machine operations, you will be using push buttons on the control panel shown in **Figure 39**.

Note: *For a complete list of CNC laser commands, a Command Tree diagram is located in* ***SECTION 10: APPENDIX*** *on* ***Page 95****.*

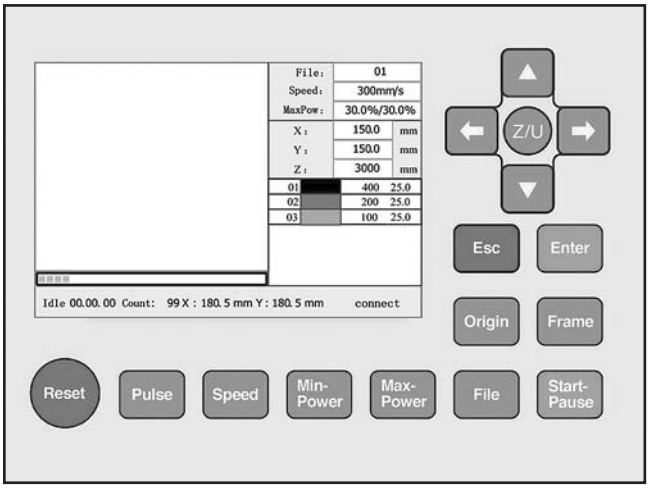


Figure 39. Control panel layout.

Item Needed
USB Flash Drive (Included w/Machine)..... 1

Transferring .RD File w/USB Flash Drive

1. Turn machine ***ON*** and wait for startup procedure to complete.

2. When machine startup is completed, status screen will be displayed (see **Figure 40**).

   Note: *If a .RD file has been previously loaded, it will be displayed as a numeral (e.g. "File: 01"), and show any attributes assigned to that file.*

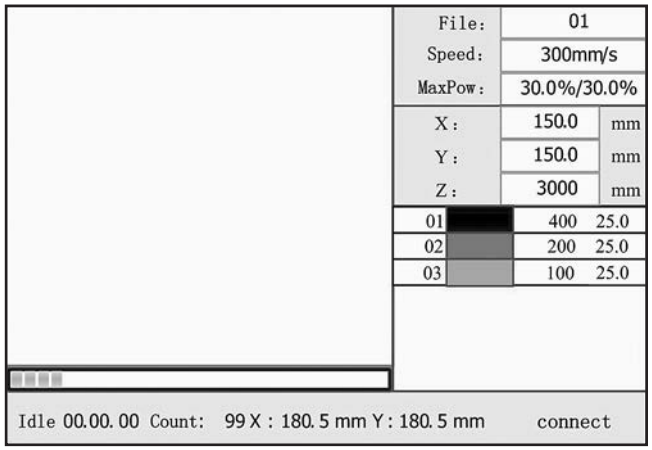


Figure 40. Example of status screen.

3. Insert USB flash drive into USB port on machine.

4. Press File button on control panel to display file management screen (see **Figure 41**).

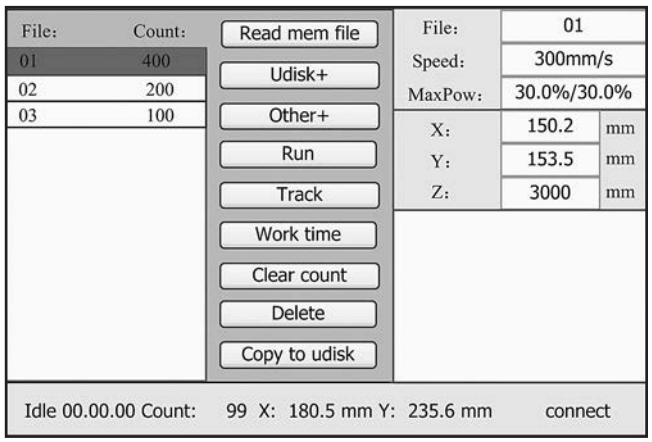


Figure 41. Example of file management screen.

5. Use arrow nav buttons on control panel to select "Udisk+", then press Enter.

6. Screen will display files currently on USB flash drive (see **Figure 42**).

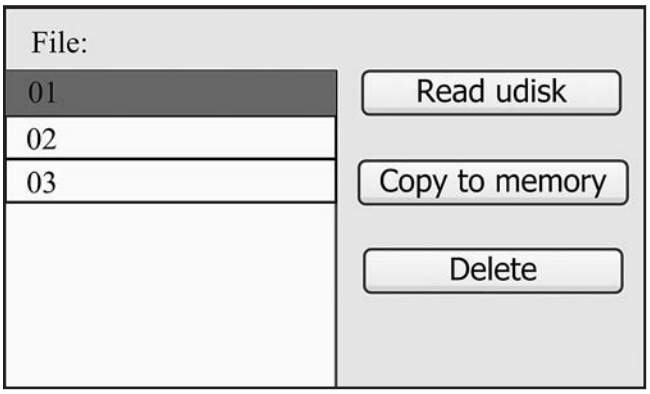


Figure 42. Example of Udisk+ screen.

7. Use up and down arrow nav buttons (▼ and ▲) on control panel to highlight desired file, and use left and right arrow nav buttons (⬅ and ➡) to select "Copy to memory", then press Enter.

8. Once file transfer message is displayed, press Esc button to return to status screen. File is now ready for laser operations.

Loading .RD File From Machine Memory

1. Turn machine ***ON*** and wait for startup procedure to complete.

2. When machine startup is completed, status screen will be displayed (see **Figure 40**).

   Note: *If a .RD file has been previously loaded, it will be displayed as a numeral (e.g. "File: 01"), and show any attributes assigned to that file.*

3. Press File button on control panel to display file management screen (see **Figure 41**).

4. Use up and down arrow nav buttons (▼ and ▲) on control panel to highlight desired file, and use left and right arrow nav buttons (⬅ and ➡) to select "Read mem file", then press Enter.

5. Once file transfer message is displayed, press Esc button to return to status screen. File is now loaded and ready for laser operations.

Setting Focal Length

Focal length is the distance between the tip of the laser head and the workpiece (see **Figure 43**). It must be set before every cutting/engraving operation for optimum laser performance.

IMPORTANT: Excessive/insufficient focal length will diffuse laser beam output and cause weak cutting/engraving results.

Note: *For workpieces with varying height, it may be necessary to manually focus separate cutting/engraving operations for each height tier to maintain consistent focal length.*

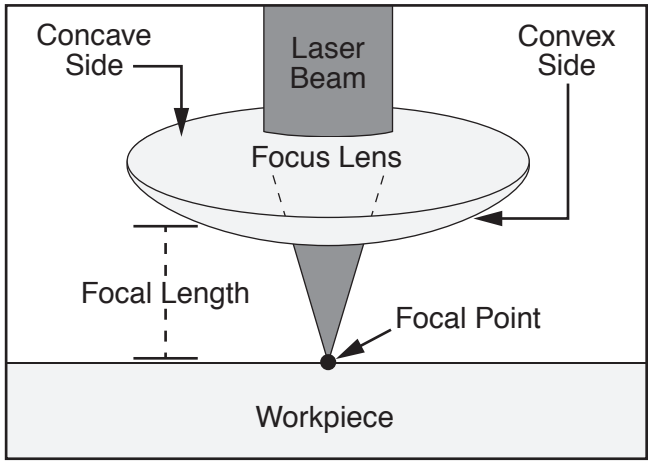


Figure 43. Focal point of laser on workpiece.

Items Needed	Qty
Class 4 Laser Eye Protection (per person)	1
Focus Gauge	1
Hex Wrench 2.5mm	1
Workpiece	As Needed

Using Auto Focus

1. Turn machine ***ON*** and wait for startup procedure to complete.

2. Open top loading door and move laser head assembly to easily accessible area.

3. Load flat, even workpiece onto table under laser head assembly.

4. Press Z/U button on control panel to display Z/U menu screen (see **Figure 44**).

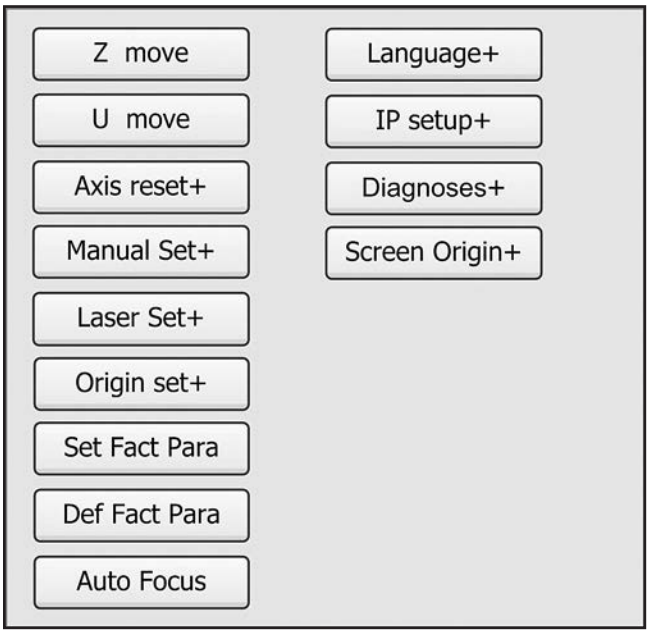


Figure 44. Example of Z/U menu screen.

5. Use arrow nav buttons to highlight "Auto Focus" and press Enter.

6. Table will raise until tip of auto focus sensor contacts workpiece surface before lowering to correct focal length.

7. Focal length is now correctly set, close top loading door before beginning operations.

Setting Manual Focus

1. Turn machine ***ON*** and wait for startup procedure to complete.

2. Open top loading door and move laser head assembly to easily accessible area.

3. Load flat, even workpiece onto table under laser head assembly.

4. Press Z/U button on control panel to display Z/U menu screen, then use arrow nav buttons to highlight "Z move" (see **Figure 44**).

5. Use left and right arrow nav buttons (⬅ and ➡) on control panel to raise or lower table until distance between workpiece surface and air nozzle is approximately 9mm.

6. Loosen (1) cap screw on auto focus sensor mount, raise auto focus sensor even with tip of air nozzle, then tighten cap screw (see **Figure 45**).

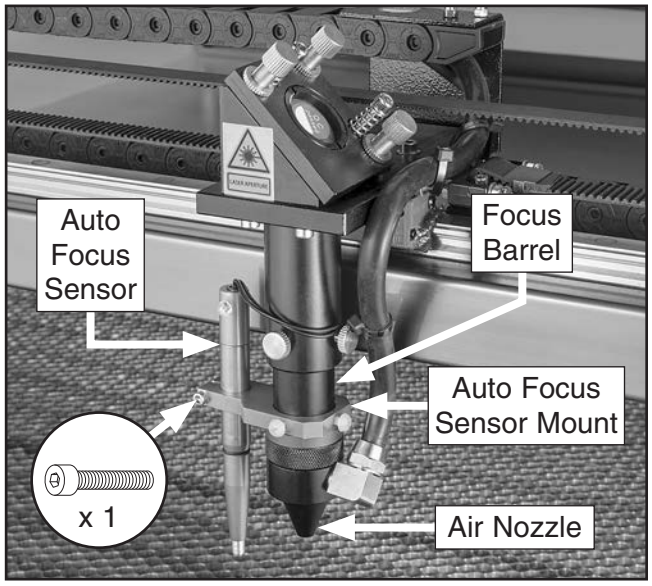


Figure 45. Auto focus sensor components.

7. Use arrow nav buttons to highlight "Z move" (see **Figure 44** on **Page 37**).

8. Place bottom of focus gauge on workpiece, and raise or lower table using left and right arrow nav buttons (⬅ and ➡) on control panel until tab on focus gauge rests on top of auto focus sensor mount (see **Figure 46**).

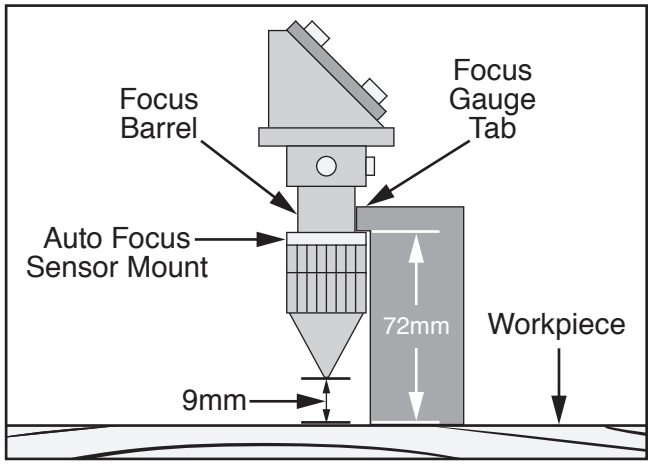


Figure 46. Focus gauge resting on workpiece and auto focus sensor mount.

9. Loosen (1) cap screw on auto focus sensor mount, lower auto focus sensor flush with workpiece, then tighten cap screw (see **Figure 45**).

10. Focal length is now correctly set. Remove focus gauge and setup tools before closing top loading door.

Performing Track Function

The "Track" function verifies the working envelope of a selected file to prevent exceeding available table area.

Note: *This optional function is useful for setting origin, and for reducing delays from travel errors during cutting/engraving operations.*

To perform "Track" function:

1. Turn machine ***ON*** and wait for startup procedure to complete.

2. Load *.RD* file from machine memory (see **Loading .RD File From Machine Memory** on **Page 36**).

3. Position workpiece so loaded file fits within working envelope.

4. Move laser head assembly to location of origin defined in RDWorks, in reference to working envelope.

   Note: *For example, if operator set origin to center of image in RDWorks software, position laser head assembly over center of table.*

5. Press Origin button on control panel. Machine will audibly *beep* to indicate origin has been properly set.

6. Press File button on control panel to display file management screen (see **Figure 47**).

7. Use arrow nav buttons to highlight "Track" and press Enter (see **Figure 47**).

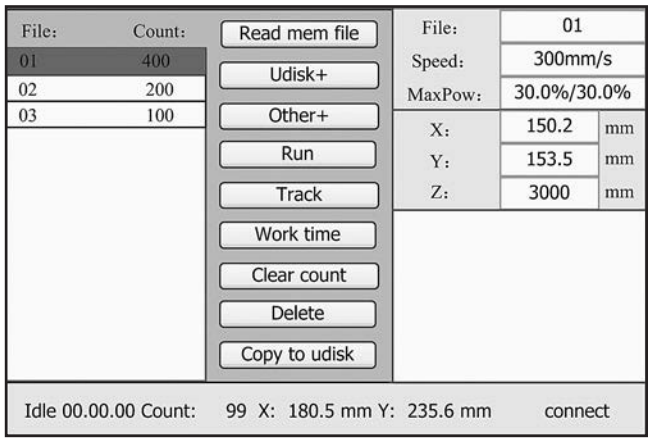


Figure 47. Example of file management screen.

8. Observe perimeter of toolpath being traced by laser head movement. Verify display shows "Tracking Frame" during operation.

   — If "Track Frame Completed" displays on file management screen, "Track" function has completed successfully.

   — If "XSlop over," "YSlop over," or "Frame slop" errors are displayed on screen, review *.RD* file in RDWorks for dimensional/positioning errors, then repeat **Steps 2–7**.

   Note: *Once "Track" function is completed, you may physically reposition workpiece in reference to position of laser head. This helps ensure laser head has available room for maneuvering over workpiece.*

NOTICE

If "XSlop Over," "YSlop Over," or "Frame slop" errors are displayed on file management screen, the machine has determined that the currently loaded image is outside the working envelope of the machine, based on current origin.

Performing Work Time Function

The "Work time" function instructs the controller to review all toolpath settings of the currently loaded file and estimate the total time required for completing the cutting/engraving operations.

Note: *This optional function is useful for calculating the cost-per-unit or for estimating the remaining life of machine consumables.*

To perform "Work time" function:

1. Turn machine ***ON*** and wait for startup procedure to complete.

2. Load *.RD* file from machine memory (see **Loading .RD File From Machine Memory** on **Page 36**).

3. Press File button on control panel to display file management screen (see **Figure 47**).

4. Use arrow nav buttons to highlight "Work time" and press Enter (see **Figure 47**).

5. File management screen will display "Calculating Work Time, Please Wait" during function.

6. When controller finishes calculating total cutting/engraving time, job duration is displayed on file management screen.

   Tip: *RDWorks software has a similar work time function that will also simulate the entire operation in real-time. Select "Preview" icon in System Commands menu to begin simulated operation.*

Inspecting Workpiece

Some materials are not safe for laser cutting, or may be outside the capabilities of your machine. **Before cutting/engraving, inspect all workpieces for the following:**

- ***Engraving Material:*** This machine is capable of engraving natural wood, MDF, glass, acrylic, PVC, rubber, ceramic, leather, cloth, and paper. This machine is NOT designed to engrave metal; engraving this material with this machine may lead to machine damage or personal injury.

- ***Cutting Material:*** This machine is capable of cutting natural wood, MDF, acrylic, PVC, rubber, leather, cloth, and paper. This machine is NOT designed to cut metal, glass, or ceramics; cutting these materials with this machine may lead to machine damage or personal injury.

- ***Foreign Objects:*** Nails, staples, dirt, rocks, and other foreign objects are often embedded in wood. Always visually inspect your workpiece for these items. If they cannot be removed, DO NOT use the workpiece.

- ***Wood Knots:*** Knots in wood are denser than the natural grain surrounding them, and may cause unpredictable cutting/engraving results. Always use wood workpieces that do not have knots, or position working envelope away from visibly knotted areas to maintain consistent cutting/engraving quality.

- ***Wet or "Green" Wood:*** Avoid using wood with a high water content. Wood exposed to excessive moisture (such as rain or snow), will cut/engrave poorly and cause large clouds of smoke and debris inside the machine.

- ***Excessive Warping:*** Workpieces with excessive cupping, bowing, or twisting are difficult to cut/engrave due to inconsistent surface height negatively affecting focal length. Always use flat stock to maintain consistent cutting/engraving depth.

Cutting/Engraving Tips

- When cutting/engraving acrylic, use a raised, nonreflective surface that promotes airflow underneath the workpiece. This will help prevent refracted laser rays from melting the surface and causing blemishes.

- Plywoods are formed from bonding many different wood types together using adhesive. The adhesive used to bond the plies will regularly ignite during cutting/engraving and cause unwanted surface defects. Use solid wood for optimal finish quality.

- Use the **Material Cutting Power/Speed Chart** below as a guide for determining optimal power/speed settings for cutting ¼" thick wood or plastic with your machine. Always test new settings on scrap material first, then make adjustments as necessary until desired cutting results are achieved.

  Note: *Engraving settings require too many variables to effectively list here. A good starting point for most hardwoods is 30% power and 300mm/s speed.*

Material Cutting Power/Speed Chart		
Material Type	**G0911/G0913 Power/Speed**	**G0912/G0914 Power/Speed**
Hardwood	70% - 15mm/s	65% - 20mm/s
Softwood	55% - 25mm/s	40% - 30mm/s
MDF	75% - 15mm/s	65% - 20mm/s
Acrylic	75% - 15mm/s	65% - 20mm/s
PVC	60% - 50mm/s	50% - 60mm/s
Rubber	75% - 15mm/s	70% - 20mm/s
Leather	75% - 15mm/s	70% - 20mm/s
Cloth	20% - 150mm/s	20% - 200mm/s
Paper	20% - 150mm/s	20% - 200mm/s

Figure 48. Material cutting power and speed settings.

Water Chiller Overview

During operation, water is circulated through the laser tube cooling chambers. As the water flows through the laser tube, it absorbs heat along the way. The returned water dissipates heat through a refrigerant-cooled radiator before returning to the reservoir and being cycled through the laser tube again.

The water temperature must be kept below 122°F (50°C) and above 50°F (10°C) or the water chiller will sound an audible alarm and suspend circulating water. If an overheat alarm occurs regularly, a larger water chiller system may be required, or a refrigeration-type water chiller may have to be installed in environments susceptible to extreme heat. To prevent water from freezing, add 50/50 *non-corrosive* anti-freeze to water chiller reservoir.

IMPORTANT: Always use anti-freeze that is listed as *non-corrosive* to prevent water hoses from prematurely deteriorating.

Air Pump Overview

Laser cutting operations require an air nozzle to focus a jet of air that blows fumes, smoke, dust, and other materials away from the laser beam focal point. This jet of air also prevents combustion by continuously cooling the area and limiting fuel at the source of ignition.

During operation, air enters the rear of the pump through a barbed-fitting on the filter cover. The air passes through a washable-foam air filter, and exits out of a metal barbed fitting at the front of the pump. The air then travels through a hose to the AIR IN fitting on the auxiliary systems connection panel, before continuing on to the laser beam focal point.

Extraction Fan Overview

⚠WARNING

Gases and fumes generated by laser machines are hazardous to your health. It is your responsibility to install a dedicated and rated fume extractor if toxic gases or fumes are produced during laser cutting operations.

⚠WARNING

Dust and embers from laser machines present a fire hazard. DO NOT direct exhaust ports anywhere combustible materials exist, or combine laser extraction fan with woodworking dust collection systems.

The extraction fan is a simple centrifugal-type fan that blows a large volume of air away from the machine when operating.

During operation, the extraction fan creates a negative-airflow vacuum in the machine interior, which extracts smoke and particulates from the worktable down through the lower cabinet and exits the machine via the exhaust ducting.

Operating Laser

DANGER

Operator and bystanders MUST wear ANSI-approved eye protection rated for 10,600 nm (10.6 µm) wavelength CLASS 4 infrared lasers when machine is operating. NEVER look directly into laser beam or stare at laser contact point, or severe eye injury or blindness will occur!

WARNING

NEVER leave machine unattended; materials could catch fire during operation. Fires MUST be extinguished immediately to prevent personal injury and machine damage.

WARNING

To prevent exposure to toxic fumes and particulates during operation, CNC lasers MUST be equipped with a fume extractor that utilizes MERV 15+ or HEPA filters.

Once the *.RD* file is transferred to machine memory, the artwork file must be loaded before operating the laser. Dual laser head operations require activation in RDWorks, and the distance between the laser head assembly air nozzle centerlines must be input accurately in the artwork file.

Note: *For a complete list of CNC laser commands, a Command Tree diagram is located in* ***SECTION 10: APPENDIX*** *on* ***Page 95****.*

Items Needed	Qty
Class 4 Laser Eye Protection	1
Hex Wrench 2.5mm	1
Tape Measure	1

Operating Single Laser Head (G0911/G0912)

1. Clear all setup tools away from machine.
2. Turn machine ***ON*** and wait for startup procedure to complete.
3. Open top loading door.
4. Select applicable table for current job:
   - — For light materials such as wood, cloth, leather, and thin veneers that need close support, use honeycomb table.
   - — For heavy/rigid self-supporting material hard enough to damage honeycomb table, or heat-sensitive materials like acrylic and plastic which require high airflow to prevent damaging surface, use blade table.
   - — For irregularly-shaped workpieces incapable of being self-supported, build a custom support or design a jig to prevent workpiece movement during operation.
5. Press Z/U button and use arrow nav buttons to highlight "Z move".
6. Use left and right arrow nav buttons (⬅ and ➡) on control panel to raise or lower table.

NOTICE

Before loading a workpiece, measure and verify that sufficient space exists between laser head tip and workpiece. Inadvertent contact with laser head assembly during workpiece loading can damage machine.

7. Measure thickness of workpiece and verify adequate space exists between workpiece and laser head assembly, then place workpiece on table.

Note: *Excess space will be adjusted later when setting focal length.*

8. Load *.RD* file from machine memory (see **Loading .RD File From Machine Memory** on **Page 36**).

9. Use arrow nav buttons on control panel to move laser head assembly to origin, then push Origin button on control panel.

IMPORTANT: Controller requires laser head assembly to be moved using arrow nav buttons to accurately determine position.

10. Set focal length as instructed in **Setting Focal Length** on **Page 37**.

11. Perform "Track" function (see **Performing Track Function** on **Page 38**).

12. Perform "Work time" function (see **Performing Work Time Function** on **Page 39**).

13. Turn ***ON*** all auxiliary systems and verify operation.

14. Put on Class 4 laser eye protection.

15. Close top loading door and press Start-Pause button to begin laser operations.

Note: *If problems arise, or job must be stopped for a period of time, press Start-Pause button to pause or resume operations. In case of power interruption, or Emergency Stop button is pressed, machine will resume operations exactly where the event occurred once power is restored.*

16. During operation, verify ammeter indicator *does not* exceed mA rating listed above ammeter (see **Figure 49**).

IMPORTANT: An ammeter indication exceeding mA rating may be caused by impending laser tube failure, or electrical faults.

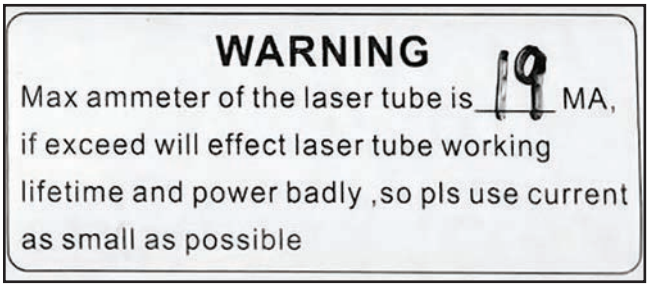


Figure 49. Example of ammeter mA rating.

17. When laser operations are completed, turn machine ***OFF***.

18. Turn ***OFF*** all auxiliary systems.

19. Remove workpiece and scrap parts, put all tools away, and clean area for next operation.

Operating Dual Laser Head (G0913/G0914)

The dual laser heads are NOT independent from each other and operate in tandem. All operational settings are entered in RDWorks but can be altered using the control panel.

1. DISCONNECT MACHINE FROM POWER!

2. Open top loading door and loosen (2) cap screws securing left belt mounting bracket on primary laser head assembly, position primary laser head assembly as desired, then secure cap screws (see **Figure 50**).

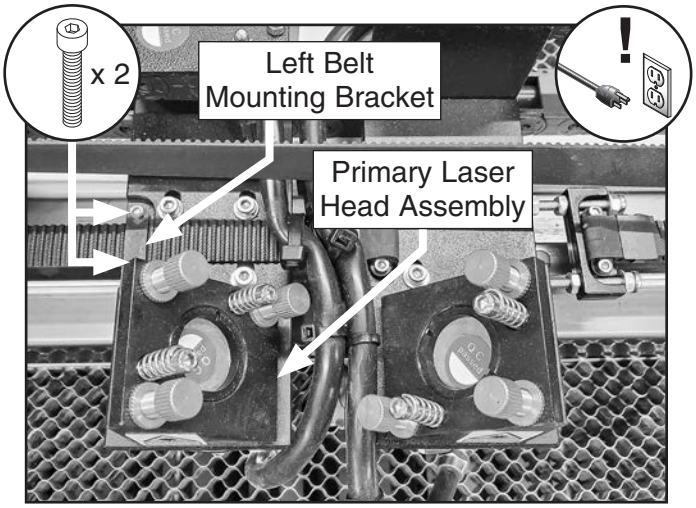


Figure 50. Left belt mounting bracket location.

3. Measure distance between primary and secondary laser head assembly air nozzle centerlines (see **Figure 51**).

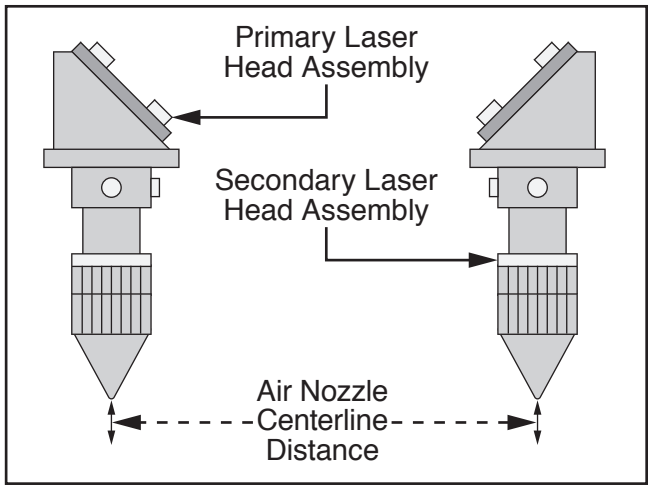


Figure 51. Example of measuring distance between air nozzle centerlines.

4. Open artwork file in RDWorks and select "Output" tab of control panel, then select "Enable offset of Laser2" (see **Figure 52**).

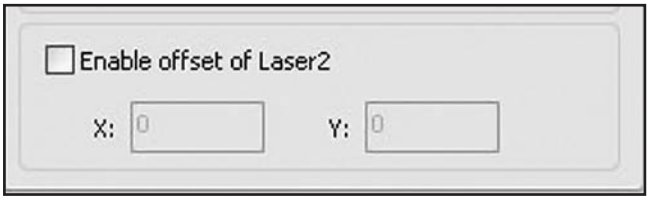


Figure 52. Example of output panel offset.

5. Enter measured value from **Step 3** in "X:" box as a negative integer in millimeters (e.g. "–50").

   Note: *Primary laser head can only be offset towards negative X-axis.*

6. Save artwork as *.RD* file (see **Preparing Artwork** on **Page 32**) and transfer to machine memory.

DANGER

Operator and bystanders MUST wear ANSI-approved eye protection rated for 10,600 nm (10.6 µm) wavelength CLASS 4 infrared lasers when machine is operating. NEVER look directly into laser beam or stare at laser contact point, or severe eye injury or blindness will occur!

7. Perform **Steps 1–19** of **Operating Single Laser Head** beginning on **Page 42**.

SECTION 5: ACCESSORIES

⚠WARNING

Installing unapproved accessories may cause machine to malfunction, resulting in serious personal injury or machine damage. To reduce this risk, only install accessories recommended for this machine by Grizzly.

NOTICE

Refer to our website or latest catalog for additional recommended accessories.

T33668—100W Laser Tube for G0911/G0913
Replacement 100W laser tube for use with the Model G0911/G0913 CNC Laser Cutter/Engraver.

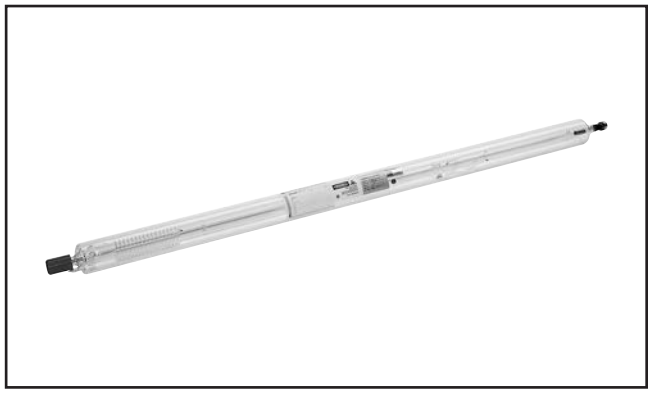


Figure 53. Model T33668 100W Laser Tube.

T33669—130W Laser Tube for G0912/G0914
Replacement 130W laser tube for use with the Model G0912/G0914 CNC Laser Cutter/Engraver.

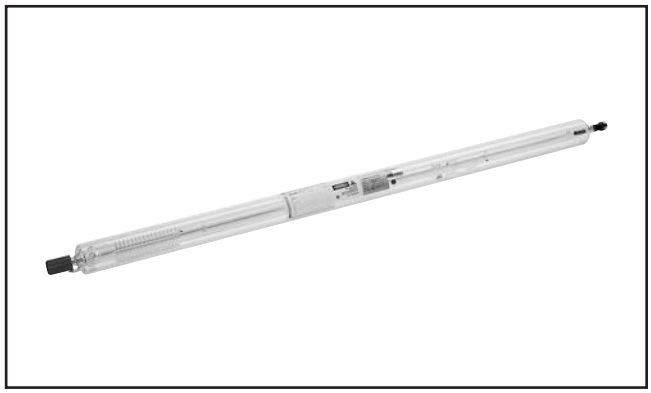


Figure 54. Model T33669 130W Laser Tube.

T33667—39" x 63" Honeycomb Table
Replacement honeycomb table for use with the Model G0911–G0914 CNC Laser Cutter/Engraver.

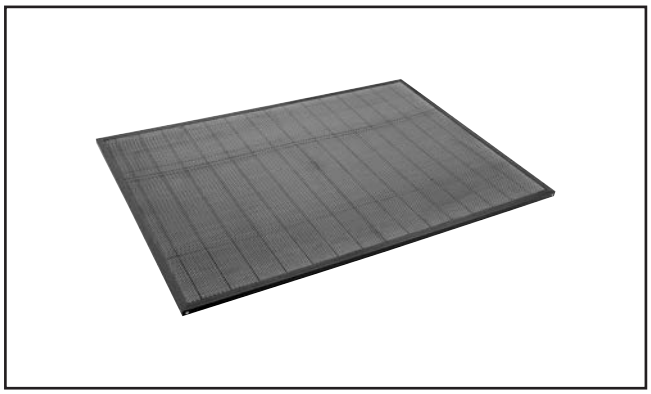


Figure 55. Model T33667 Honeycomb Table.

T30339—Water Chiller System (G0911/G0912)
T33670—Water Chiller System (G0913/G0914)
Replacement water chiller system for use with the Model G0911–G0912 CNC Laser Cutter/Engraver.

Figure 56. Model T30339 Water Chiller System.

T30336—Extraction Fan for CNC Lasers
Replacement extraction fan for use with the Model G0911–G0914 CNC Laser Cutter/Engraver.

Figure 57. Model T30336 Extraction Fan.

T30335—Air Pump for CNC Lasers
Replacement air pump for use with the Model G0911–G0914 CNC Laser Cutter/Engraver.

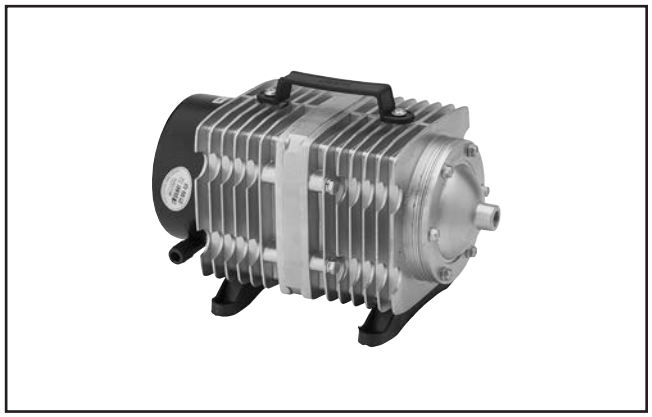


Figure 58. Model T30335 Air Pump.

T32364—Replacement 25mm Mirror
Replacement 25mm mirror for use with the Model G0911–G0914 CNC Laser Cutter/Engraver.

Figure 59. Model T32364 25mm Mirror.

T32362—Replacement Focal Lens (63.5mm Focal Length) for G0911–G0914
Replacement focal lens for use with the Model G0911–G0914 CNC Laser Cutter/Engraver.

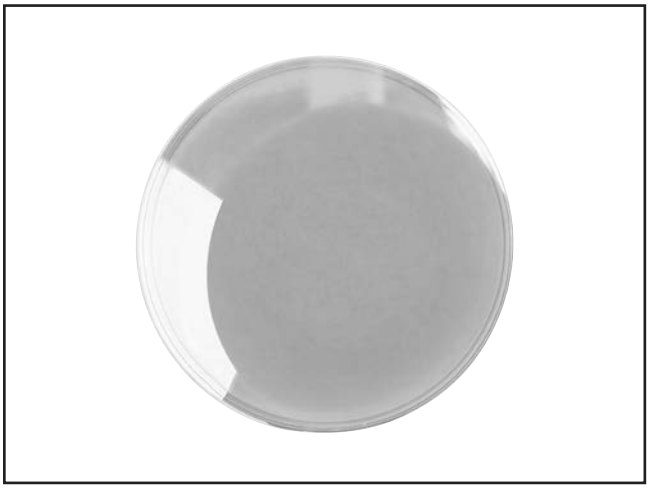


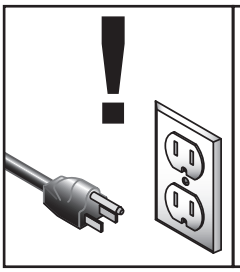
Figure 60. Model T32362 Focal Lens.

G0953—HEPA Fume Extractor for Lasers
Pulls fumes and particulates through eight types of filters within three housings, filtering the air of harmful odors, chemicals, and particulates.

Airflow capacity (6" inlet): 423 CFM @ 0.38" SP
Airflow capacity (4" inlet): 335 CFM @ 0.91" SP

Figure 61. Model G0953 Fume Extractor.

SECTION 6: MAINTENANCE



⚠WARNING

To reduce risk of shock or accidental startup, always disconnect machine from power before adjustments, maintenance, or service.

Schedule

For optimum performance from this machine, this maintenance schedule must be strictly followed.

Ongoing

To minimize your risk of injury and maintain proper machine operation, shut down the machine immediately if you ever observe any of the items below, and fix the problem before continuing operations:

- Loose mounting bolts.
- Damaged laser optics.
- Worn or damaged wires.
- Any other unsafe condition.

Daily Maintenance

- Wipe down interior cabinet area before and after use.
- Clean and vacuum dust buildup on table, inside cabinet, and on shafts and rails.
- Verify laser tube connections are secure and no air bubbles are present in tube.
- Check auxiliary systems for proper function and fill water reservoir, as required.

Weekly Maintenance

- Clean and vacuum dust buildup on auxiliary systems and air pump filter.
- Wipe shaft and rail metal surfaces with light sewing machine oil.

Monthly Check

- Verify fasteners on moving parts are secure.
- Inspect laser optics and clean as required.
- Inspect condition of electrical system.
- Verify proximity switches are operational.
- Check synchronous belts for wear.

Cleaning & Protecting

The Model G0911–G0914 only requires a general cleaning before and after each use. After one month of use, perform a comprehensive inspection and verify all fasteners on all moving parts have not come loose.

Over the life of the machine, longevity is reduced by moisture, abrasive material, corrosion, dust, and fumes generated by laser operations.

The following sections summarize the cleaning and lubrication required for each area.

NOTICE

DO NOT clean belts with acids, alkalis, oils, or solvents. Contact with chemicals and oils will accelerate belt deterioration.

NOTICE

Avoid harsh solvents like acetone or brake parts cleaner that may damage painted surfaces. Always test on a small, inconspicuous location first.

Lubrication

Grizzly recommends sewing machine oil (ISO 10 or less) for its light viscosity, odorless application, and resilience to capturing particulates.

General machine oil or mineral oil is NOT recommended for use on this machine due to the high volume of particulates produced by laser cutting and engraving.

Items Needed	Qty
Flashlight	1
Soft Paintbrush	1
Stiff-Bristled Brush	1
Window Cleaner	As Needed
Mineral Spirits	As Needed
Sewing Machine Oil	As Needed
Clean Shop Rags	As Needed

Cabinet Cleaning Best Practices

Vacuum accumulated dust, ash, and scrap material. DO NOT use compressed air as it contains atomized oil and water, and will obscure machine optics over time.

Note: *A soft paintbrush paired with a vacuum nozzle works well for cabinet cleaning.*

The cabinet interior should be wiped down before and after every use with a quality window cleaner. DO NOT use solvents or soap and water. Solvent will damage paint, Plexiglas, and labels. Water can short electronics and corrode parts.

⚠WARNING

If materials that produce toxic dust or ash are cut, verify that MERV 15+ or HEPA filter is installed in vacuum. Hazardous particles can quickly spread through enclosed areas when expelled from vacuum.

⚠WARNING

Under certain conditions, residual ash particles and wood chips may continue to smolder long after igniting. To help prevent vacuum container from smoldering and possibly catching fire, incorporate these safety steps in cleanup schedule:

- **After machine use, wait for a period of time to allow any smoldering chips to naturally expire.**
- **Immediately empty and dispose of collected waste in steel container.**
- **Use vacuum with steel drum, and avoid using vacuums with paper bags or existing combustible material.**

Shaft and Rail Metal Surfaces

By design, the shafts, rails, and other metal parts on this machine have hardened surfaces that are highly resistant to corrosion and wear. However, periodically wipe metal parts with light sewing machine oil to extend their life.

Note: *Lubrication can cause sludge build-up that will bind moving parts, and corrosion can still occur if catalysts are trapped beneath lubricant. Always clean surfaces before applying any form of lubrication.*

Moving Parts

Use a flashlight to inspect belts, pulleys, guideways, rails, drive couplings, tracks, and slides before and after every use. Look for evidence of loose or missing parts, ensure mechanical connections and fasteners are tightened, and verify that the X, Y, and Z axes operational paths are clean and unobstructed.

Tip: *If you must vacuum immediately after laser operations, and if using a wet/dry shop vacuum, the collection drum can be filled with 1" of water at the bottom to extinguish any smoldering particles.*

Tip: *Using a flashlight, even in well-lit areas, greatly improves the quality of inspection. In busy and visually-distracting areas, the light beam serves as a focal point and highlights the area being inspected.*

X- & Y-Axis Linear Guideways

IMPORTANT: When performing lubrication procedures, make sure to protect laser optics and belts from any cleaning fluid or lubricating oil.

To clean and lubricate X & Y linear guideways:

1. DISCONNECT MACHINE FROM POWER!
2. Place clean shop rags under areas to be cleaned and lubricated.

3. Slowly push laser head assembly to left-most X-axis position.

   Note: *If you move laser head, or any component driven by stepper motor too quickly, it will generate electricity and promptly stop movement. Once charge dissipates, try moving component again at slower pace.*

4. Using clean shop rag lightly covered with sewing machine oil, wipe linear guideway and carriage until clean (see **Figure 62**).

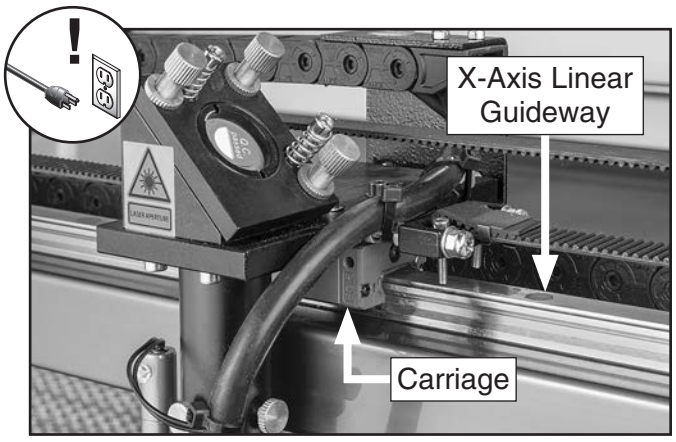


Figure 62. X-axis linear guideway and carriage.

5. Slowly push laser head assembly to right-most X-axis position.

6. Using clean shop rag lightly covered with sewing machine oil, wipe linear guideway and carriage until clean.

7. Dip rag in oil and apply a thin coating across entire surface of linear guideway.

8. Repeat **Steps 3–7** on left and right Y-axis linear guideways and carriages (see **Figures 63–64**).

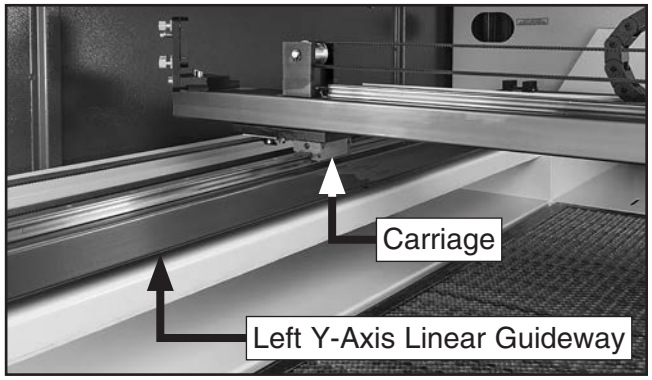


Figure 63. Left Y-axis linear guideway and carriage.

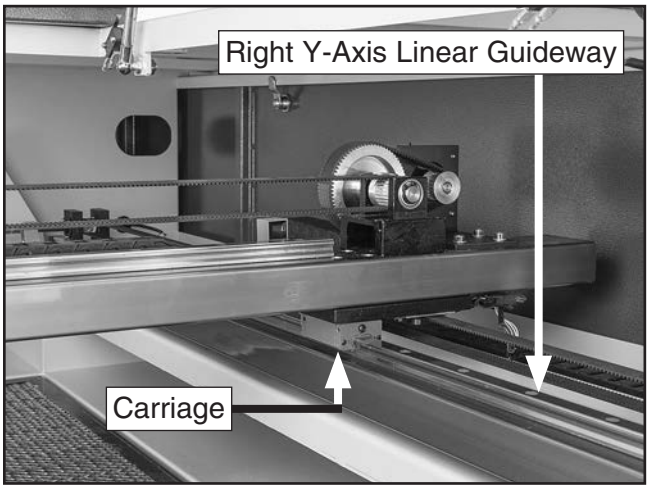


Figure 64. Right Y-axis linear guideway and carriage.

9. Remove and dispose of any shop rags left in area when finished.

Z-Axis Table Lift

The Model G0911–G0914 table is raised using the left and right arrow nav buttons (◀ and ▶) on the control panel. At each corner of the table, a leadscrew threaded with a leadscrew nut raises and lowers the table.

A pair of leadscrews on the left and right side are timed with one another by a synchronous belt, belt tensioner, and stepper motor (see **Figure 65**).

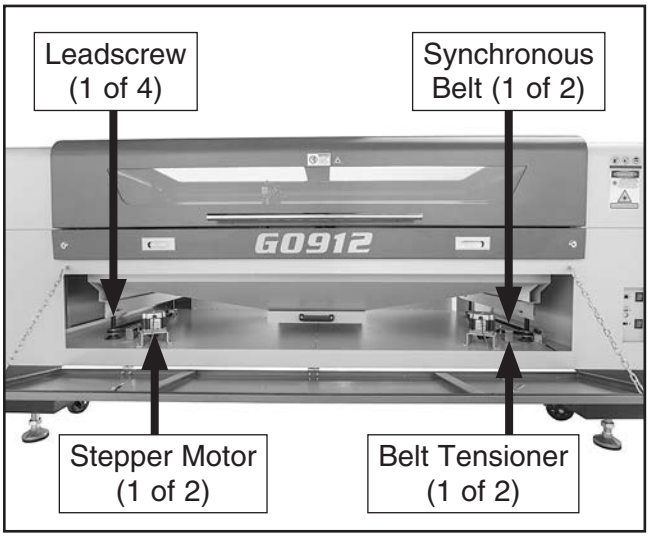


Figure 65. Z-Axis table lift components.

To clean and lubricate Z-Axis table lift:

1. DISCONNECT MACHINE FROM POWER!

2. Access lower cabinet by opening front access door.

3. Use stiff brush to loosen existing build-up and vacuum all contaminants from leadscrews, synchronous belts, belt tensioners, and stepper motors (see **Figures 66–67**).

4. Use clean shop rags to protect synchronous belts from cleaning fluids and lubricating oil (see **Figures 66–67**).

   — If leadscrews have heavy contamination, use stiff-bristled brush and rag with mineral spirits to clean threads.

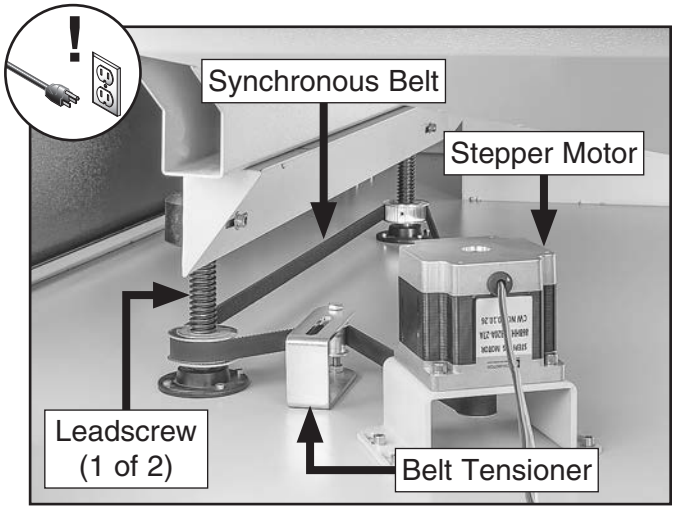


Figure 66. Left Z-Axis table lift components.

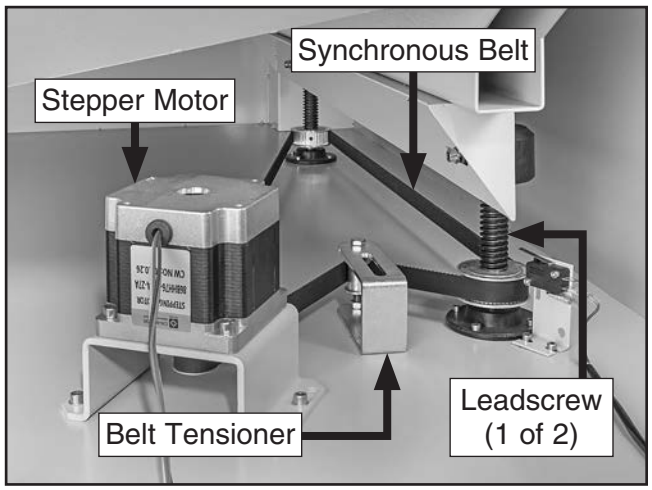


Figure 67. Right Z-Axis table lift components.

5. Allow leadscrews to dry after cleaning, and apply light coating of sewing machine oil.

6. Move table up and down the full range of movement to distribute oil over leadscrews.

Belts & Pulleys

The rotational direction of pulleys is controlled by the X and Y stepper motors, which are given directional coordinates by the CNC software.

The pulleys are toothed and engage with cogged synchronous belts to prevent slipping when the laser head moves along the linear guideways (see **Figure 68**). The bearings for these pulleys are sealed and maintenance-free.

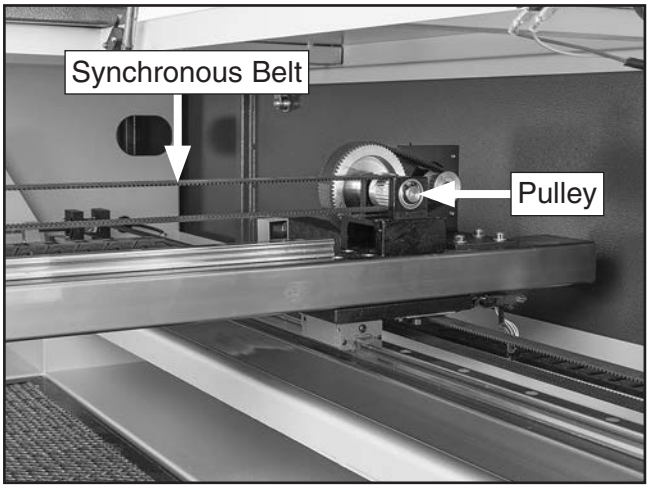


Figure 68. Synchronous belt and pulley.

NOTICE

DO NOT clean belts with acids, alkalis, oils, or solvents. Contact with chemicals and oils will accelerate belt deterioration.

To inspect and clean pulley belts and cogs:

1. DISCONNECT MACHINE FROM POWER!

2. Slowly move laser head along X- and Y-axes while inspecting condition of belts and pulley cogs with flashlight.

3. Check for belt deflection as instructed in **Adjusting Synchronous Belts** on **Page 59**.

4. Verify that left and right belts (where used) have same deflection, or binding may occur.

5. Remove any contaminants in crevices of cogs or teeth by using firm-bristled toothbrush while supporting underside of belt with your finger to prevent stretching.

   Note: *Material build-up on cogs or teeth can cause bump or notch in cutting path.*

6. If any belts have cracks or damaged teeth, replace as instructed in **Replacing Synchronous Belts** on **Page 61**.

Maintaining Laser Components

The laser tube(s) on the Model G0911–G0914 has no maintenance requirements other than protecting it from freezing when filled with water, and periodic inspection to verify water connections are secure, large air bubbles are not present in the tube, and electrical contacts are clean and free from corrosion.

Laser tube, lenses, and mirrors are consumable parts and are covered under warranty only for defects that occur during shipping. Periodic replacement is required and should be done as a complete set.

The life expectancy of the laser tube is affected by the laser operating time, strength setting, heating and cooling cycles, and the natural dissipation of gas from the laser tube.

IMPORTANT: Grizzly Industrial *does not* recommend having a second laser tube on hand for longer than **three months**. Laser tubes are perishable and will lose their efficiency over time by just sitting on the shelf.

Tip: *To cover the operating cost of a replacement laser tube, divide the price of a replacement laser tube by the amount of units you expect to produce. This calculation does not take into account length of laser run time, or power settings required for different types of widgets, but it will provide a baseline value to add to each unit to cover laser tube operating costs.*

Laser Optics Introduction

CNC laser cutters and engravers are a new generation of highly sensitive machines available for the general consumer market, and require special attention to properly maintain.

Note: *When replacing the laser tube, it is highly recommended that lenses and mirrors are also replaced.*

The beam emitted from the laser tube is reflected three times before reaching the focal point on the workpiece. This alternating direction of laser travel is achieved by mirrors. Optimum performance of the machine is largely affected by the ability of these lenses and mirrors to focus and reflect the beam without diffusion.

Over time, smoke, fumes, and dust will coat the reflective surfaces and diffuse the beam, resulting in low-quality cuts.

If the lenses and mirrors are not kept clean, any ash or dust on the surface will absorb laser energy. This energy converts to heat, causing a "thermal lens effect," where the optics will become permanently pitted after normal use. As a result, laser machine optics are considered consumable.

Once the optics have begun degrading, the user will have to increase laser power over time to achieve the same cutting results. The longer the laser tube is operated at higher power settings, the sooner the tube will require replacing.

Treat laser optics with care and protect delicate surfaces from improper cleaning methods, and ambient contaminants. Even the smallest dust particle can cause microscopic scratching if the surface is wiped by hand. Microscopic scratches will increase the damage caused by "thermal lens effect."

Laser Optics Best Practices

- DO NOT use compressed air to clean optics. Compressed air contains microscopic oil and water particles.
- DO NOT use a vacuum nozzle with an attached brush. Even soft brushes can scratch laser lenses and mirrors.
- DO NOT blow on the optics. Moisture droplets can stain the surface.
- DO NOT touch the film layer of the lens when removing. Hold lenses and mirrors by the edges when transporting.
- Keep all optics in a clean, dry container protected with soft lens paper until ready for use.
- Prepare all cleaning surfaces with several layers of new lens cotton or paper. DO NOT use shop rags, newspapers, or paper towels, which might be contaminated with microscopic abrasives.
- Set up the cleaning area indoors, away from wind and airborne particulates.
- DO NOT eat or drink while cleaning optics.

Cleaning Laser Optics

The most important step when working around optics is to thoroughly wash and dry your hands. In the event you have to handle lenses or mirrors, always wear sterile, disposable gloves.

Items Needed	Qty
Small Bellows	1
Optics-Grade Cotton Swabs	As Needed
Lens Paper	As Needed
Denatured/Isopropyl Alcohol	As Needed
Clean Shop Rags	As Needed

Method 1 (Optics Installed)

When lenses and mirrors are installed, they can be cleaned using a cotton swab (see **Figure 69**).

IMPORTANT: While cleaning optics, make sure to protect the pulley belts from all cleaning fluids. Belts will deteriorate from contact with chemicals and oils.

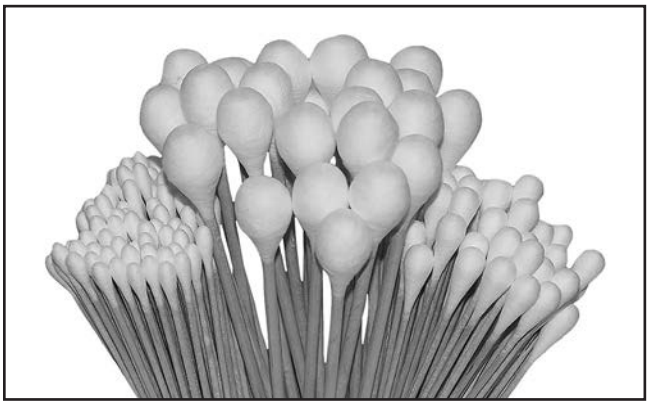


Figure 69. Typical optics-grade cotton swabs.

To clean installed laser optics:

1. DISCONNECT MACHINE FROM POWER!
2. Use small bellows to blow any particulates off lens/mirror surface.

   IMPORTANT: DO NOT physically wipe lenses or mirrors.
3. Soak ends of several cotton swabs in denatured or isopropyl alcohol. Saturate swabs with enough solution to be moist, but when pressed against a surface, solution *does not* squeeze out and drip.
4. With gentle rolling motion, roll swab across surface of lens/mirror to absorb any particulates stuck to surface (see **Figure 70**).

   Tip: *Dislodge and lift particulates off of surface by rolling cotton swab, which exposes clean cotton as you progress. Rubbing or dragging swab across surface without rolling it can create scratches and damage lens and mirrors.*

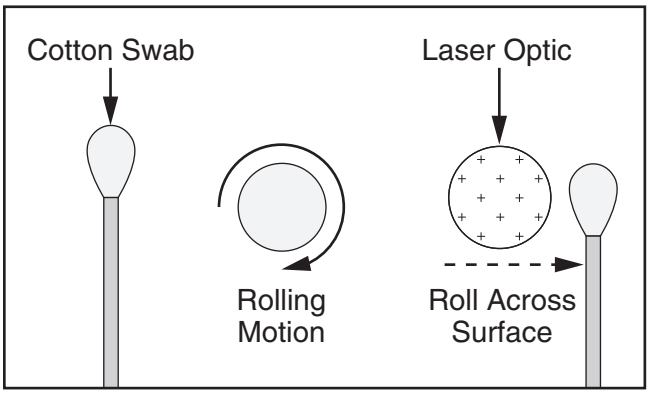


Figure 70. Rolling swab across surface.

5. Moisten dry swab with 1–3 drops of same solution, roll swab across surface of lens/mirror, and allow surface to air dry.

6. Inspect lens/mirror surface:

   — If any particulates or surface stains remain, repeat **Steps 2–5**.

   — If any particulates or surface stains are still present after second cleaning, they are most likely permanently burned into surface. Replace optics as instructed in **Removing/Replacing Laser Optics** on **Page 81**.

Method 2 (Optics Removed)
When lenses and mirrors are removed, they can be cleaned using the "Drop and Drag" method used for cleaning camera and microscope lenses.

To clean removed laser optics:

1. DISCONNECT MACHINE FROM POWER!

2. Use small bellows to blow any particulates off lens/mirror surface.

   IMPORTANT: DO NOT physically wipe lenses or mirrors.

3. Place small drop of denatured/isopropyl alcohol on center of lens cleaning paper.

   Note: *Flooding paper with solvent only leaves residual streaks. Only place enough solvent so that paper conforms to surface, and solvent does not absorb to edge of paper.*

4. Grab edge of paper and slowly pull across lens/mirror surface (see **Figure 71**). Allow surface to air dry.

   Note: *Dry edge of paper removes any residual solvent and streaking. This method does not scratch optics since no downward force is being applied to paper.*

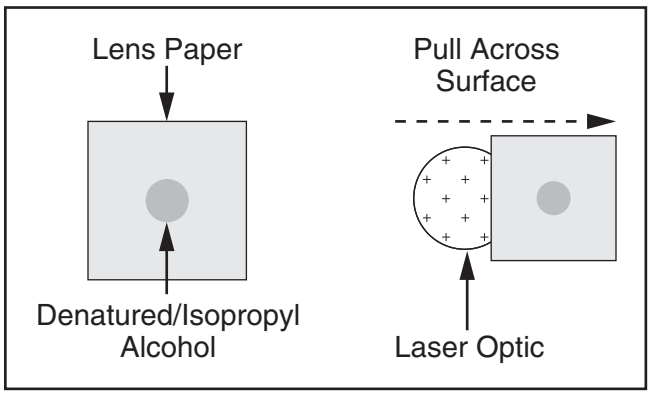


Figure 71. Pulling lens paper across surface.

5. Inspect lens/mirror surface:

   — If any particulates or surface stains remain, repeat **Steps 2–4** using clean sheet of lens cleaning paper for every pass.

   — If any particulates or surface stains are still present after second cleaning, they are most likely permanently burned into surface. Replace optics as instructed in **Removing/Replacing Laser Optics** on **Page 81**.

Water Chiller System

Water quality and effective cooling directly contribute to the operational life of the laser tube. The cooling system requires distilled water to prevent scaling and contaminant build-up. Due to oxygenation and warm temperatures inherent in the system, water needs to be checked regularly for evidence of algae or unpleasant odors. Mildew growth can reduce cooling efficiency and decrease tube life.

⚠CAUTION

DO NOT use chemical additives such as concentrated automotive coolant or bleach to prevent freezing and algae growth. Additives can degrade cooling efficiency, damage components, and cause excess electrical conductivity within the laser tube.

Operational load determines actual maintenance intervals. General maintenance of the water chiller system is as follows.

To inspect and maintain water chiller system:

1. DISCONNECT WATER CHILLER SYSTEM FROM POWER!

2. Inspect radiator fan intake screen for blockage, and clean as required.

3. Inspect hoses and connections for leaks or damage, and repair or replace as required.

4. Inspect water for discoloration and evidence of algae. If contaminated, drain water, clean reservoir, and refill with distilled water.

5. Reconnect water chiller system to power and turn ***ON***. Allow water to cycle for 1 minute and verify air bubbles have released from laser tube.

6. Verify water level is in green area on water level gauge.

   Note: *For additional information on alarm codes and troubleshooting guidelines, see user's manual included with water chiller.*

Cleaning Air Pump Filter

The air pump requires no internal maintenance, but uses a foam filter to maintain clean air delivery to the laser focal point.

Operating time and cleanliness of the air drawn into the pump determines actual maintenance intervals.

To clean air pump filter:

1. DISCONNECT AIR PUMP FROM POWER!

2. At intake-end of air pump, loosen Phillips head screw, and remove cover plate.

3. Remove foam filter (see **Figure 72**), and soak in solution of warm water and dish soap.

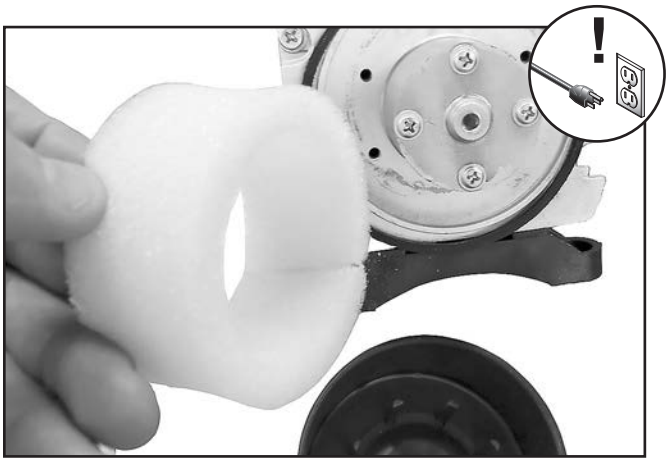


Figure 72. Typical air pump foam filter.

4. Wrap clean shop rag around foam filter and dry with a few firm squeezes.

   Note: *DO NOT use compressed air to dry filter or damage may occur.*

5. Inspect foam filter for holes, rips, or tears. Replace as required.

6. Inspect tubing and filter cover for cracks and leakage. Replace as required.

7. Re-install filter and secure cover with screw removed in **Step 2**.

Extraction Fan

The extraction fan requires no internal maintenance, and only regular visual inspections and light cleaning to remain operational.

Operating time and cleanliness of the air drawn through the fan determines actual maintenance intervals.

To inspect and clean extraction system:

1. DISCONNECT EXTRACTION FAN FROM POWER!

2. Inspect ducting for evidence of leaks. Patch or replace ducts as required.

   Note: *If screens have been attached to inlet/outlet ducts to prevent pest infestation, inspect and clean them as required.*

3. Verify duct clamps and power cord are secure and undamaged.

4. Verify extraction fan is securely mounted in accessible location where ducting can be removed and cleaned during maintenance.

5. Disconnect ducting and separate from extraction fan far enough to gain access to input and output ports.

6. Vacuum chips, dust, and ash from extraction fan intake screen.

7. Vacuum deposits at bends in ducting.

8. Re-attach ducting to extraction fan and secure.

NOTICE

If extraction outlet ducting is routed outside, install metal screen on duct opening to prevent invasive animals from nesting in extraction system.

Machine Storage

For long-term machine storage, or when not in operation during winter months, it is MANDATORY that ALL water is drained from the laser tube. Freezing temperatures can be encountered even in heated buildings or storage facilities from power outages. Water left in the laser tube may freeze and break the internal glass cooling coils. Damage to the laser tube after shipping is NOT covered under warranty.

Grizzly Industrial recommends that the Model G0911–G0914 be stored in a sealed, wooden crate for long-term storage over a year. Place generous quantities of desiccant bags in the laser cabinet, electrical boxes, and in the crate before sealing.

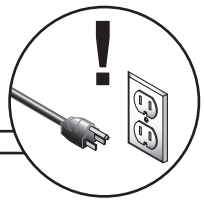
Perform ALL maintenance procedures for cleaning and lubrication as outlined in **SECTION 6: MAINTENANCE** on **Page 47** before placing machine into storage.

When bringing machine out of storage, follow all procedures for setup and testing as instructed in **SECTION 3: SETUP** on **Page 18**.

SECTION 7: SERVICE

Review the troubleshooting procedures in this section if a problem develops with your machine. If you need replacement parts or additional help with a procedure, call our Technical Support. **Note:** *Please gather the serial number and manufacture date of your machine before calling.*

Troubleshooting



Motor & Electrical

Symptom	Possible Cause	Possible Solution
Machine does not start, or power supply breaker immediately trips after startup.	1. Emergency Stop button depressed/at fault. 2. Machine circuit breaker tripped or at fault. 3. Blown fuse. 4. Incorrect power supply voltage or circuit size. 5. Power supply circuit breaker tripped or fuse blown. 6. Auxiliary system(s) has a short. 7. Control/ground wiring broken, disconnected, or corroded. 8. Control panel/controller at fault. 9. Laser tube at fault. 10. Power supply at fault. 11. Motor or motor bearings at fault.	1. Rotate Emergency Stop button head to reset. Replace if at fault. 2. Reset circuit breaker. 3. Replace fuse/ensure no shorts. 4. Ensure correct power supply voltage and circuit size (**Page 16**). 5. Ensure circuit is sized correctly and free of shorts. Reset circuit breaker or replace fuse. 6. Inspect/test/replace if at fault. 7. Fix broken control/ground wires or disconnected/ corroded connections. 8. Inspect/test/replace if at fault. 9. Inspect for arcing at laser tube connections. Verify wire insulation is preventing discharge to frame. 10. Inspect/test/replace if at fault. 11. Replace motor.
Machine stalls or is underpowered.	1. Laser beam path not aligned. 2. Machine undersized for task. 3. Pulley slipping on shaft. 4. One or more synchronous belt(s) are damaged, binding, or slipping. 5. Stepper motor at fault.	1. Properly align laser beam path (**Page 71**). 2. Increase power settings/decrease speed/use thinner workpiece (**Page 40**). 3. Tighten/replace loose pulley. 4. Inspect synchronous belt(s) on each axis for damage or debris. Adjust belt(s) (**Page 59**). 5. Test wire continuity between stepper motor and stepper driver; repair/replace if at fault. Verify stepper driver DIP switch configuration (**Page 82**).
Machine has vibration or noisy operation.	1. Guideway(s) contaminated or damaged. 2. Stepper motor or component loose. 3. Machine incorrectly supported. 4. Synchronous belt(s) worn, loose, pulleys loose/ misaligned, or belt slapping component. 5. Workpiece loose. 6. Stepper motor bearings at fault. 7. Stepper driver(s) at fault. 8. Incorrect value(s) in RDWorks Vendor Settings. 9. Auxiliary system(s) contacting machine frame.	1. Clean and lubricate guideways (**Page 48**). Inspect guideway(s) for damage, replace if at fault. 2. Replace damaged or missing bolts/nuts or tighten. 3. Adjust feet, shim, or tighten mounting hardware. 4. Inspect/replace synchronous belt(s) (**Page 59**). Secure pulley on shaft; realign if necessary. 5. Use holding fixture/secure workpiece with clamps. 6. Test by rotating shaft; rotational grinding/loose shaft requires bearing replacement. 7. Verify stepper driver DIP switch configuration (**Page 82**). 8. Contact Grizzly Tech Support. 9. Secure auxiliary system(s) off of machine frame.

Laser Operations

Symptom	Possible Cause	Possible Solution
USB flash drive is not read by controller, or file unable to load.	1. Controller memory is full. 2. Incorrect file structure or wrong file format. 3. Artwork file not saved using RDWorks software. 4. USB flash drive at fault. 5. USB port at fault.	1. Delete memory files in controller (**Page 95**). 2. Use a FAT32/FAT16 formatted flash drive with artwork saved in RDWorks (*.RD*) format. 3. Save artwork file using RDWorks (**Page 32**). 4. Test USB flash drive; replace if at fault. 5. Inspect USB port cable connections. Unplug USB port cable and plug USB flash drive directly into controller; replace USB port if at fault.
Laser beam has poor cutting or engraving quality.	1. Path, layer, or other CAD error exists. 2. Incorrect laser speed or laser power setting. 3. Focal length is not set correctly. 4. Laser beam path not aligned. 5. Laser path is obstructed by smoke or debris. 6. Laser unable to cut or engrave workpiece. 7. Laser cut is too wide. 8. Laser head has vibration or lash (workpiece path shows distortion/overlap). 9. Workpiece buckling or moving. 10. Laser output creating sawtooth pattern on cuts or engravings. 11. Laser tube at fault. 12. Controller, power supply, or control panel at fault.	1. Review RDWorks settings and verify that artwork file is free of errors. 2. Review RDWorks speed/power settings (**Page 33**) and verify that speed/power is set properly for current workpiece material (**Page 40**). 3. Inspect/adjust focal length (**Page 37**). Inspect/adjust table level (**Page 66**). 4. Verify mirrors are secure and reflective side is facing outward (**Page 81**). Align laser beam path (**Page 71**). Clean laser optics (**Page 52**). 5. Verify air supply hose is unobstructed and connected to air nozzle. Verify extraction fan is functional and ducting is unobstructed. 6. Workpiece material unsuitable for operation (**Page 40**). 7. Verify mirrors are secure and reflective side is facing outward (**Page 81**). Align laser beam path (**Page 71**). Clean laser optics (**Page 52**).Inspect/adjust table level (**Page 66**). 8. Adjust/replace belts (**Page 61**). Inspect/adjust gantry components for loose fasteners or binding. Set origin in different location. 9. Use honeycomb table for thin workpiece support. Use clamps to secure workpiece. 10. Increase laser power (**Page 33**). Inspect workpiece for impurities that ignite (**Page 40**). 11. Inspect/test/replace laser tube (**Page 66**). Inspect/test/replace high-voltage power supply. 12. Inspect/test/replace controller, power supply, or control panel, as required.
Laser tube inoperative or laser powers off while machine is operating.	1. Top loading door open or interlock switch activated. 2. Water chiller system not cooling laser tube; temperature switch activates or water chiller alarm sounds. 3. Laser tube electrical connections at fault. 4. Laser tube at fault. 5. Auxiliary system(s) has a short. 6. Electrical system at fault.	1. Close top loading door; replace top loading door interlock switch and test operation (**Page 27**). 2. Inspect/test/replace water chiller system (**Page 54**). Reduce ambient temperature of machine environment. Add ice to reservoir or add additional water chilling equipment, as required. 3. Verify laser tube electrical connections are correct and secure. 4. Inspect/test/replace laser tube (**Page 66**). 5. Test receptacle fuse; replace if at fault. 6. Inspect/test/replace electrical system components, as required.

Machine Operations

Symptom	Possible Cause	Possible Solution
Axis will not move after control panel receives commands.	1. One axis not moving.	1. Check connection to stepper motor. Check control panel connection to controller. Adjust stepper driver DIP switch configuration (**Page 82**).
	2. All axes not moving.	2. Check control panel connection to controller. Adjust stepper driver DIP switch configuration (**Page 82**). Inspect/replace power supply to stepper motors or faulty gantry components.
	3. Incorrect value(s) in RDWorks Vendor Settings.	3. Contact Grizzly Tech Support.
Axis movement and location not repeatable.	1. Origin incorrectly set in artwork file.	1. Review RDWorks settings; verify origin setting.
	2. One or more stepper driver(s) have incorrect DIP switch configuration.	2. Adjust stepper driver DIP switch configuration (**Page 82**).
	3. Guideway(s) contaminated or damaged.	3. Clean and lubricate guideways (**Page 48**). Inspect guideway(s) for damage, replace if at fault.
	4. One or more synchronous belt(s) are damaged or binding.	4. Inspect/replace synchronous belt(s) (**Page 61**). Realign pulleys if necessary.
One or more axes only move in one direction.	1. Axes proximity switch(es) activated.	1. Clear error(s); test proximity/limit switch (**Page 28**).
	2. Controller/stepper motor connection loose.	2. Inspect connections and ensure all are secure.
	3. Incorrect value(s) in RDWorks Vendor Settings.	3. Contact Grizzly Tech Support.
	4. Control panel/controller at fault.	4. Inspect/replace control panel/controller.
	5. Stepper motor(s) at fault.	5. Inspect/replace stepper motor(s).
	6. Stepper driver(s) at fault.	6. Adjust stepper driver DIP switch configuration (**Page 82**). Replace if at fault.
One or more axes will not move.	1. Direction wire and pulse wire switched on controller connector.	1. Rewire direction/pulse wire on controller connector.
	2. Stepper motor(s) disconnected.	2. Reconnect stepper motor(s).
	3. Stepper motor(s) at fault.	3. Inspect/replace stepper motor(s).
	4. No pulse signal from controller.	4. Inspect/replace controller.
Machine fails to home, or moves beyond soft limits when homing.	1. Incorrect value(s) in RDWorks Vendor Settings.	1. Contact Grizzly Tech Support.
	2. Faulty connection.	2. Find/secure connection.
	3. Proximity/limit switch not aligned.	3. Inspect/adjust proximity/limit switch.
	4. Loose proximity/limit switch wire.	4. Secure connection.
	5. Proximity/limit switch at fault.	5. Test proximity/limit switch (**Page 28**). Repair/replace proximity/limit switch.
	6. Controller at fault.	6. Inspect/replace if at fault.

Auxiliary Systems Operations

Symptom	Possible Cause	Possible Solution
Auxiliary system does not start, or machine circuit breaker immediately trips after startup.	1. Machine circuit breaker tripped or at fault.	1. Reset machine circuit breaker; connect auxiliary systems to power supply separate from machine (**Page 16**).
	2. Blown receptacle fuse.	2. Replace receptacle fuse/ensure no shorts.
	3. Incorrect power supply voltage or circuit size.	3. Ensure correct power supply voltage and circuit size; connect auxiliary systems to power supply separate from machine (**Page 16**).
	4. Power supply circuit breaker tripped or fuse blown.	4. Ensure circuit is sized correctly and free of shorts. Reset circuit breaker or replace fuse.
	5. Control/ground wiring broken, disconnected, or corroded.	5. Fix broken control/ground wires or disconnected/corroded connections.
	6. Power supply at fault.	6. Inspect/test/replace if at fault.

Adjusting Synchronous Belts

The Model G0911–G0914 uses toothed synchronous belts that engage with a cogged drive pulley.

After long-term use, one or more synchronous belts may have to be adjusted. To maximize belt life, and maintain adequate cut quality, follow these recommended guidelines:

- Unlike V-belts, the synchronous belts *must not* be allowed to slip under any circumstances, or the workpiece will be ruined due to laser coordinates straying from the programmed path. Synchronous belt tension only needs to keep the belt teeth engaged with the pulley cogs under a light load.
- Excessive belt tension will wear out delicate pulley bearings and stretch the belt.
- Insufficient belt tension will cause noisy directional changes due to belt slip, and reduce resolution quality of the cut.

The following sections show proper belt tension deflection values for each axis. See **Figure 73** for a typical method of testing belt deflection using moderate pressure.

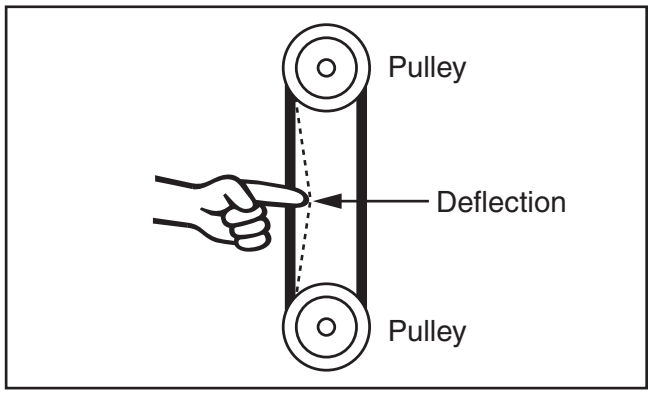


Figure 73. Testing belt deflection.

Items Needed	Qty
Caliper or Precision Ruler	1
Hex Wrenches 2.5, 3mm	1 Ea.
Open-End Wrench 7mm	1
Phillips Head Screwdriver #2	1
Clean Shop Rags	As Needed

X-Axis Belt Adjustment

1. DISCONNECT MACHINE FROM POWER!
2. Open top loading door and center laser head assembly over table.
3. Test for approximately 10mm of deflection on top side of belt at its center (see **Figure 74**).

   — If belt deflection is approximately 10mm, no adjustment is required.

   — If belt deflection is *greater than* or *less than* 10mm, proceed to **Step 4**.

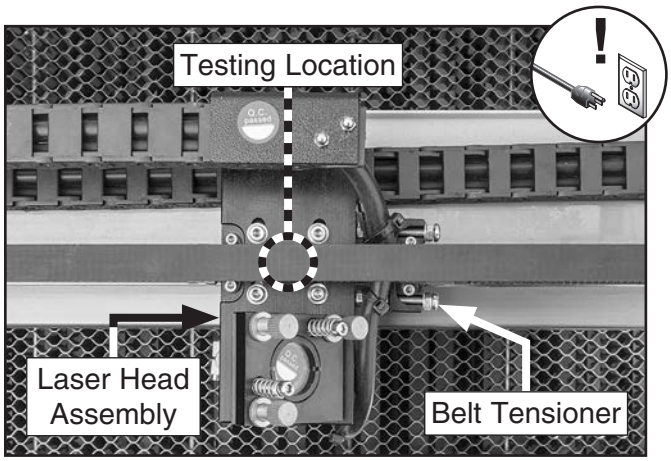


Figure 74. X-axis belt deflection testing location.

4. To adjust belt tension, loosen (4) jam nuts on belt tensioner, loosen or tighten (2) Phillips head screws, then secure jam nuts (see **Figure 75**). Repeat **Step 3**.

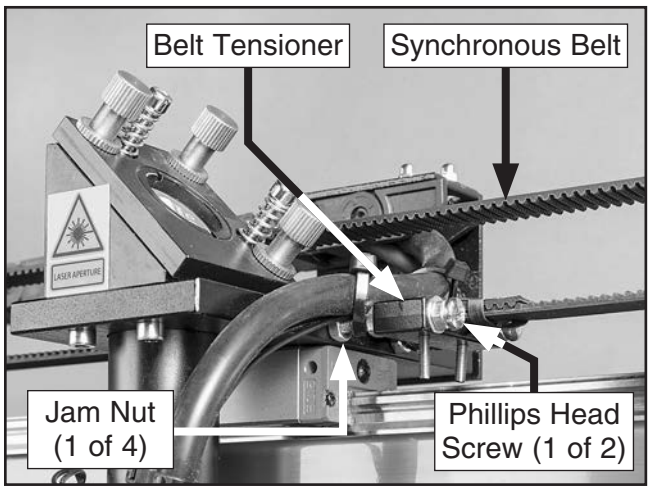


Figure 75. X-axis belt tensioner components.

Y-Axis Belts Adjustment

1. DISCONNECT MACHINE FROM POWER!

2. Open top loading door and center laser head assembly over table.

   Note: *Y-axis synchronous belt components are the same on left and right sides.*

3. Test for approximately 8mm of deflection on bottom side of Y-axis belt at its center (see **Figure 76**).

   — If belt deflection is approximately 8mm, no adjustment is required.

   — If belt deflection is *greater than* or *less than* 8mm, proceed to **Step 4**.

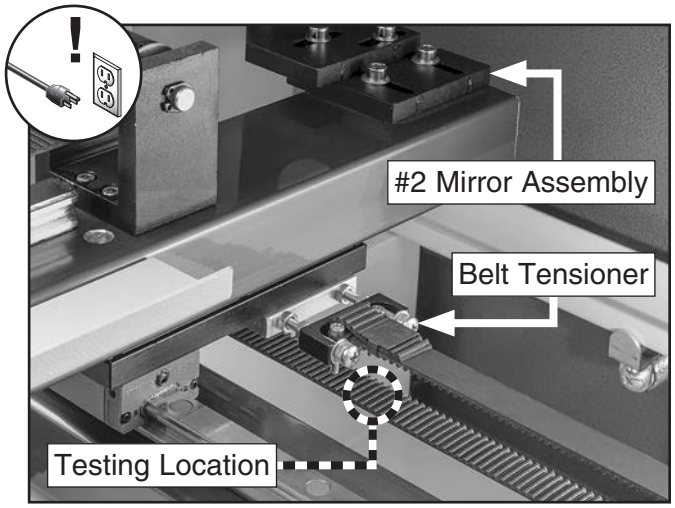


Figure 76. Right Y-axis belt deflection testing location.

4. To adjust belt tension, loosen (4) jam nuts on belt tensioner, loosen or tighten (2) Phillips head screws, then secure jam nuts (see **Figure 77**). Repeat **Step 3**.

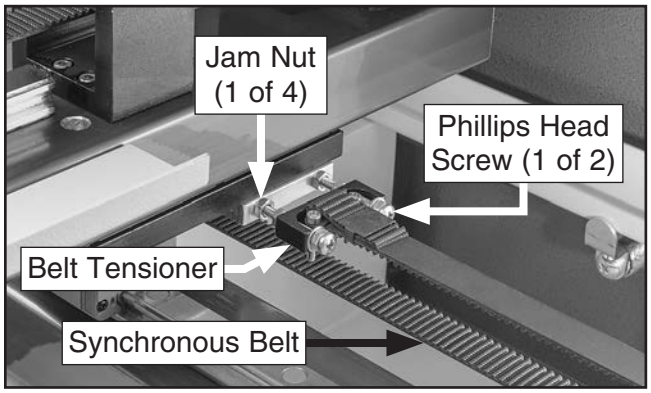


Figure 77. Y-axis belt tensioner components.

5. Repeat **Step 3** on opposite Y-axis synchronous belt.

Z-Axis Belts Adjustment

1. Turn machine ***ON***, press Z/U button on control panel to access Z/U menu, then highlight "Z move".

2. Press left arrow nav button (⬅) on control panel to raise table all the way up.

3. DISCONNECT MACHINE FROM POWER!

4. Open front access door.

   Note: *Z-axis synchronous belt components are the same on left and right sides.*

5. Test for approximately 8mm of deflection on top side of Z-axis belt at its center between table leadscrews (see **Figure 78**).

   — If belt deflection is approximately 8mm, no adjustment is required.

   — If belt deflection is *greater than* or *less than* 8mm, proceed to **Step 6**.

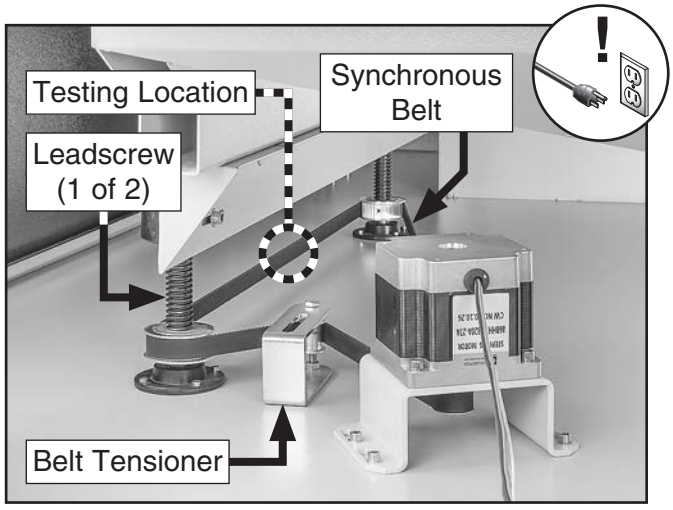


Figure 78. Left Z-axis belt deflection testing location.

6. To adjust belt tension, loosen (2) cap screws on belt tensioner, adjust belt tensioner towards or away from belt, then secure cap screws (see **Figure 79**). Repeat **Step 5**.

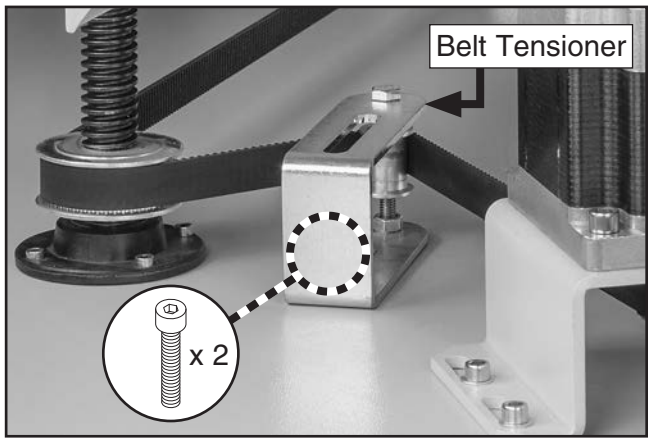


Figure 79. Z-axis belt tensioner components.

7. Repeat **Step 5** on opposite Z-axis synchronous belt.

Replacing Synchronous Belts

If a synchronous belt begins to slip or has frayed after long-term use, the belt should be replaced. The following section outlines procedures for replacing the synchronous belts on the Model G0911–G0914.

Items Needed	Qty
Hex Wrenches 2.5, 3, 5mm	1 Ea.
Scissors	1
Wood Blocks	As Needed
Replacement Synchronous Belts	As Needed
Clean Shop Rags	As Needed

X-Axis Belt Replacement

1. DISCONNECT MACHINE FROM POWER!

2. Open top loading door and center laser head assembly over table.

3. Remove (2) cap screws on right belt mounting bracket securing X-axis synchronous belt, then remove bracket from belt (see **Figure 80**).

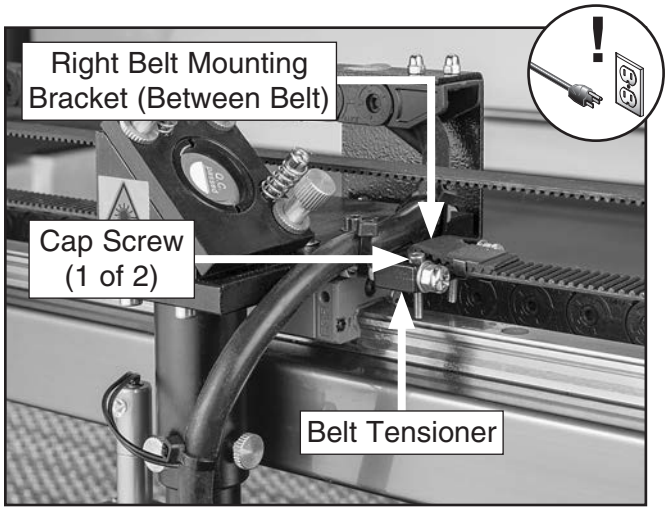


Figure 80. X-axis right belt mounting bracket location.

4. Remove (2) cap screws on left belt mounting bracket securing X-axis synchronous belt, then remove bracket from belt (see **Figure 81**).

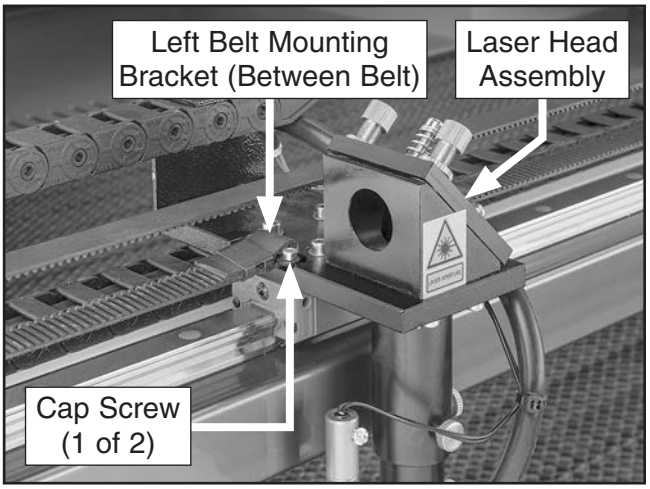


Figure 81. X-axis left belt tensioner bracket location.

5. Remove belt from idler pulleys on both sides of gantry, then remove belt from machine (see **Figure 82**).

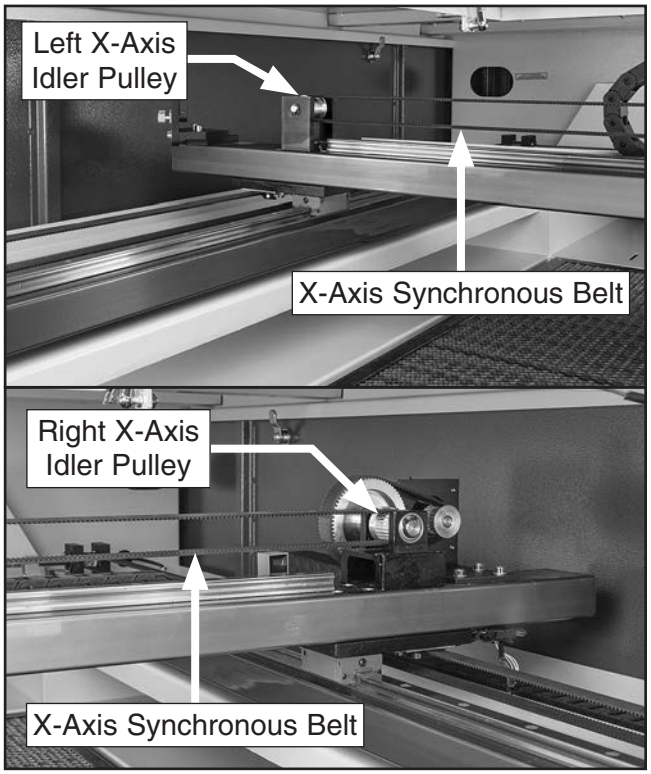


Figure 82. Left and right X-axis idler pulley locations.

6. Install replacement synchronous belt through left and right idler pulleys and verify belt meshes with pulley teeth (see **Figure 83**).

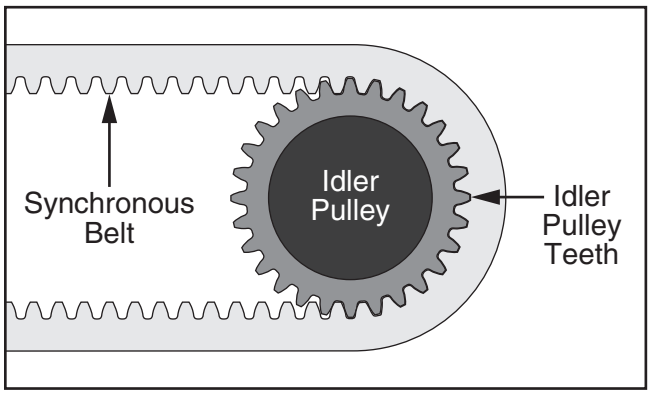


Figure 83. Synchronous belt meshing with idler pulley teeth.

7. Insert right belt mounting bracket between right belt loop and install bracket using (2) cap screws removed in **Step 3** on **Page 61**.

8. Insert left belt mounting bracket between left belt loop and install bracket using (2) cap screws removed in **Step 4**.

9. Verify correct X-axis synchronous belt deflection (see **X-Axis Belt Adjustment** on **Page 59**).

Y-Axis Belt Replacement

1. DISCONNECT MACHINE FROM POWER!

2. Open top loading door and center laser head assembly over table.

3. Open left or right upper side access door depending on which belt needs to be replaced.

   Note: *Y-axis synchronous belt components are the same on left and right sides.*

4. Remove (2) cap screws on rear belt mounting bracket securing Y-axis synchronous belt, then remove bracket from belt (see **Figure 84**).

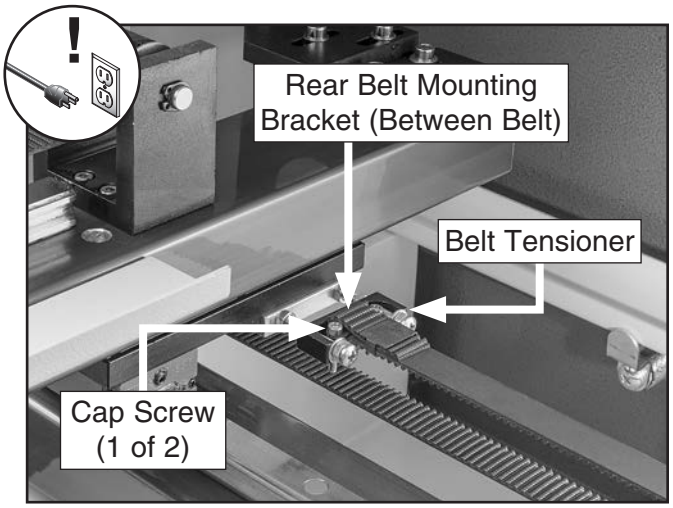


Figure 84. Y-axis rear belt mounting bracket location.

5. Remove (2) cap screws on front belt mounting bracket securing Y-axis synchronous belt, then remove bracket from belt (see **Figure 85**).

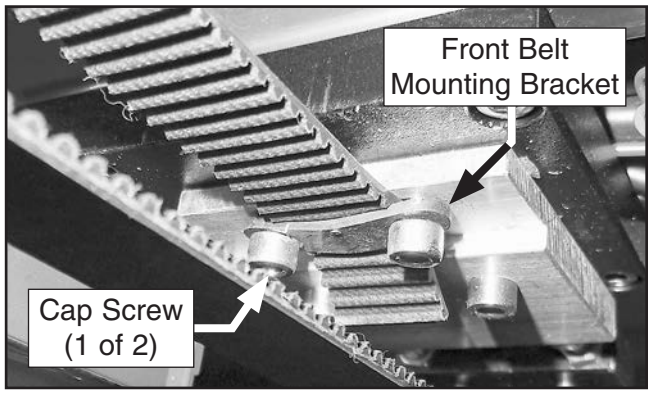


Figure 85. Y-axis front belt mounting bracket location.

6. Remove belt from idler pulleys on front and rear of support rail, then remove belt from machine (see **Figure 86**).

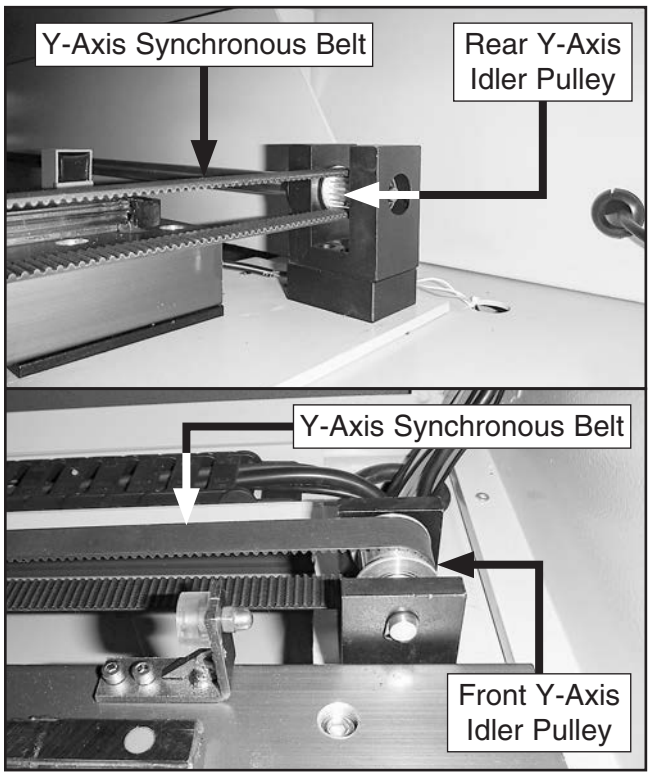


Figure 86. Front and rear Y-axis idler pulley locations.

7. Install replacement synchronous belt through front and rear idler pulleys and verify belt meshes with pulley teeth (see **Figure 83** on **Page 62**).

8. Insert rear belt mounting bracket between rear belt loop and install bracket using (2) cap screws removed in **Step 4**.

9. Insert front belt mounting bracket between front belt loop and install bracket using (2) cap screws removed in **Step 5**.

10. Verify correct Y-axis synchronous belt deflection (see **Y-Axis Belts Adjustment** on **Page 60**).

Z-Axis Belt Replacement

1. Open front access door.

   Note: *Z-axis synchronous belt components are the same on left and right sides.*

2. Turn machine ***ON***, press Z/U button on control panel to access Z/U menu, then highlight "Z move".

3. Press left arrow nav button (⬅) on control panel to raise table enough to fit wood blocks under both table support brackets between leadscrews (see **Figure 87**). Lower table until support brackets rest on wood blocks.

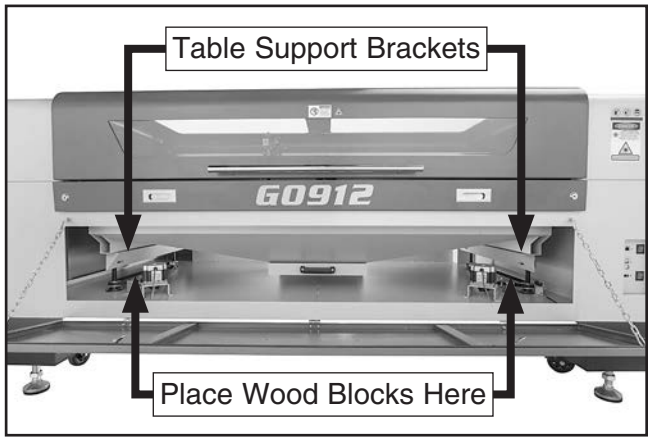


Figure 87. Z-axis table support brackets location.

4. DISCONNECT MACHINE FROM POWER!

5. Loosen (2) cap screws on belt tensioner, then pull belt tensioner away from belt to release tension (see **Figure 88**).

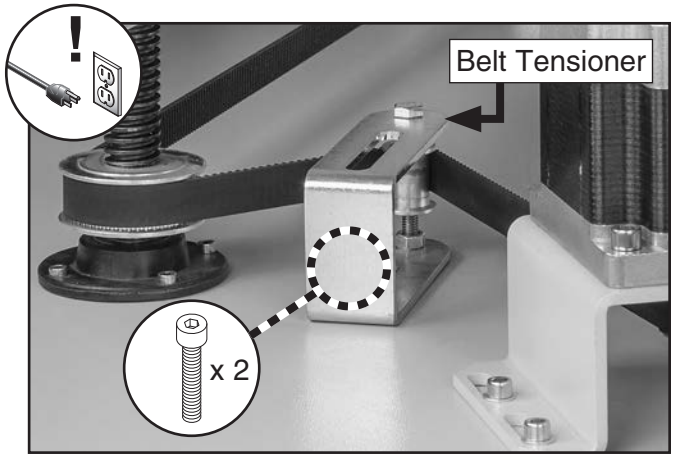


Figure 88. Z-axis belt tensioner components.

6. With belt tension released, cut defective belt and remove from machine.

⚠CAUTION

Only remove one leadscrew at a time to maintain adequate table support or machine damage and personal injury may occur!

7. Remove (4) cap screws on front leadscrew lower mounting base (see **Figure 89**).

8. Remove (2) cap screws on front leadscrew upper mounting base (see **Figure 89**).

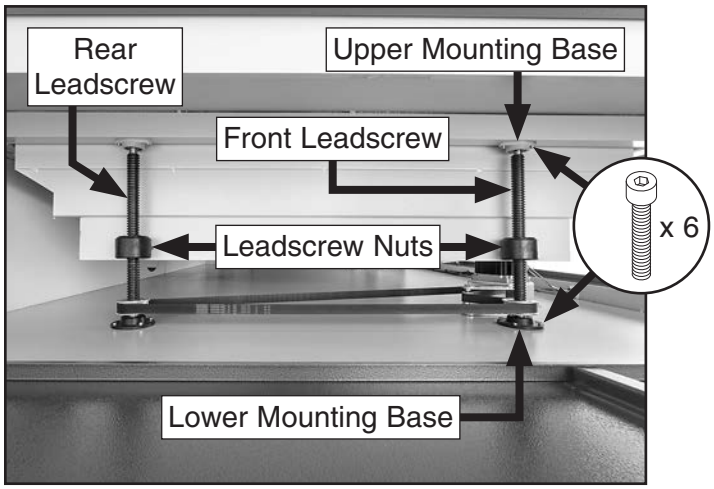


Figure 89. Leadscrew components location.

9. Remove (1) cap screw and flat washer from front leadscrew nut (see **Figure 90**).

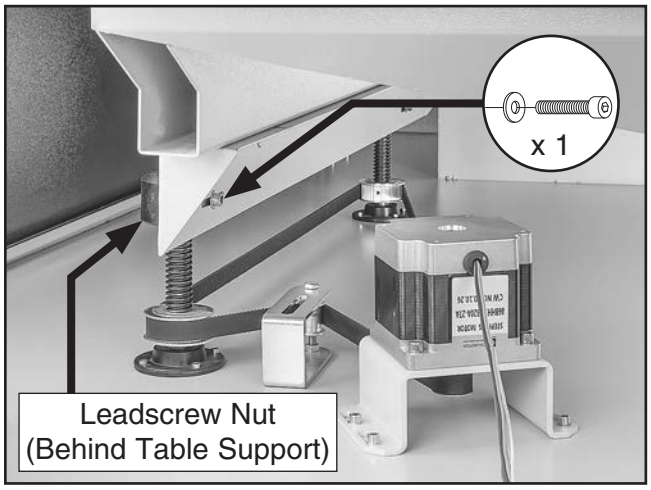


Figure 90. Leadscrew nut cap screw location.

10. Lift leadscrew and place replacement synchronous belt around leadscrew lower mounting base.

Note: *Keep synchronous belt out of the way to prevent damage during installation.*

11. Re-install (6) cap screws on leadscrew upper and lower mounting bases removed in **Steps 7–8** on **Page 64**.

12. Re-install (1) cap screw and flat washer on leadscrew nut removed in **Step 9** on **Page 64**.

13. Repeat **Steps 7–12** beginning on **Page 64** on rear leadscrew.

Note: *If replacing left Z-axis synchronous belt, open left lower side access door for easier access to rear leadscrew.*

14. Install replacement synchronous belt around front and rear leadscrew idler pulleys, and stepper motor idler pulley (see **Figure 91**).

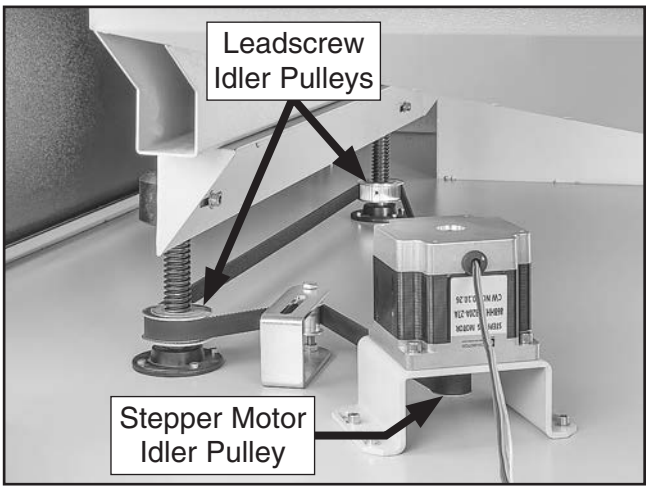


Figure 91. Synchronous belt around pulleys.

15. Verify belt meshes with all idler pulley teeth (see **Figure 92**).

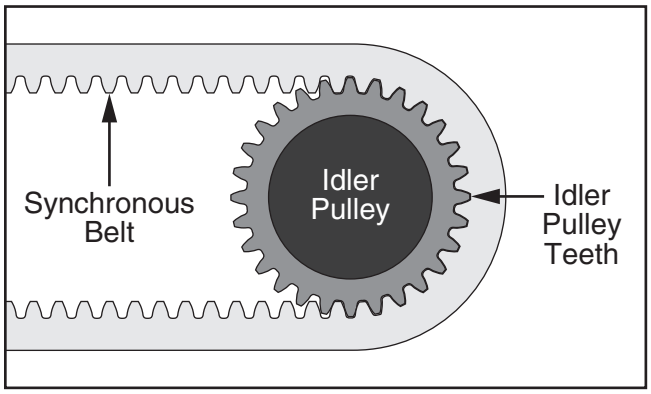


Figure 92. Synchronous belt meshing with idler pulley teeth.

16. Push belt tensioner towards belt, and then secure (2) cap screws (see **Figure 93**).

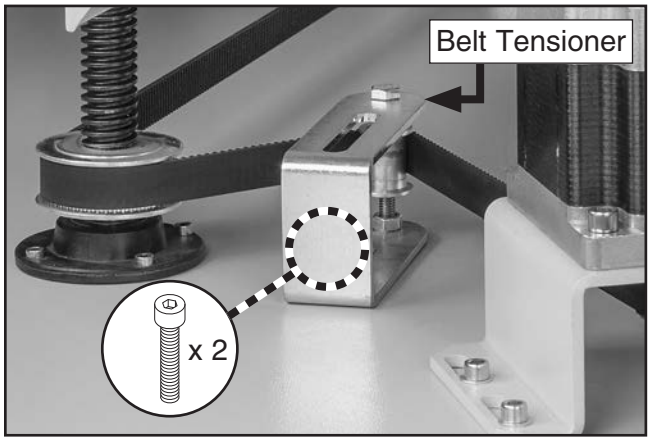


Figure 93. Z-axis belt tensioner components.

17. Verify correct Z-axis synchronous belt deflection (see **Z-Axis Belts Adjustment** on **Page 60**).

Leveling Table

The Model G0911–G0914 table may slowly twist or drop over time, causing inadequate workpiece cutting and variations in engraving quality.

Items Needed	Qty
Protective Gloves	1
Precision Ruler	1

To level table:

1. DISCONNECT MACHINE FROM POWER!

2. Verify machine is level (see **Leveling** on **Page 22**).

3. Open front access door and lower side access door, then measure distance of each leadscrew nut from bottom of cabinet (see **Figure 94**).

   — If measured distance *is* the same for all leadscrews, no adjustments are required.

   — If measured distance *is not* the same for all leadscrews, proceed to **Step 4**.

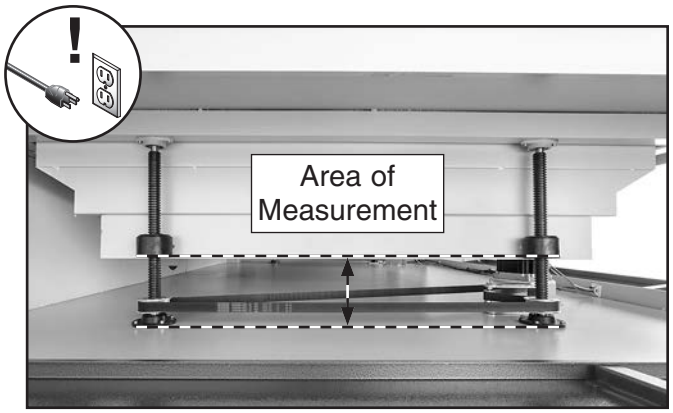


Figure 94. Leadscrew nut measurement.

4. Release Z-axis belt tension on leadscrew(s) requiring adjustment (see **Step 6** of **Z-Axis Belts Adjustment** on **Page 61**).

5. Grasp irregular leadscrew(s) by hand and rotate to raise or lower table until distance measured in **Step 2** is the same for all leadscrews.

6. Tension Z-axis synchronous belt (see **Step 6** of **Z-Axis Belts Adjustment** on **Page 61**).

Removing/Installing Laser Tube(s)

Each CO_2 gas-filled laser tube is supported by two soft-mount saddles and straps. Each tube has four connection points: two for water inlet/outlet hoses, and two for electrical connections.

The following procedure includes steps required for the purpose of long-term storage or machine shipping. If the laser tube has reached the end of its service life and will be discarded, the tube should be placed in a container and tagged for appropriate disposal.

Note: *Laser tube removal/installation is the same on primary and secondary laser tubes.*

Items Needed	Qty
Hex Wrenches 2.5, 3mm	1 Ea.
Phillips Head Screwdriver #2	1
Utility Knife	1
Bucket	1
Container (for Removed Laser Tube)	1
Isopropyl Alcohol	As Needed

Removing Laser Tube

1. DISCONNECT MACHINE AND AUXILIARY SYSTEMS FROM POWER!

2. Open laser tube access door.

3. Disconnect water hose(s) at INLET port(s) of water chiller, and place end(s) into bucket to collect water runoff (see **Figure 95**).

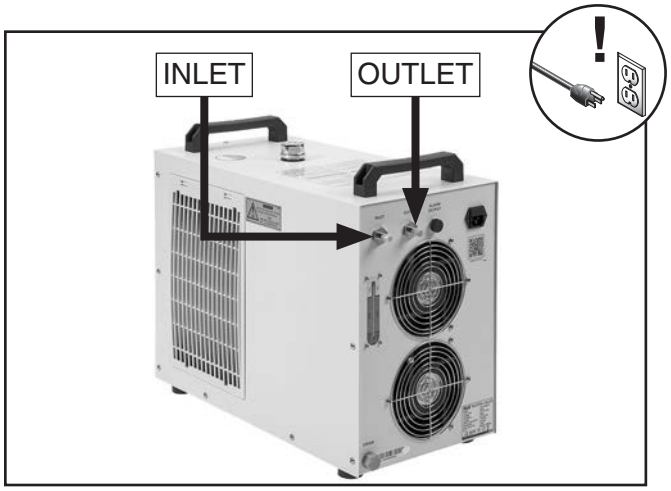


Figure 95. Location of water chiller ports.

4. Disconnect water hose(s) at OUTLET port(s) of water chiller, and manually blow through hose(s) several times to purge laser tube(s) and hoses of water.

   IMPORTANT: Remove as much residual water from laser tube(s) as possible. If freezing temperatures occur, laser tube glass will crack and render laser tube inoperable.

5. Install caps or tape on all open water ports and hoses to keep system sealed and free from contaminants and obstructions.

6. Remove any covers or sleeves on laser tube.

7. Disconnect anode and cathode wires from laser tube (see **Figure 96**).

8. At laser tube INLET and OUTLET water spouts (see **Figure 96**), cut off water hose at end of spout, and with utility knife, carefully slit remaining hose until it can be peeled off.

   IMPORTANT: DO NOT attempt to pull hose directly off of spout. Doing so could break glass water spout.

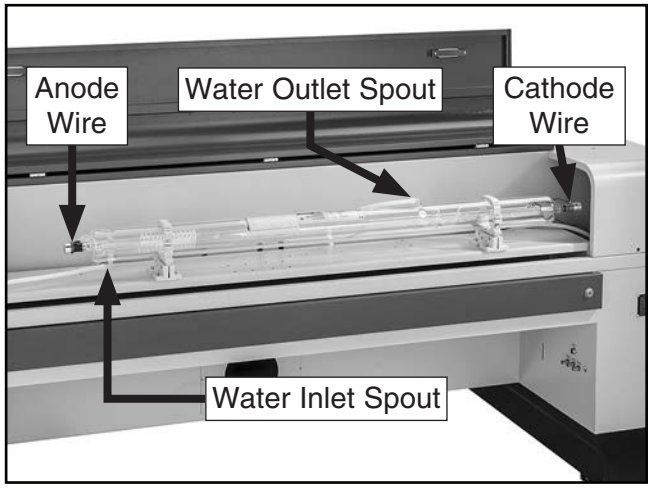


Figure 96. Laser tube component locations.

9. Install caps or tape on both open water hoses to keep system sealed and free from contaminants and obstructions.

10. Remove saddle-strap cap screws in an alternating pattern, and then remove saddle straps (see **Figure 97**).

    IMPORTANT: When removing saddle straps for laser tube removal, DO NOT loosen or reposition saddles. Saddles are factory-aligned and require many additional steps to re-align if original alignment is altered.

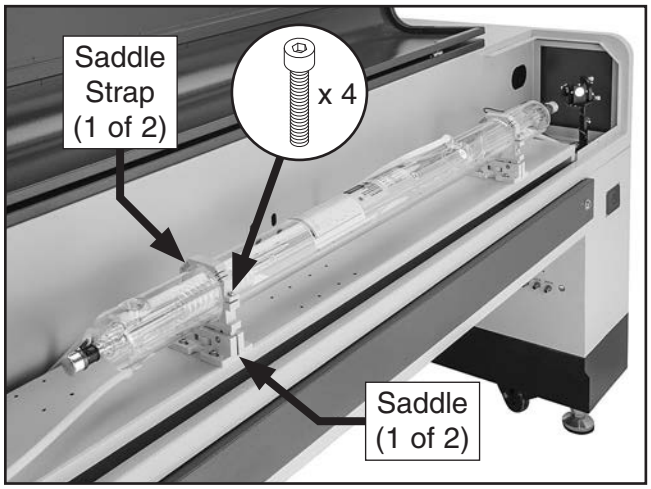


Figure 97. Laser tube saddle components.

11. Install caps or tape on (2) open water spouts to keep laser tube sealed and free from contaminants and obstructions.

12. Prepare container to hold laser tube after removal from machine.

NOTICE

To avoid damaging laser tube, remove tube from saddles ONLY when ready to place in container. Handle tube carefully in a pre-planned manner to prevent tube contacting machine cabinet.

13. Carefully lift laser tube out of saddles and place into container.

14. **G0913/G0914 Only:** Repeat **Steps 6–13** on secondary laser tube.

Installing Laser Tube

1. Inspect laser tube saddles and rubber pads for any debris or foreign material, and clean as required (see **Figure 98**).

   IMPORTANT: When inspecting and setting up machine for laser tube installation, DO NOT loosen or reposition laser tube saddles. Saddles are factory-aligned and require many additional steps to re-align if original alignment is altered.

2. Carefully open laser tube shipping container.

   Note: *DO NOT destroy or discard laser tube shipping container. Retain original box for ordering replacement tubes, or in the event of damage caused during shipping.*

3. Remove dust caps or tape (if installed) from laser tube.

   IMPORTANT: DO NOT force caps off water spout if they cannot be removed by hand. Carefully cut them off using utility knife.

NOTICE

To avoid damaging laser tube, remove tube from container ONLY when ready to place in machine. Handle tube carefully in a pre-planned manner to prevent tube contacting machine cabinet.

4. Carefully remove laser tube from shipping container, and position anode-end on anode side of tube compartment (see **Figure 98**).

5. Gently place laser tube in saddles.

6. Position cathode-end of laser tube so there is a gap of approximately 6" between end and center of first mirror (see **Figure 98**).

   Note: *Laser tube has labels showing suggested support location for saddles.*

7. Verify inlet and outlet hoses will not interfere with closed doors or covers, and hoses are free of kinks that could potentially restrict water flow to laser tube.

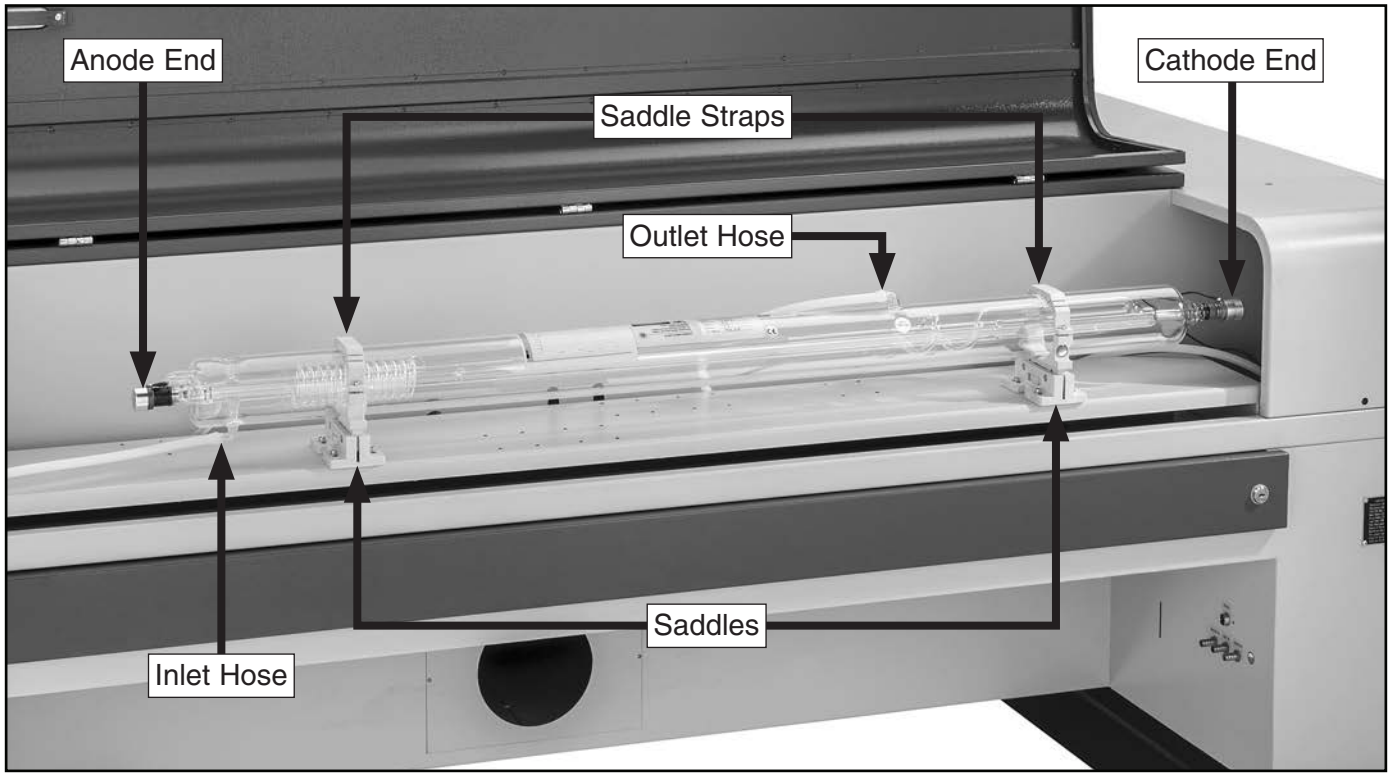


Figure 98. Laser tube compartment identification.

NOTICE

DO NOT use hose or spring clamps to secure water hoses to laser tube spouts. Compression from clamping can cause glass spout to crack during operation.

8. Carefully install inlet and outlet water hoses over appropriate glass spouts marked INLET and OUTLET until barbed-end is fully covered by hose.

   Note: *Water-based lubricant may be applied to exterior of spout to aid installation. DO NOT apply any lubricant to interior of spout where it will enter water chiller system.*

   IMPORTANT: If water hose must be removed from laser tube, DO NOT attempt to pull hose directly off of spout. Doing so could break glass water spout. Cut off water hose near end of spout and carefully slit remaining hose segment with utility knife until it can be removed.

9. Rotate and center laser tube in saddles so inlet spout is pointed down, and outlet spout is pointed up, as shown in **Figure 99**.

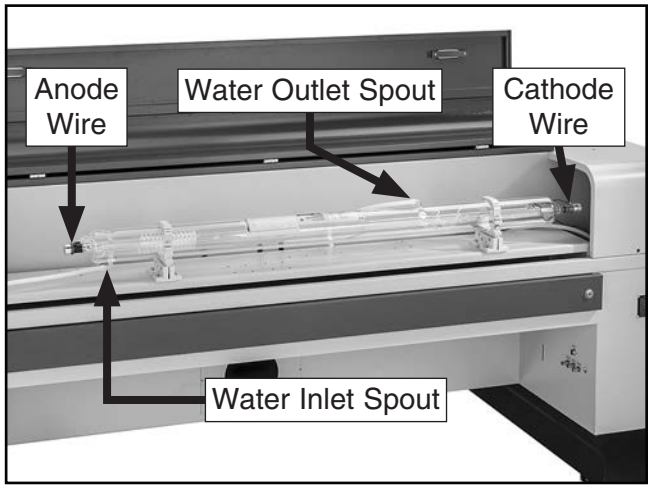


Figure 99. Laser tube water inlet/outlet spouts.

10. **G0913/G0914 Only:** Repeat **Steps 1–9** on secondary laser tube.

    Note: *Laser tube anode and cathode ends will be reversed in figures.*

11. Verify water chiller system inlet and outlet hoses are connected to auxiliary systems connection panel according to **Installing Water Chiller System** on **Page 23.**

    Tip: *If you are replacing laser tube, replace distilled water in water chiller system as well. This will prevent accumulation of contaminants in laser tube.*

12. Turn water chiller system ***ON*** and allow system to run. DO NOT turn ***ON*** laser.

13. Verify laser tube cooling chambers fill with water and no leaks are visible throughout water chiller system.

14. Wait one minute for water to flow through system, then slowly rotate laser tube while slightly raising tube at cathode-end to release air bubbles.

    IMPORTANT: DO NOT tap on laser tube to release air bubbles. Air bubbles will dissipate from cooling chambers once tube begins to warm up during first use.

15. Once all large air bubbles are released, laser tube is primed with water (see **Figure 100**).

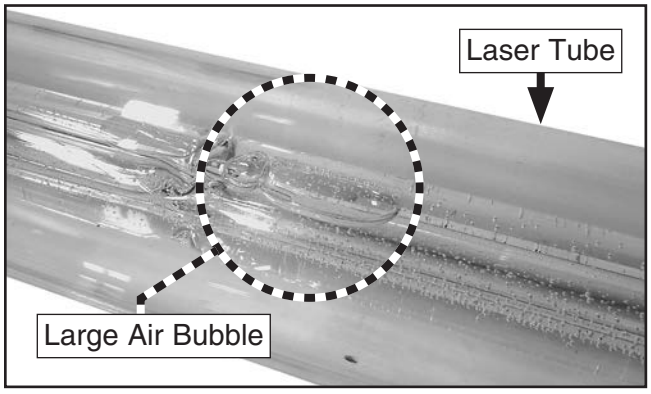


Figure 100. Example of large air bubbles when priming laser tube.

16. Verify water chiller reservoir level is in green area (see **Installing Water Chiller System** on **Page 23**).

17. Turn water chiller system ***OFF***.

NOTICE

DO NOT turn laser *ON* with water chiller system turned *OFF*. Laser tube will quickly overheat during laser operations without functioning cooling system.

18. Remove any oxidation on terminals with isopropyl alcohol, then install anode wire on positive (+) terminal (see **Figure 101**).

19. Remove any oxidation on terminals with isopropyl alcohol, then install cathode wire on negative (-) terminal (see **Figure 101**).

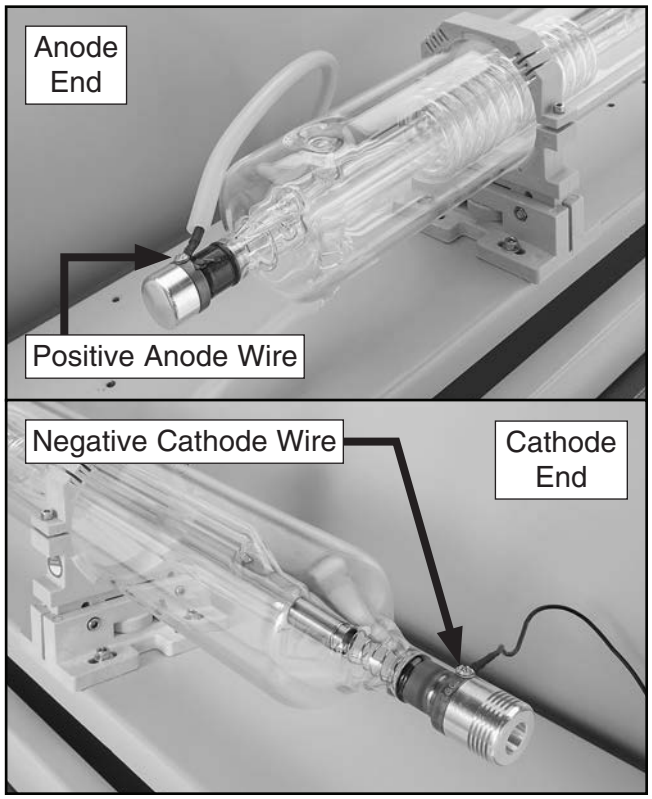


Figure 101. Location of laser tube anode/cathode wires.

20. Verify gap of approximately 6" is still present between cathode-end of laser tube and center of first mirror.

21. Verify laser tube is centered evenly in rubber saddle pads, and no contaminants are visible on pad surfaces.

22. Clean rubber pads on saddle straps and place on laser tube above saddles, as shown in **Figure 102**.

    Note: *Gap between saddle strap and saddle may be necessary for proper fit.*

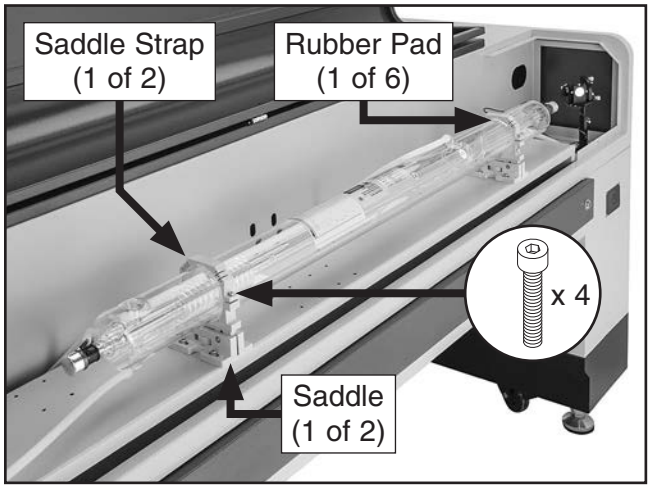


Figure 102. Laser tube saddles installed.

NOTICE

Laser tube saddles should gently hold laser tube in position. Tightening saddle straps with excessive force WILL break laser tube.

23. Carefully secure saddle straps to saddles by gently tightening cap screws in an alternating pattern until laser tube can no longer be rotated by hand.

24. Align laser tube beam path by performing **Aligning Laser Beam Path** on **Page 71**.

Aligning Laser Beam Path

DANGER

Operator and bystanders MUST wear ANSI-approved eye protection rated for 10,600 nm (10.6 µm) wavelength CLASS 4 infrared lasers when machine is operating. NEVER look directly into laser beam or stare at laser contact point, or severe eye injury or blindness will occur!

The primary laser beam path is directed by three mirrors before passing through a focus lens to the focal point on the workpiece, as shown in **Figure 103**. The included low-power reference laser connected to Mirror #1 can be used as a visual reference point when adjusting alignment.

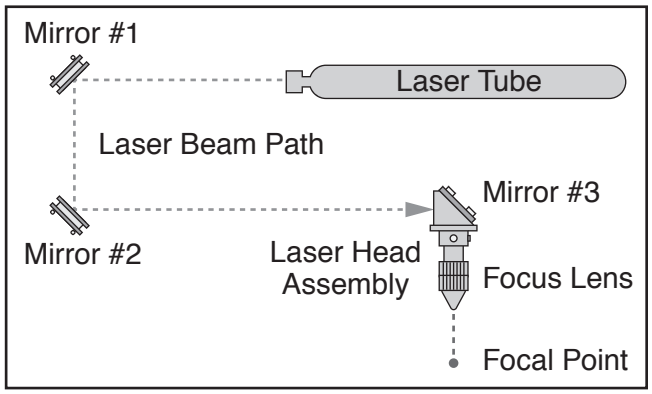


Figure 103. Primary laser beam path through cabinet.

Proper alignment of the laser beam path is critical to power efficiency, cutting/engraving quality, and laser tube service-life.

Items Needed	Qty
Class 4 Laser Eye Protection (per person)	1
Laser Beam Alignment Gauge	1
Mirror Alignment Gauge	1
Hex Wrenches 2.5, 3mm	1 Ea.
Manila Folder	As Needed
Sheet of Paper	As Needed
Masking Tape	As Needed

Aligning Primary Laser Beam Path

1. Prepare machine for operation according to **SECTION 3: SETUP** on **Page 18**.
2. Open top loading door and main laser tube access door.
3. Loosen (4) cap screws and remove (1) right laser tube cover to access primary Mirror #1.
4. Turn machine and water chiller system ***ON***. Allow machine to complete boot cycle.
5. Press Max-Power button. Max-Power setting screen will open (see **Figure 104**).

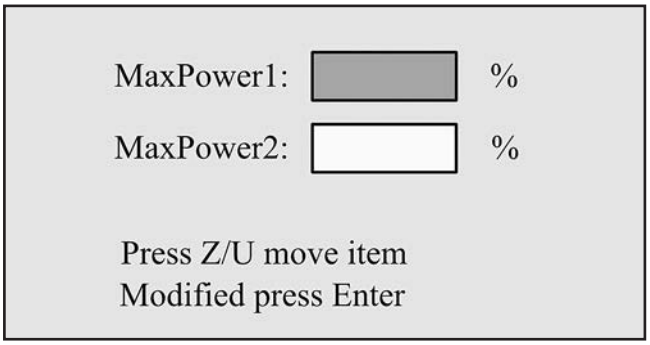


Figure 104. Example of "Max-Power" screen.

6. Press Z/U button to highlight "MaxPower1", and use arrow navigation buttons to set maximum power to 75%, then press Enter.
7. **G0913/G0914 Only:** Press Z/U button to highlight "MaxPower2", and use arrow navigation buttons to set maximum power to 75%, then press Enter.
8. Press Min-Power button. Min-Power setting screen will open (see **Figure 105**).

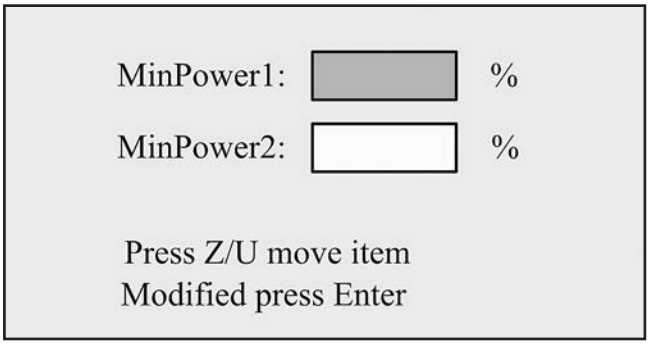


Figure 105. Example of "Min-Power" screen.

9. Press Z/U button to highlight "MinPower1", and use arrow navigation buttons to set minimum power to 50%, then press Enter.

10. G0913/G0914 Only: Press Z/U button to highlight "MinPower2", and use arrow navigation buttons to set minimum power to 50%, then press Enter.

11. Move primary laser head assembly to upper left corner of table (see **Figure 106**).

Note: *Steps for aligning the secondary laser beam path on the Model G0913/G0914 are performed after aligning the primary path, as instructed in* ***Aligning Secondary Laser Beam Path*** *on* ***Page 75****.*

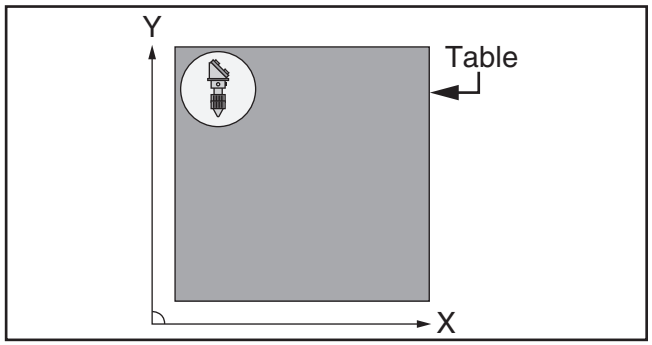


Figure 106. Laser head assembly in upper left corner of table.

12. Insert 1" piece of paper or manila folder into small slot on laser beam alignment gauge behind wire crosshairs, and install gauge in beam inlet on laser head assembly (see **Figure 107**).

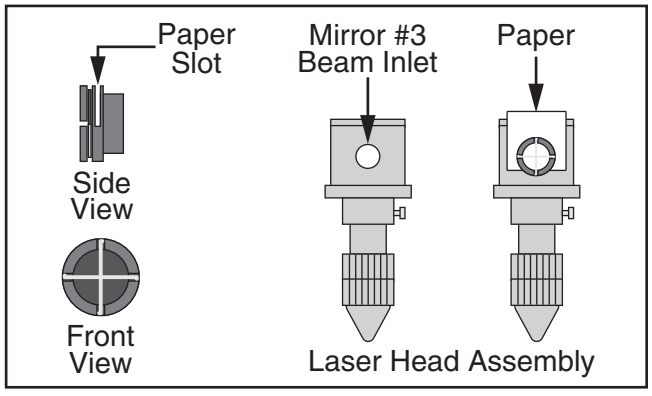


Figure 107. Laser beam alignment gauge installed in beam inlet.

13. Close top loading door and check alignment by pressing Pulse button on control panel. Compare results with **Figure 108** below.

IMPORTANT: Pulse function will only operate with top loading door closed.

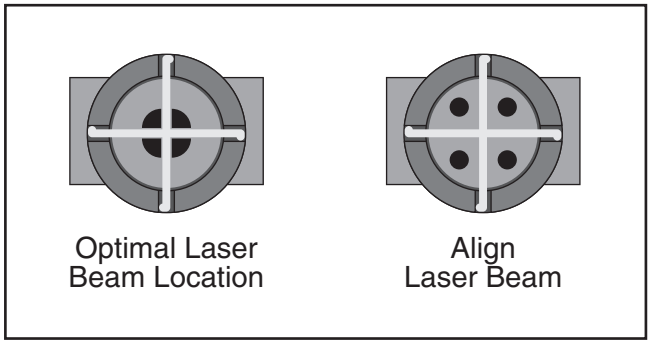


Figure 108. Laser beam alignment marks.

— If laser beam *is* in center of crosshairs, alignment is optimal. Proceed to **Step 17**.

— If laser beam *is not* in center of crosshairs, adjustment is required. Proceed to **Step 14**.

14. Loosen lock nuts on (3) thumbscrews located behind Mirror #1 (see **Figure 109**).

Note: *Tension bolts on mirror assemblies help prevent misalignment during operation. Always keep moderate tension on tension bolts when adjusting alignment.*

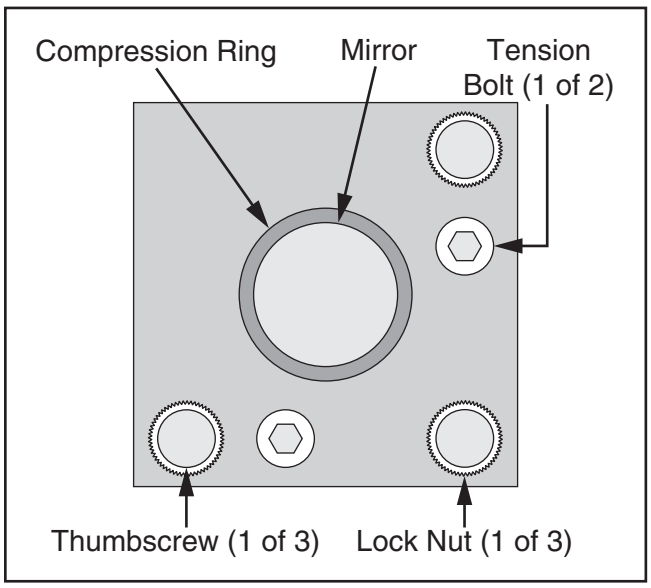


Figure 109. Typical mirror assembly.

15. Adjust direction of beam path by tightening thumbscrews depending on desired direction of beam travel (see **Figure 110**).

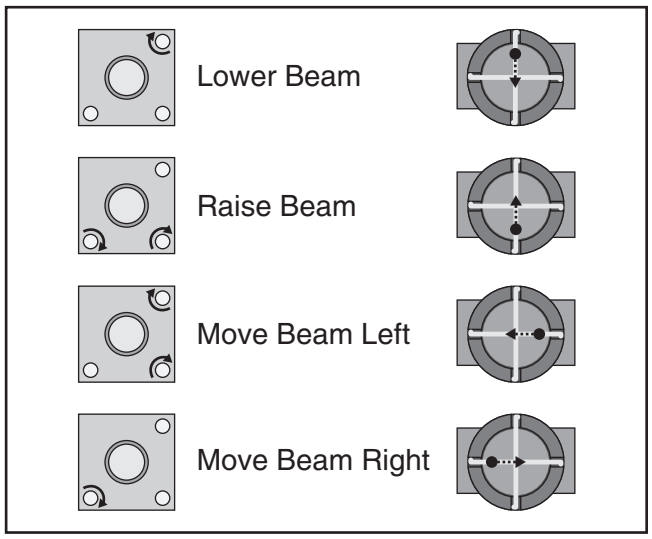


Figure 110. Mirror thumbscrew adjustment.

16. Verify mirror adjustment by pressing Pulse button on control panel. Compare results with those shown in **Figure 108** on **Page 72**.

— If laser beam *is* in center of mirror, alignment is optimal. Proceed to **Step 17**.

— If laser beam *is not* in center of mirror, adjustment is required. Repeat **Steps 15–16**.

17. Move laser head assembly to lower left corner of table (see **Figure 111**).

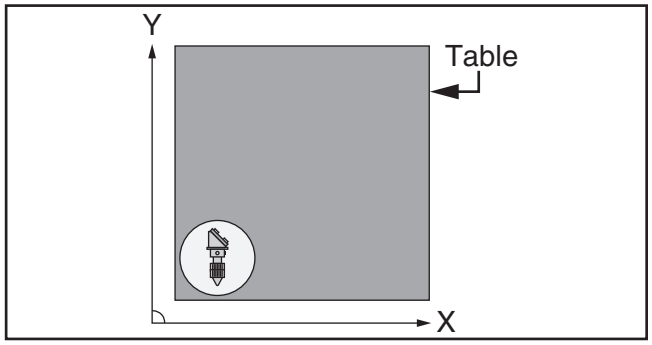


Figure 111. Laser head assembly in lower left corner of table.

18. Check alignment by pressing Pulse button on control panel. Compare results with those shown in **Figure 108** on **Page 72**.

— If laser beam *is* in center of crosshairs, alignment is optimal. Proceed to **Step 24**.

— If laser beam *is not* in center of crosshairs, adjustment is required. Proceed to **Step 19**.

19. Place mirror alignment gauge in front of primary Mirror #2 and hold in place with masking tape, as shown in **Figure 112**.

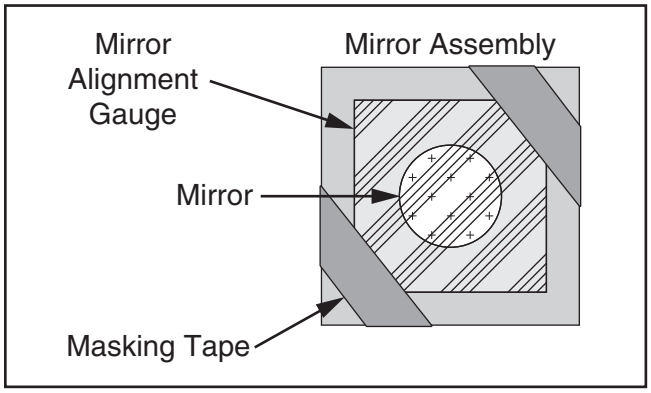


Figure 112. Mirror alignment gauge installed.

20. Verify Mirror #1 and Mirror #2 alignment by pressing Pulse button on control panel.

— If laser beam *is* within center of mirror, alignment is optimal. Remove mirror alignment gauge from Mirror #2, then proceed to **Step 24**.

— If laser beam *is not* in center of mirror, adjustment is required. Proceed to **Step 21**.

21. If no adjustments were made in **Step 14**, loosen lock nuts on (3) brass thumbscrews located behind Mirror #1 assembly (see **Figure 109** on **Page 72**).

22. Adjust direction of beam path by tightening thumbscrews depending on desired direction of beam travel, as shown in **Figure 110**.

23. Repeat **Step 20.**

24. Move laser head assembly to lower right corner of table (see **Figure 113**).

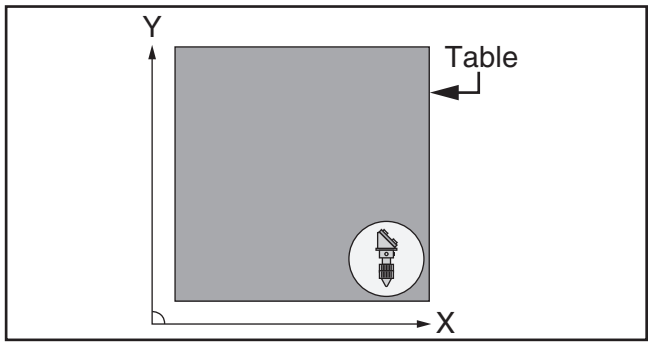


Figure 113. Laser head assembly in lower right corner of table.

25. Verify Mirror #2 and Mirror #3 alignment by pressing Pulse button on control panel.

— If laser beam *is* in center of crosshairs, alignment is optimal. Proceed to **Step 29**.

— If laser beam *is not* in center of crosshairs, adjustment is required. Proceed to **Step 26**.

26. Loosen lock nuts on (3) brass thumbscrews located behind Mirror #2 assembly (see **Figure 114**).

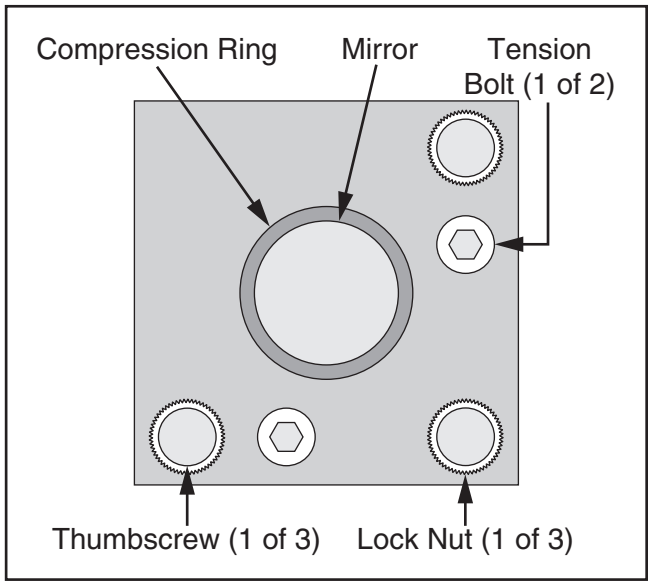


Figure 114. Typical mirror assembly.

27. Adjust direction of beam path by tightening thumbscrews depending on desired direction of beam travel (see **Figure 115**).

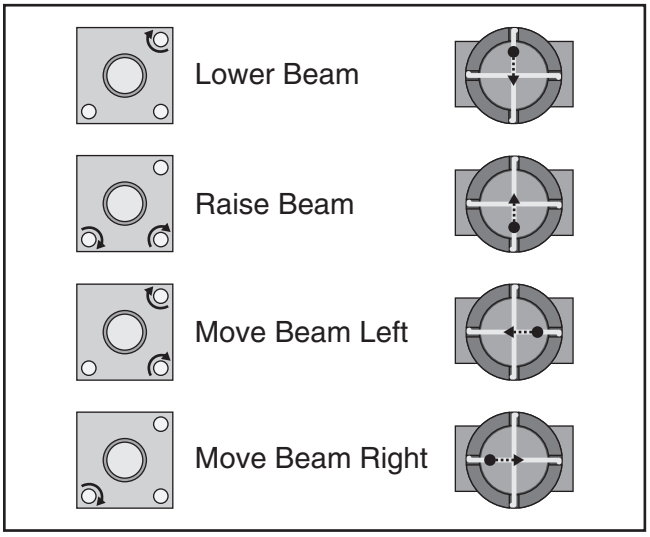


Figure 115. Mirror thumbscrew adjustment.

28. Repeat **Step 25.**

29. Remove laser beam alignment gauge, open top loading door, then place a clean sheet of paper or manila folder under laser head assembly.

30. Set focal length as instructed in **Setting Focal Length** on **Page 37**.

31. Close top loading door and verify primary Mirror #3 and focal point alignment by pressing Pulse button on control panel. Compare results with **Figure 116**.

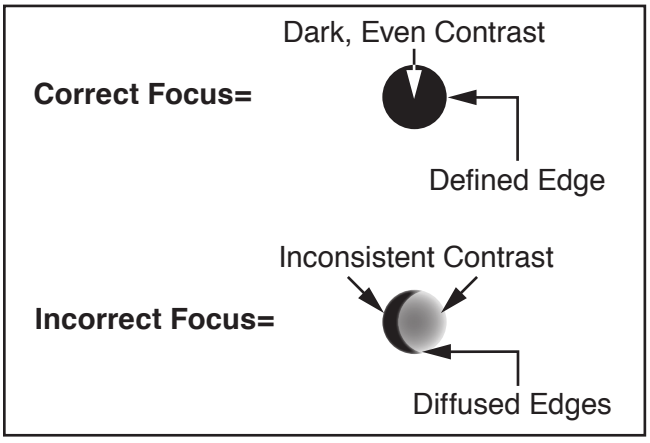


Figure 116. Focal point alignment examples.

— If laser beam focal point *is* dark and even, alignment is optimal. Proceed to **Step 35**.

— If laser beam focal point *is not* dark and even, adjustment is required. Proceed to **Step 32**.

32. Open top loading door and loosen lock nuts on (3) brass thumbscrews located behind Mirror #3 assembly (see **Figure 117**).

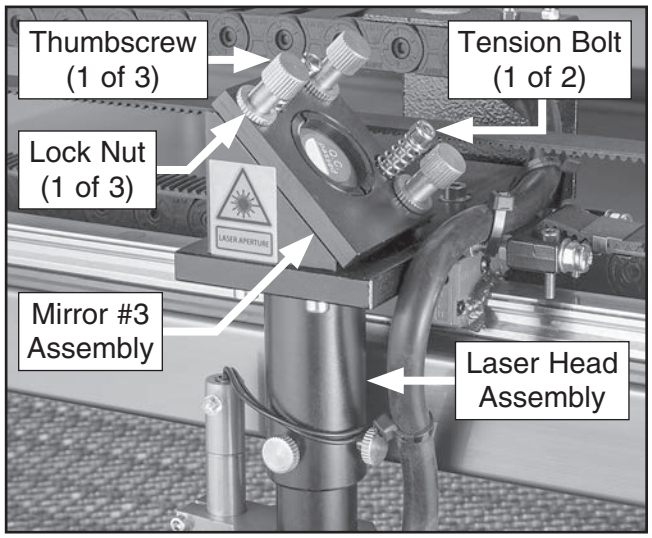


Figure 117. Mirror #3 assembly components.

33. Adjust direction of beam path by tightening thumbscrews depending on desired direction of beam travel (see **Figure 118**).

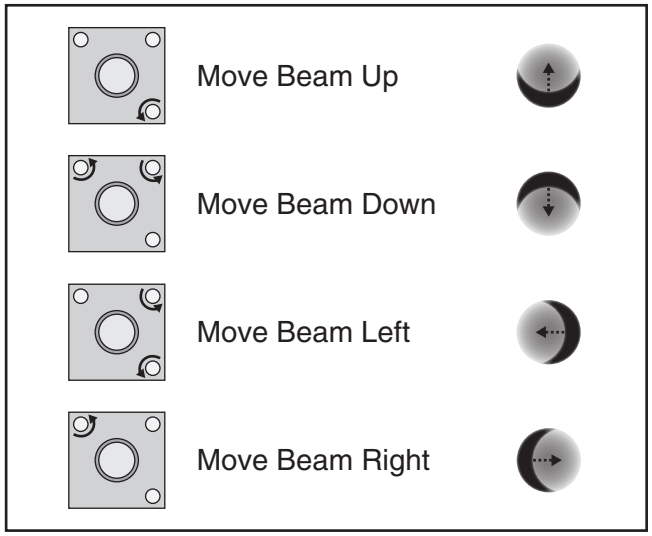


Figure 118. Mirror thumbscrew adjustment.

34. Repeat **Step 31.**

35. Tighten all lock nuts on mirror assembly thumbscrews if loosened for adjustment. DO NOT tighten thumbscrews!

36. G0913/G0914 Only: Proceed to **Aligning Secondary Laser Beam Path** on this page.

37. Align reference laser beam path as instructed in **Aligning Reference Laser** on **Page 80**.

38. Re-install (4) cap screws and (1) right laser tube cover removed in **Step 3**, and close all doors opened for alignment.

39. Turn machine power ***OFF***.

40. Turn water chiller system ***OFF***.

41. Put all tools and gauges away, then clean area for next operation.

Aligning Secondary Laser Beam Path

The secondary laser beam path is directed by three mirrors before passing through a focus lens to the focal point on the workpiece, as shown in **Figure 119**. The included low-power reference laser connected to Mirror #1 can be used as a visual reference point when adjusting alignment.

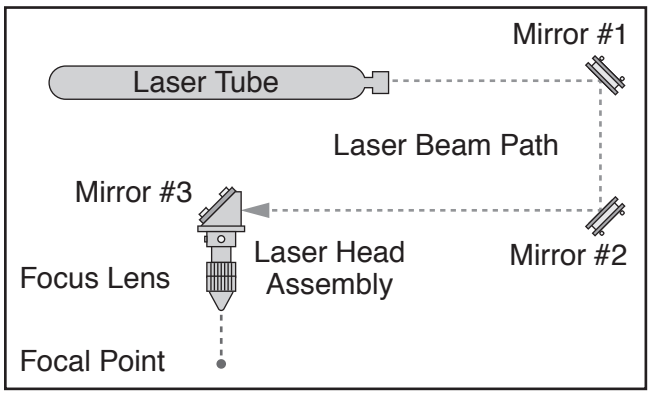


Figure 119. Secondary laser beam path through cabinet.

DANGER

Operator and bystanders MUST wear ANSI-approved eye protection rated for 10,600 nm (10.6 µm) wavelength CLASS 4 infrared lasers when machine is operating. NEVER look directly into laser beam or stare at laser contact point, or severe eye injury or blindness will occur!

To align secondary laser beam path:

1. Loosen (4) cap screws and remove (1) left laser tube cover to access secondary Mirror #1, then move secondary laser head assembly to upper right corner of table (see **Figure 120**).

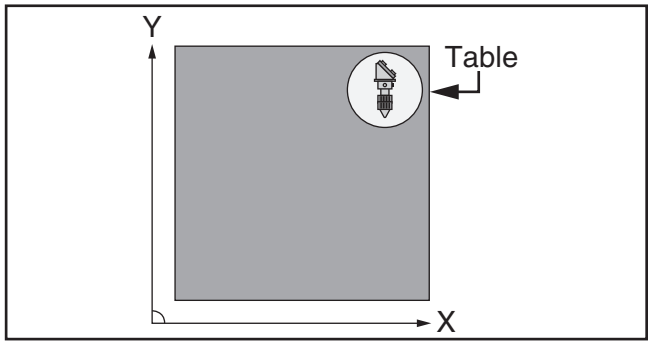


Figure 120. Laser head assembly in upper right corner of table.

2. Insert 1" piece of paper or manila folder into laser beam alignment gauge, and install gauge in beam inlet on laser head assembly (see **Figure 121**).

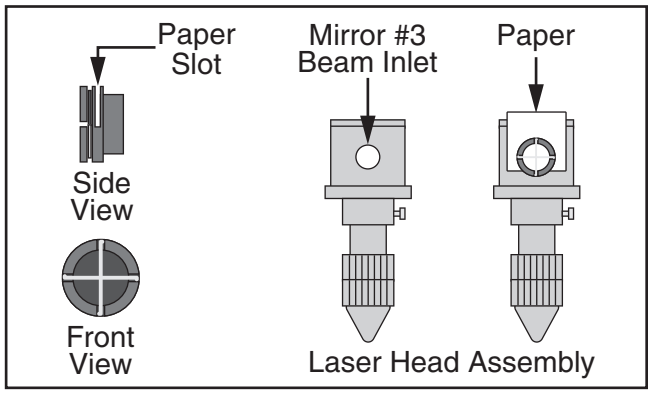


Figure 121. Laser beam alignment gauge installed in beam inlet.

3. Close top loading door and check alignment by pressing Pulse button on control panel. Compare results with **Figure** below.

IMPORTANT: Pulse function will only operate with top loading door closed.

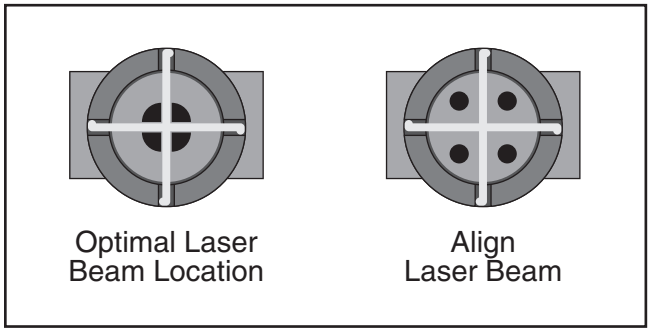


Figure 122. Laser beam alignment marks.

— If laser beam *is* in center of crosshairs, alignment is optimal. Proceed to **Step 7**.

— If laser beam *is not* in center of crosshairs, adjustment is required. Proceed to **Step 4**.

4. Loosen lock nuts on (3) brass thumbscrews located behind Mirror #1 assembly (see **Figure 123**).

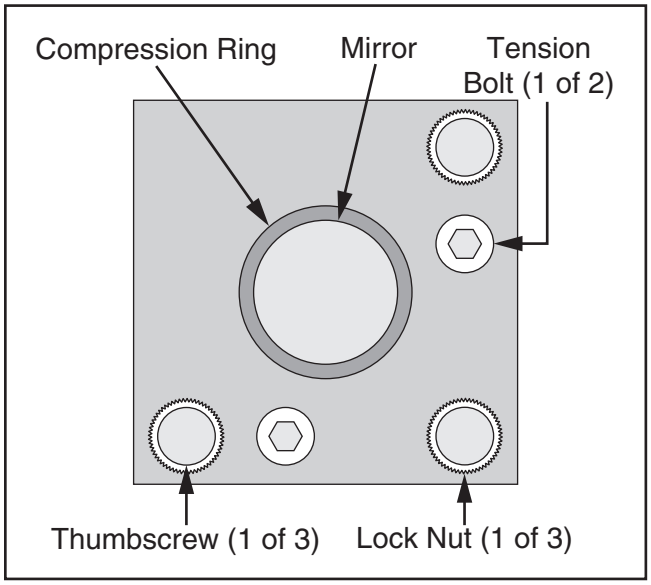


Figure 123. Typical mirror assembly.

5. Adjust direction of beam path by tightening thumbscrews depending on desired direction of beam travel (see **Figure 124**).

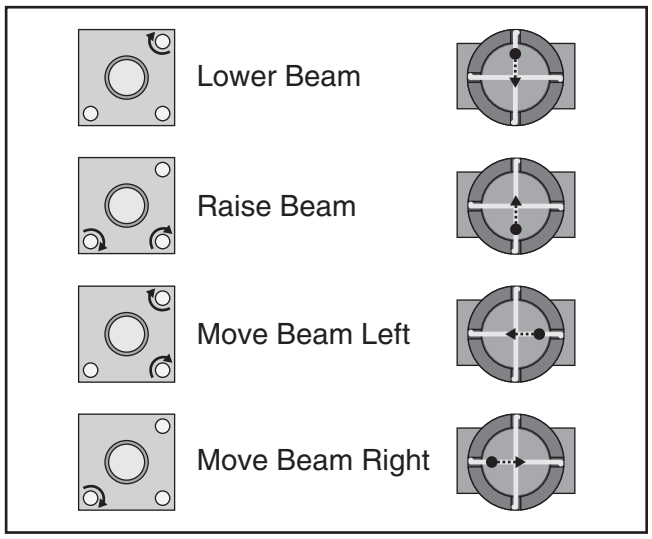


Figure 124. Mirror thumbscrew adjustment.

6. Verify mirror adjustment by pressing Pulse button on control panel. Compare results with those shown in **Figure 122** on **Page 76**.

   — If laser beam *is* in center of crosshairs, alignment is optimal. Proceed to **Step 7**.

   — If laser beam *is not* in center of crosshairs, adjustment is required. Repeat **Step 5**.

7. Move laser head assembly to lower right corner of table (see **Figure 125**).

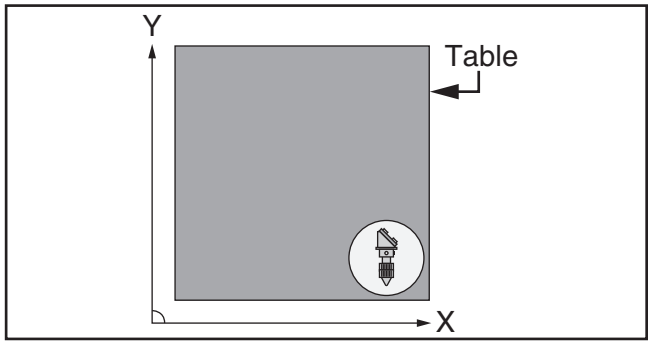


Figure 125. Laser head assembly in lower right corner of table.

8. Check alignment by pressing Pulse button on control panel. Compare results with those shown in **Figure 122** on **Page 76**.

   — If laser beam *is* in center of crosshairs, alignment is optimal. Proceed to **Step 14**.

   — If laser beam *is not* in center of crosshairs, adjustment is required. Proceed to **Step 9**.

9. Place mirror alignment gauge in front of secondary Mirror #2 and hold in place with masking tape (see **Figure 126**).

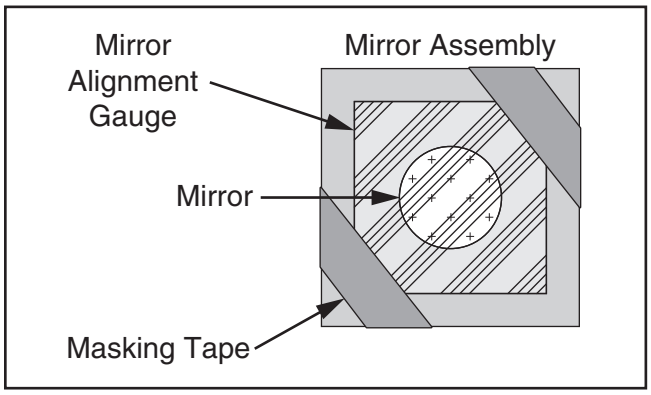


Figure 126. Mirror alignment gauge installed.

10. Verify Mirror #1 and Mirror #2 alignment by pressing Pulse button on control panel.

   — If laser beam *is* in center of mirror, alignment is optimal. Remove mirror alignment gauge from Mirror #2, then proceed to **Step 14**.

   — If laser beam *is not* in center of mirror, adjustment is required. Proceed to **Step 11**.

11. Loosen lock nuts on (3) brass thumbscrews located behind Mirror #1 assembly (see **Figure 127**).

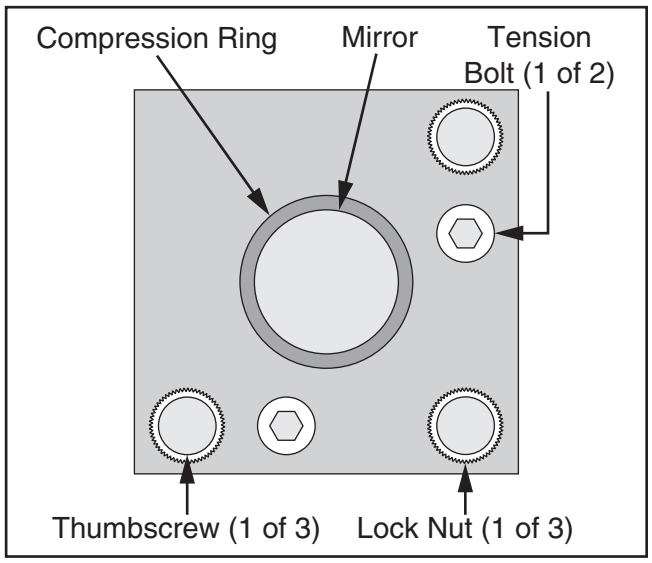


Figure 127. Typical mirror assembly.

12. Adjust direction of beam path by tightening thumbscrews depending on desired direction of beam travel (see **Figure 128**).

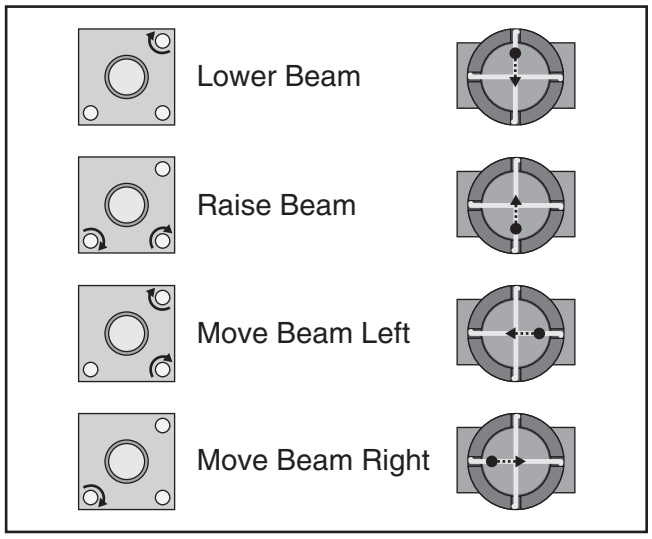


Figure 128. Mirror thumbscrew adjustment.

13. Repeat **Step 10.**

14. Move laser head assembly to lower left corner of table (see **Figure 129**).

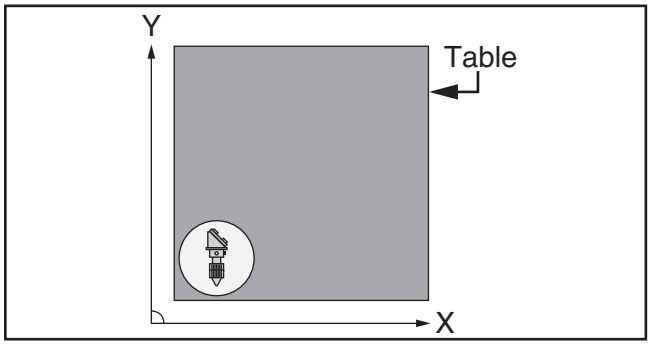


Figure 129. Laser head assembly in lower left corner of table.

15. Verify Mirror #2 and Mirror #3 alignment by pressing Pulse button on control panel.

— If laser beam *is* in center of crosshairs, alignment is optimal. Proceed to **Step 19**.

— If laser beam *is not* in center of crosshairs, adjustment is required. Proceed to **Step 16**.

16. Loosen lock nuts on (3) brass thumbscrews located behind Mirror #2 assembly (see **Figure 127**).

17. Adjust direction of beam path by tightening thumbscrews depending on desired direction of beam travel (see **Figure 128**).

18. Repeat **Step 15.**

19. Remove laser beam alignment gauge, open top loading door, then place a clean sheet of paper or manila folder under laser head assembly.

20. Set focal length as instructed in **Setting Focal Length** on **Page 37**.

21. Close top loading door and verify secondary Mirror #3 and focal point alignment by pressing Pulse button on control panel. Compare results with **Figure 130**.

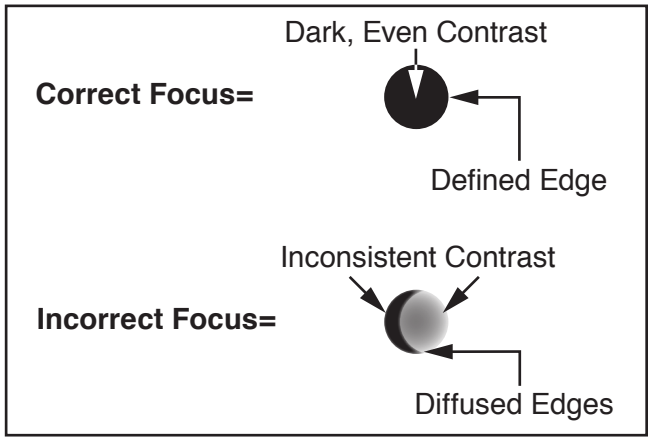


Figure 130. Focal point alignment examples.

— If laser beam focal point is dark and even, alignment is optimal. Proceed to **Step 25**.

— If laser beam focal point is inconsistent and diffused, adjustment is required. Proceed to **Step 22**.

22. Loosen lock nuts on (3) brass thumbscrews located behind Mirror #3 assembly (see **Figure 131**).

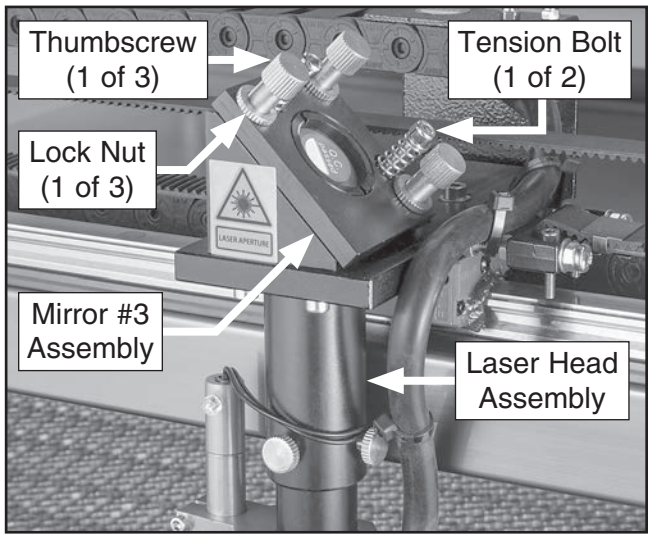


Figure 131. Mirror #3 assembly components.

23. Adjust direction of beam path by tightening thumbscrews depending on desired direction of beam travel (see **Figure 132**).

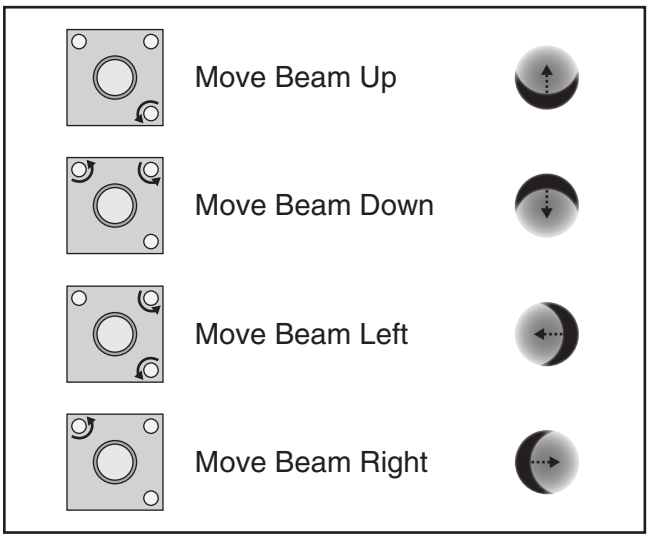


Figure 132. Mirror thumbscrew adjustment.

24. Repeat **Step 21.**

25. Tighten all lock nuts on mirror assembly thumbscrews if loosened for adjustment. DO NOT tighten thumbscrews!

26. Re-install (4) cap screws and (1) left laser tube cover removed in **Step 1**, then proceed to **Step 37** on **Page 75**.

Aligning Reference Laser

⚠WARNING

AVOID DIRECT OR REFLECTED EXPOSURE!

Operator and bystanders MUST wear ANSI-approved eye protection rated for 650 nm CLASS 3B lasers when servicing reference laser. NEVER look directly into laser beam or stare at laser contact point, or eye injury may occur!

The reference laser is a low-power, 650 nm Class 3B red laser used as a visual indicator of the laser beam focal point. The beam is reflected off an anti-reflective lens, directed through the cabinet by three mirrors, then passes through the focus lens to the focal point (see **Figure 133**).

IMPORTANT: The reference laser should only be used as a guide and is not a suitable substitute for verified laser beam path alignment.

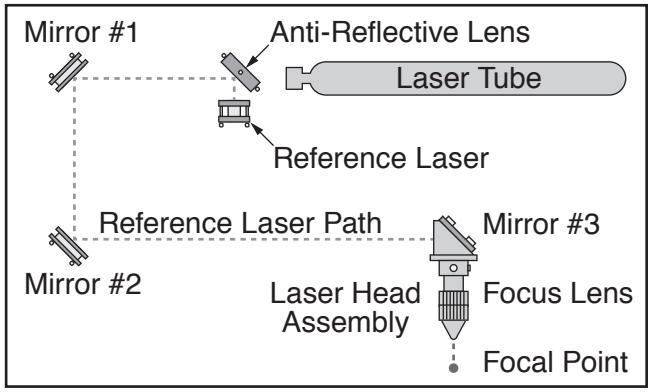


Figure 133. Reference laser path through cabinet (primary laser orientation shown).

Items Needed	**Qty**
Additional Person	1
Class 3B Laser Eye Protection (per person)	1

To align reference laser:

1. Perform **Steps 1–35** of **Aligning Laser Beam Path** beginning on **Page 71**.

2. **G0913/G0914 Only:** Perform **Steps 1–25** of **Aligning Secondary Laser Beam Path** beginning on **Page 75**.

3. Locate reference laser (see **Figure 134**).

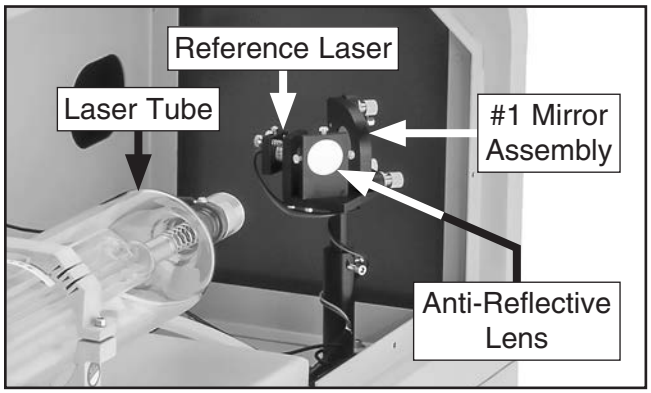


Figure 134. Reference laser components.

4. Locate (3) thumbscrews behind reference laser used to adjust beam path through cabinet (see **Figure 135**).

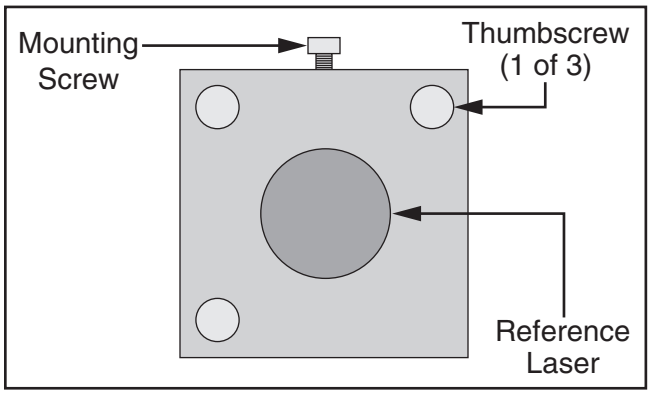


Figure 135. Reference laser adjustment.

5. With help from an additional person, rotate thumbscrews behind reference laser until laser beam focal point matches "Correct Focus" example in **Figure 130** on **Page 79**.

   — If reference laser focal point *is* dark and even, alignment is complete.

   — If reference laser focal point *is not* dark and even, repeat **Step 5**.

6. **G0913/G0914 Only:** Align second reference laser on opposite #1 mirror assembly.

Removing/Replacing Laser Optics

Before removing and replacing optical components on the Model G0911–G0914, thoroughly wash and dry hands before putting on sterile disposable gloves. This will help ensure laser optics remain clean during removal and replacing.

Follow all guidelines described in **Laser Optics Best Practices** on **Page 52** for handling sensitive optical components.

Items Needed	Qty
Optics Disassembly Tool	1
Hex Wrench 2mm	1
Duct Tape	As Needed
Sterile Disposable Gloves	As Needed
Lens Cleaning Paper	As Needed

Removing/Replacing Mirrors

1. DISCONNECT MACHINE FROM POWER!

2. Remove any covers and open any doors to gain access to mirror assembly.

   IMPORTANT: To avoid re-aligning laser beam, DO NOT remove mirror assembly from its location.

3. Locate compression ring on rear of mirror and remove with optics disassembly tool (see **Figure 136**).

   Tip: *If optics disassembly tool is too large to fit behind mirror assembly, 2mm hex wrench can be used as substitute.*

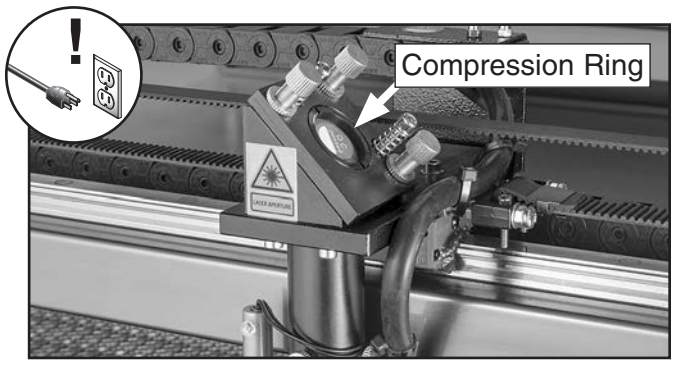


Figure 136. Typical compression ring location.

4. Remove mirror by applying duct tape to non-reflective rear surface and lifting.

5. Install replacement mirror in mirror assembly and re-install compression ring.

6. Close covers and doors opened in **Step 2**.

Removing/Replacing Focus Lens

1. DISCONNECT MACHINE FROM POWER!

2. Open top loading door and move laser head assembly to easily accessible area.

3. Disconnect air supply hose, loosen air nozzle, and set aside (see **Figure 137**).

4. Loosen thumbscrews and remove focus canister and focus sensor (see **Figure 137**).

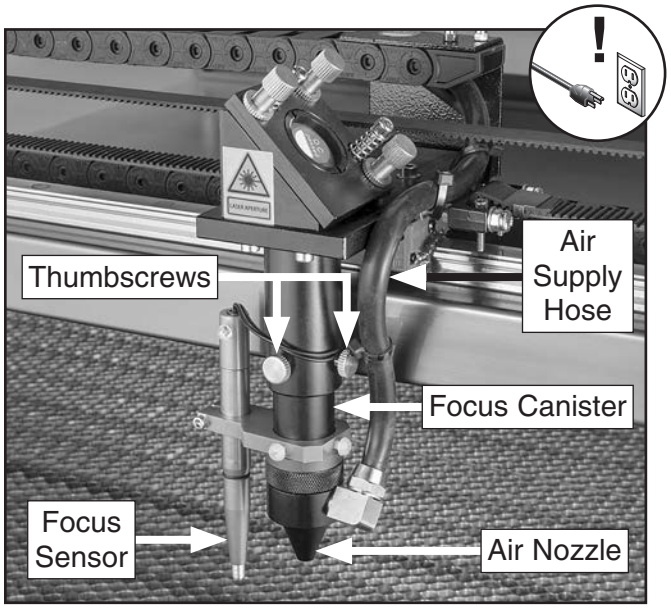


Figure 137. Laser head assembly components.

5. Locate compression ring securing focus lens and remove with optics disassembly tool.

6. Carefully separate focus lens from cushion, and set cushion on sheet of cleaning paper.

7. Install replacement focus lens with convex side facing you, then install lens cushion and compression ring.

8. Install focus canister, focus sensor, and air nozzle, then connect air supply hose.

9. Close top loading door.

Setting Stepper Driver DIP Switches

The DIP (Dual In-line Package) switches on the stepper drivers control the step size, current, and speed of the stepper motors. If the DIP switches are not configured properly, erroneous signals will cause the stepper motors to function incorrectly.

To set stepper driver DIP switches:

1. DISCONNECT MACHINE FROM POWER!

2. Open electrical cabinet and locate (3) stepper driver DIP switches (see **Figure 138**).

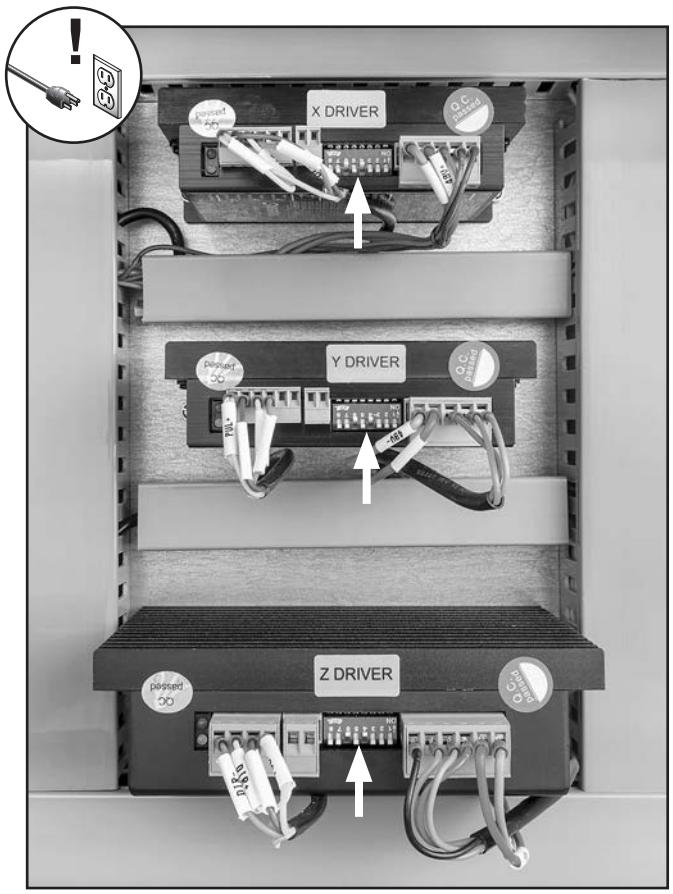


Figure 138. Stepper driver DIP switch locations.

3. Compare X-axis stepper driver DIP switch configuration to diagram in **Figure 139**.

   — If DIP switch *does* match diagram, DIP switch is set correctly.

   — If DIP switch *does not* match diagram, flip rocker switches to match diagram.

4. Compare Y-axis stepper driver DIP switch configuration to diagram in **Figure 139**.

   — If DIP switch *does* match diagram, DIP switch is set correctly.

   — If DIP switch *does not* match diagram, flip rocker switches to match diagram.

5. Compare Z-axis stepper driver DIP switch configuration to diagram in **Figure 139**.

   — If DIP switch *does* match diagram, DIP switch is set correctly.

   — If DIP switch *does not* match diagram, flip rocker switches to match diagram.

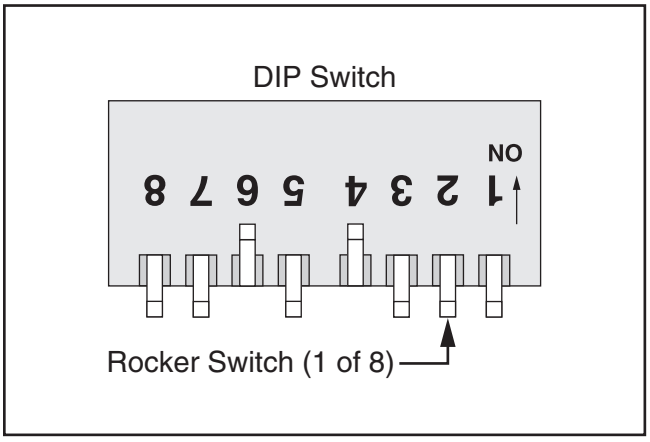


Figure 139. Stepper driver DIP switch configuration.

6. Close electrical cabinet and proceed to **Test Run** on **Page 27** to verify correct machine operation.

SECTION 8: WIRING

These pages are current at the time of printing. However, in the spirit of improvement, we may make changes to the electrical systems of future machines. Compare the manufacture date of your machine to the one stated in this manual, and study this section carefully.

If there are differences between your machine and what is shown in this section, call Technical Support at (570) 546-9663 for assistance BEFORE making any changes to the wiring on your machine. An updated wiring diagram may be available. **Note:** *Please gather the serial number and manufacture date of your machine before calling. This information can be found on the main machine label.*

⚠WARNING
Wiring Safety Instructions

SHOCK HAZARD. Working on wiring that is connected to a power source is extremely dangerous. Touching electrified parts will result in personal injury including but not limited to severe burns, electrocution, or death. Disconnect the power from the machine before servicing electrical components!

MODIFICATIONS. Modifying the wiring beyond what is shown in the diagram may lead to unpredictable results, including serious injury or fire. This includes the installation of unapproved aftermarket parts.

WIRE CONNECTIONS. All connections must be tight to prevent wires from loosening during machine operation. Double-check all wires disconnected or connected during any wiring task to ensure tight connections.

CIRCUIT REQUIREMENTS. You MUST follow the requirements at the beginning of this manual when connecting your machine to a power source.

WIRE/COMPONENT DAMAGE. Damaged wires or components increase the risk of serious personal injury, fire, or machine damage. If you notice that any wires or components are damaged while performing a wiring task, replace those wires or components.

MOTOR WIRING. The motor wiring shown in these diagrams is current at the time of printing but may not match your machine. If you find this to be the case, use the wiring diagram inside the motor junction box.

CAPACITORS/INVERTERS. Some capacitors and power inverters store an electrical charge for up to 10 minutes after being disconnected from the power source. To reduce the risk of being shocked, wait at least this long before working on capacitors.

EXPERIENCING DIFFICULTIES. If you are experiencing difficulties understanding the information included in this section, contact our Technical Support at (570) 546-9663.

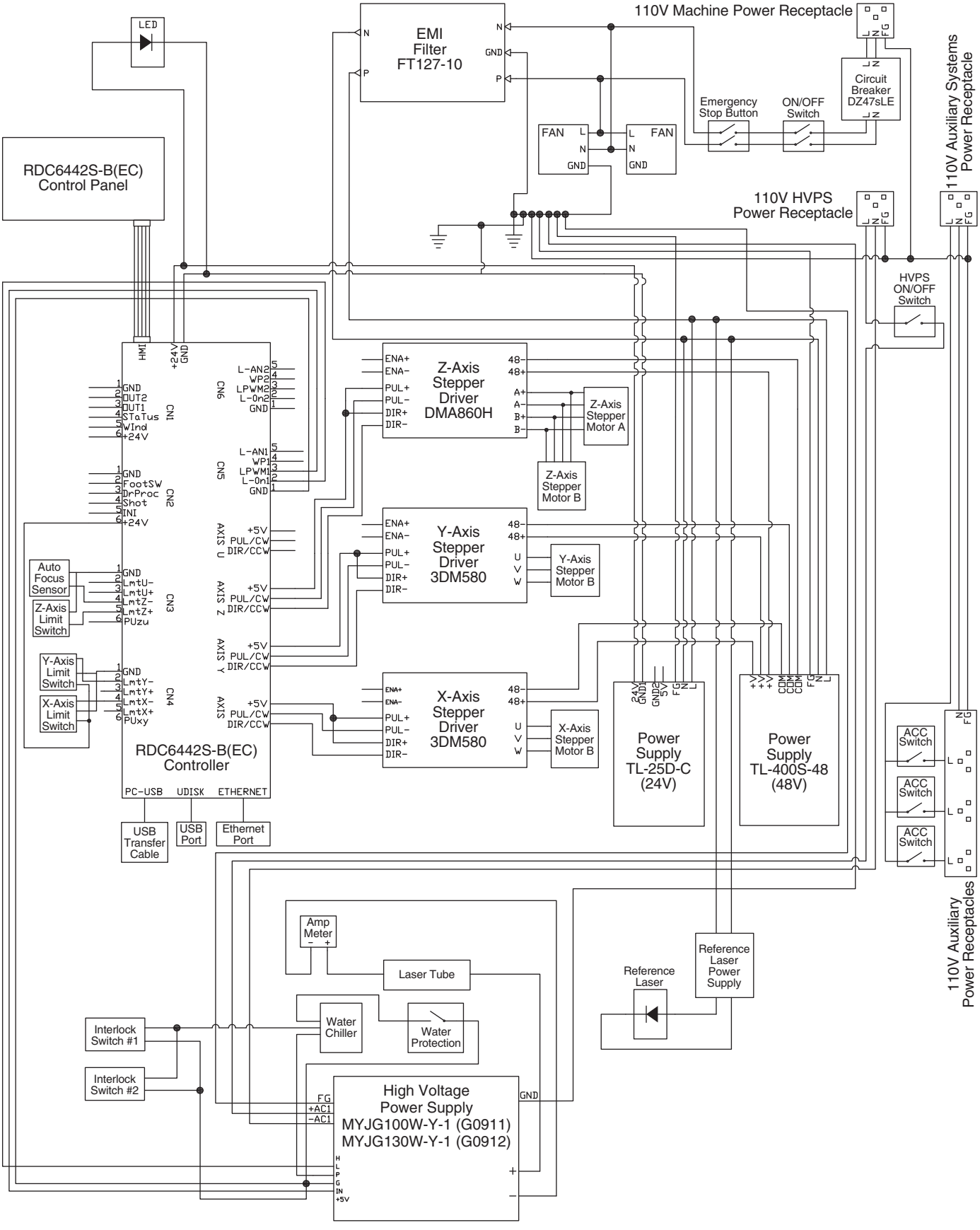
NOTICE

The photos and diagrams included in this section are best viewed in color. You can view these pages in color at www.grizzly.com.

COLOR KEY

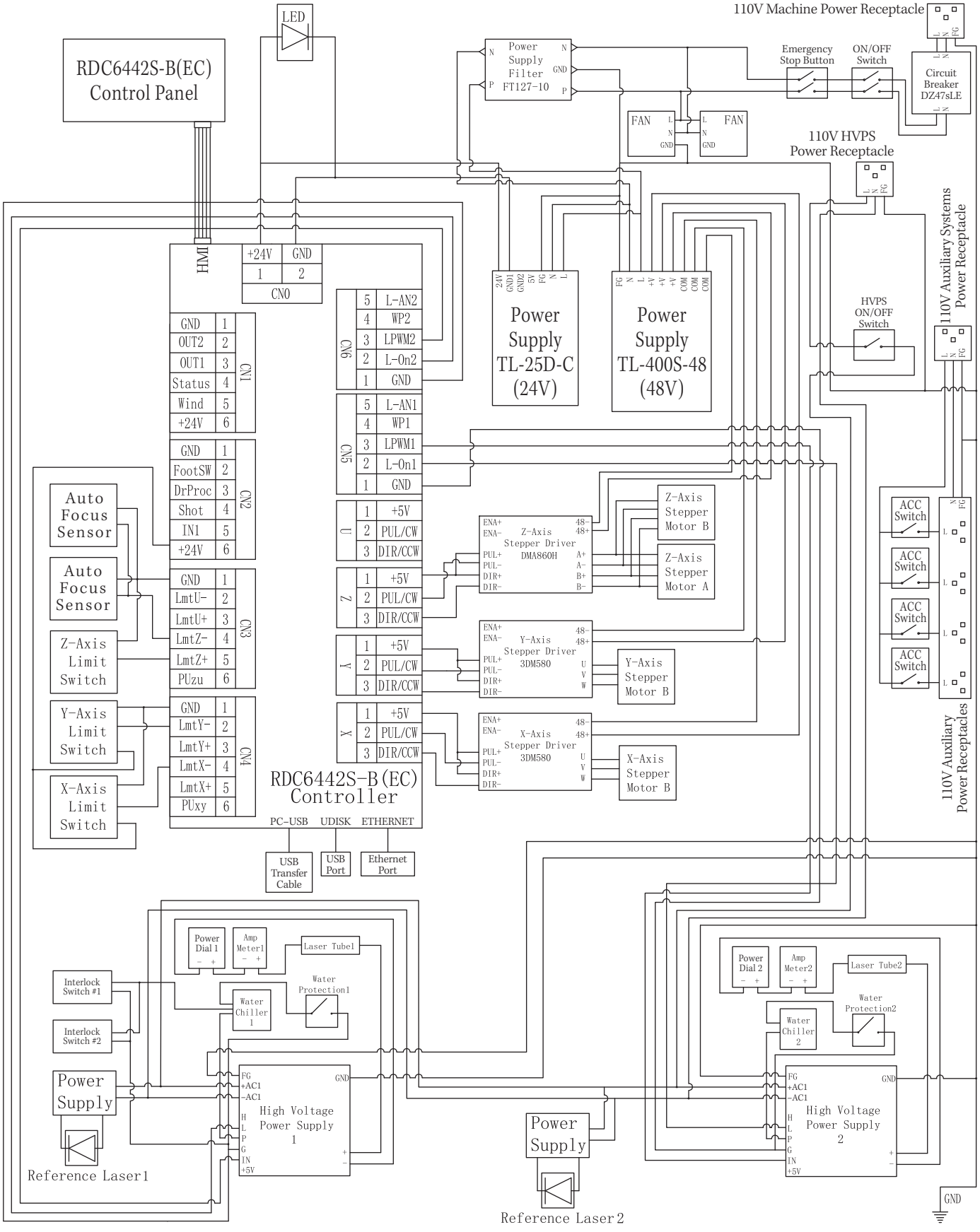
BLACK	Bk	BLUE	Bl	YELLOW	Yl	LIGHT BLUE	Lb
WHITE	Wt	BROWN	Br	YELLOW GREEN	Yg	BLUE WHITE	Bw
GREEN	Gn	GRAY	Gy	PURPLE	Pu	TURQUOISE	Tu
RED	Rd	ORANGE	Or	PINK	Pk		

G0911 & G0912 Wiring Diagram



STOP *READ ELECTRICAL SAFETY ON PAGE 83!*

G0913 & G0914 Wiring Diagram



STOP READ ELECTRICAL SAFETY ON PAGE 83!

Figure 140. Electrical cabinet overview (G0911/G0912 shown).

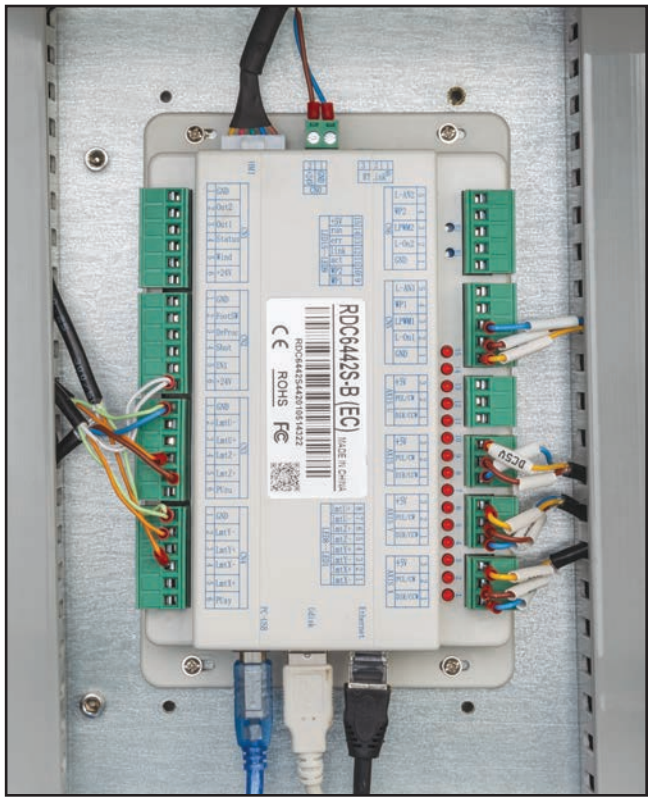


Figure 141. Ruida RDC6442S-B Controller.

Figure 142. Control panel and power controls (G0911/G0912 shown).

STOP *READ ELECTRICAL SAFETY ON PAGE 83!*

Electrical Components (Cont.)

Figure 143. Stepper drivers.

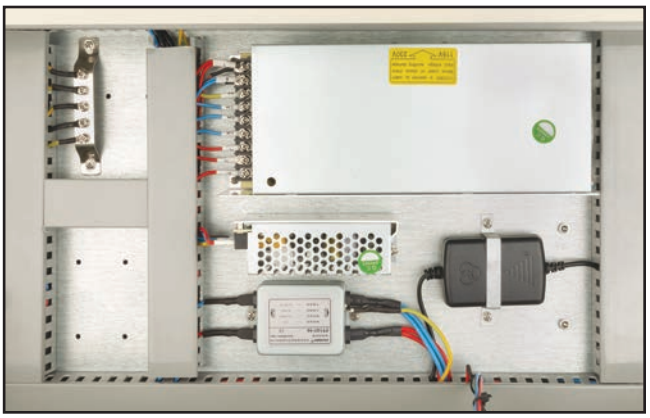


Figure 144. Transformers and EMI filter.

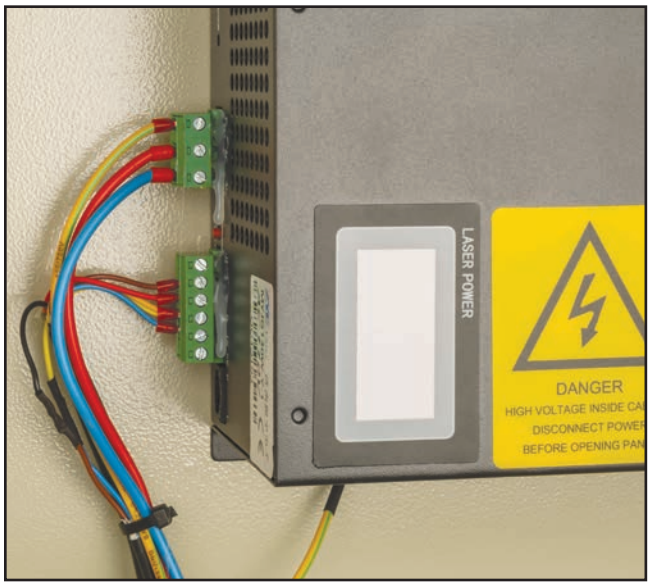


Figure 145. High voltage power supply.

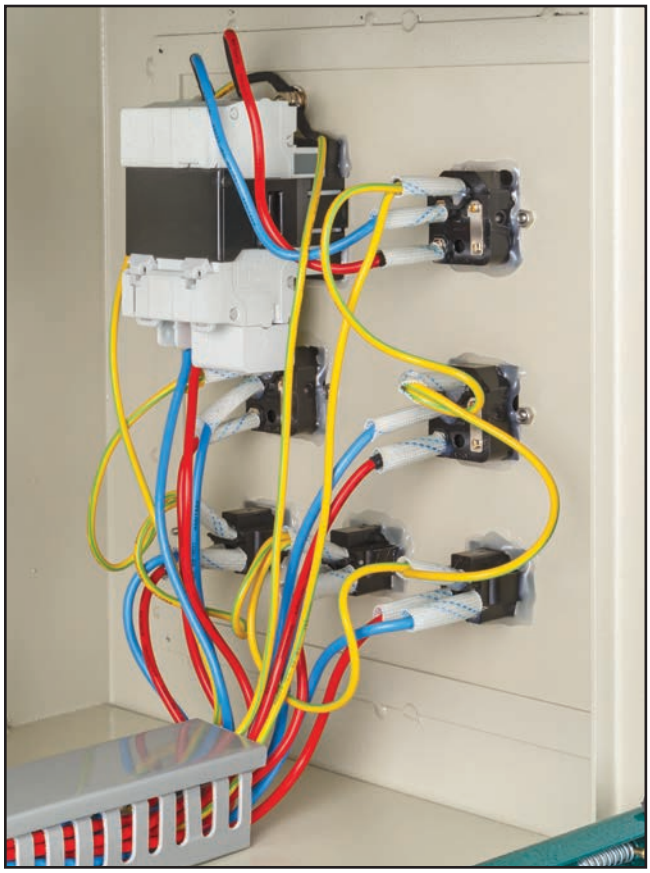
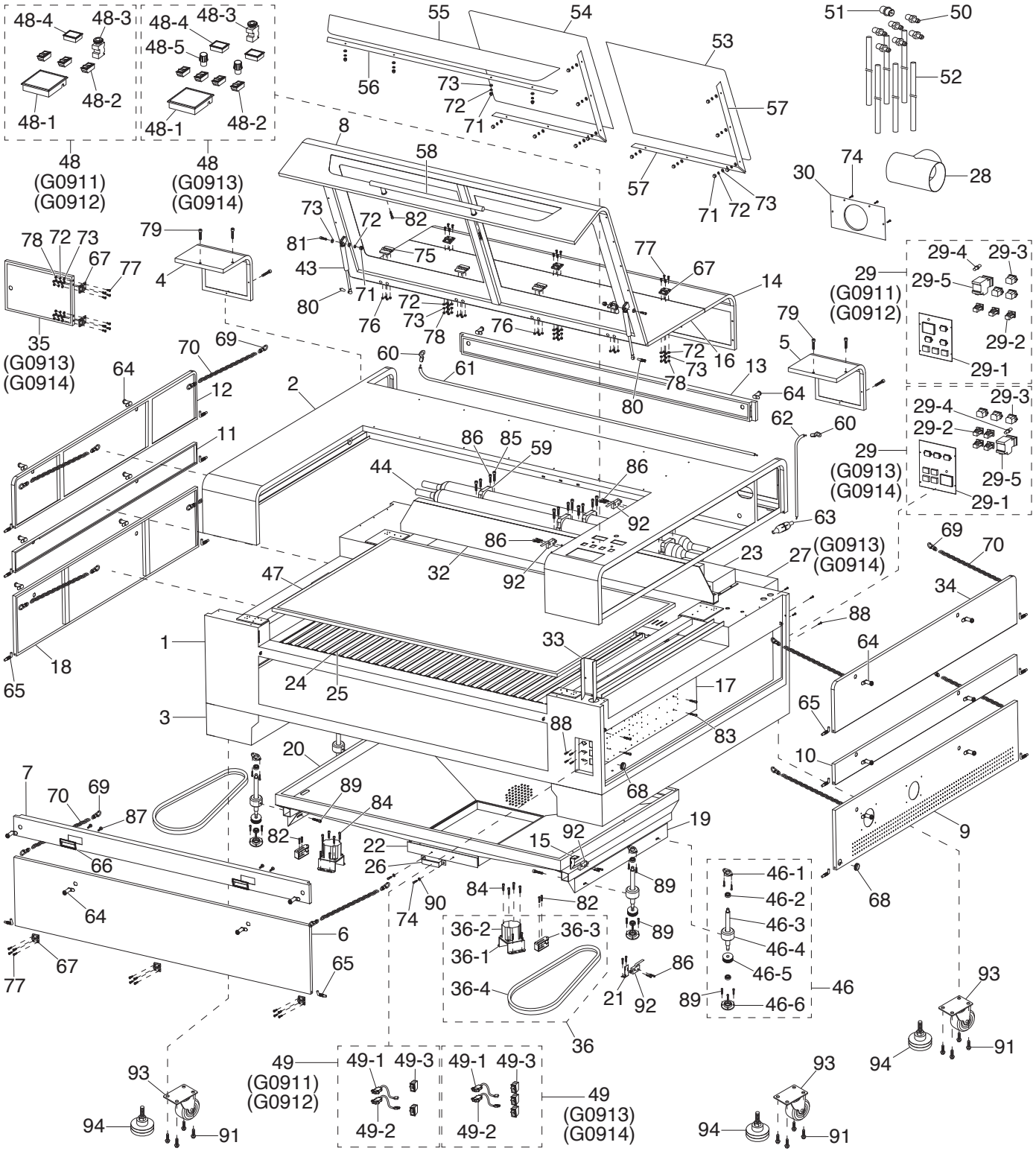


Figure 146. Power connections (G0911/G0912 shown).

SECTION 9: PARTS

We do our best to stock replacement parts when possible, but we cannot guarantee that all parts shown are available for purchase. Call **(800) 523-4777** or visit **www.grizzly.com/parts** to check for availability.

Main

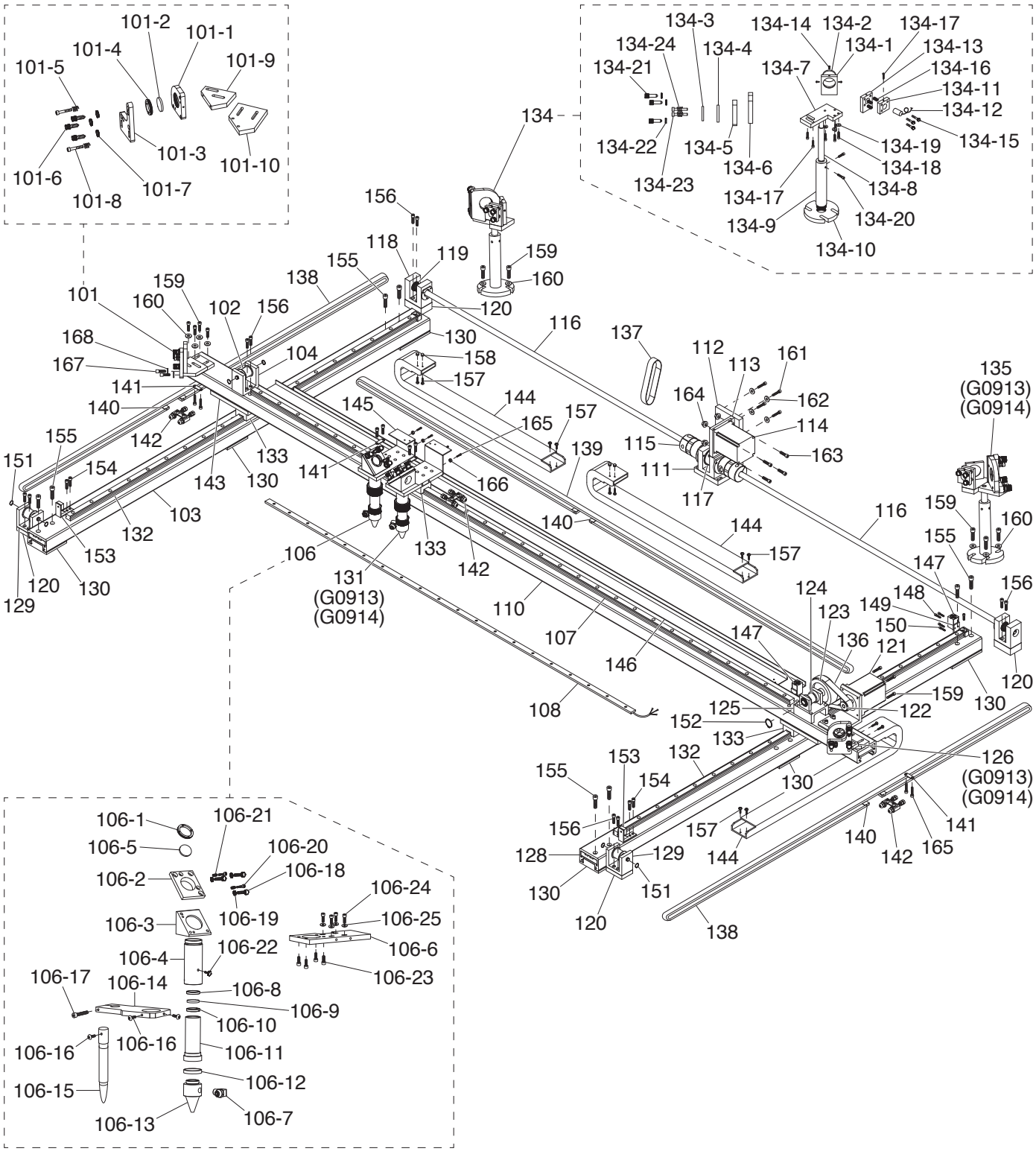


Main Parts List

REF	PART #	DESCRIPTION
1	P0911001	BODY FRAME (G0911/G0912)
1	P0913001	BODY FRAME (G0913/G0914)
2	P0911002	UPPER FRAME (G0911/G0912)
2	P0913002	UPPER FRAME (G0913/G0914)
3	P0911003	BASE FRAME
4	P0911004	LASER TUBE COVER (LEFT)
5	P0911005	LASER TUBE COVER (RIGHT)
6	P0911006	FRONT ACCESS DOOR
7	P0911007	FRONT LOADING DOOR
8	P0911008	TOP LOADING DOOR
9	P0911009	ELECTRICAL COMPARTMENT DOOR
10	P0911010	SIDE LOADING DOOR (RIGHT)
11	P0911011	SIDE LOADING DOOR (LEFT)
12	P0911012	UPPER ACCESS DOOR (LEFT)
13	P0911013	REAR LOADING DOOR
14	P0911014	LASER TUBE ACCESS DOOR
15	P0911015	UPPER LIMIT SWITCH MOUNTING BRACKET
16	P0911016	TOP LOADING DOOR TRIM
17	P0911017	ELECTRICAL MOUNTING BOARD
18	P0911018	LOWER ACCESS DOOR (LEFT)
19	P0911019	TABLE SUPPORT BRACKET
20	P0911020	TABLE SUPPORT
21	P0911021	LOWER LIMIT SWITCH MOUNTING BRACKET
22	P0911022	TABLE COLLECTION TRAY
23	P0911023	LASER TUBE PLATFORM
24	P0911024	TABLE BLADE CRADLE
25	P0911025	TABLE BLADE
26	P0911026	TRAY PULL HANDLE
27	P0913027	POWER COMPARTMENT (G0913/G0914)
28	P0911028	EXHAUST PORT ADAPTER 6"
29	P0911029	POWER CONNECTION ASSEMBLY (G0911/G0912)
29	P0913029	POWER CONNECTION ASSEMBLY (G0913/G0914)
29-1	P0911029-1	POWER CONNECTION PANEL (G0911/G0912)
29-1	P0913029-1	POWER CONNECTION PANEL (G0913/G0914)
29-2	P0911029-2	POWER RECEPTACLE NEMA 5-15 125V 15A
29-3	P0911029-3	POWER RECEPTACLE IEC C14 250V 10A
29-4	P0911029-4	EARTH GROUND POST
29-5	P0911029-5	CIRCUIT BREAKER DELIXI DZ47SLE 230V
30	P0911030	EXHAUST PORT PANEL 6"
32	P0911032	CABINET DIVIDER
33	P0911033	CABLE GUARD
34	P0911034	UPPER ACCESS DOOR (RIGHT)
35	P0913035	POWER COMPARTMENT DOOR (G0913/G0914)
36	P0911036	Z-AXIS TABLE LIFT ASSEMBLY
36-1	P0911036-1	STEPPER MOTOR MOUNTING BRACKET
36-2	P0911036-2	STEPPER MOTOR CWM 86BHH76-320A-27A
36-3	P0911036-3	Z-AXIS BELT TENSIONER
36-4	P0911036-4	Z-AXIS SYNCHRONOUS BELT 1800-3M
43	P0911043	GAS STRUT 800N
44	P0911044	LASER TUBE 100W (G0911/G0913)
44	P0912044	LASER TUBE 130W (G0912/G0914)
46	P0911046	LEADSCREW ASSEMBLY
46-1	P0911046-1	LEADSCREW MOUNT (UPPER)
46-2	P0911046-2	BALL BEARING 6200-2RS
46-3	P0911046-3	LEADSCREW
46-4	P0911046-4	LEADSCREW NUT
46-5	P0911046-5	LEADSCREW PULLEY
46-6	P0911046-6	LEADSCREW MOUNT (LOWER)

REF	PART #	DESCRIPTION
47	P0911047	HONEYCOMB TABLE 39" X 63"
48	P0911048	UPPER CONTROLS ASSEMBLY (G0911/G0912)
48	P0913048	UPPER CONTROLS ASSEMBLY (G0913/G0914)
48-1	P0911048-1	CONTROL PANEL RUIDA RDC6442S-B
48-2	P0911048-2	ROCKER SWITCH CQC KDC4 30A 250V
48-3	P0911048-3	E-STOP BUTTON YIJIA YJ139-LA38 22MM
48-4	P0911048-4	AMP METER UXCELL 85C17 50MA
48-5	P0913048-5	ROTARY DIAL SWITCH (G0913/G0914)
49	P0911049	LOWER CONTROLS ASSEMBLY (G0911/G0912)
49	P0913049	LOWER CONTROLS ASSEMBLY (G0913/G0914)
49-1	P0911049-1	PANEL-MOUNT ETHERNET CORD RJ45 36"
49-2	P0911049-2	PANEL-MOUNT USB 2.0 CORD 36"
49-3	P0911049-3	ROCKER SWITCH CQC KDC4 30A 250V
50	P0911050	TUBE FITTING 10MM STRAIGHT BR
51	P0911051	CHILLER SIGNAL RECEPTACLE
52	P0911052	SILICONE TUBING 8ID X 11OD X 1800L
53	P0911053	RIGHT ACRYLIC SAFETY WINDOW
54	P0911054	LEFT ACRYLIC SAFETY WINDOW
55	P0911055	FRONT ACRYLIC SAFETY WINDOW
56	P0911056	FRONT WINDOW BRACKET
57	P0911057	TOP WINDOW BRACKET
58	P0911058	LOADING DOOR HANDLE
59	P0911059	LASER TUBE SADDLE
60	P0911060	HIGH VOLTAGE TERMINAL LUG
61	P0911061	CATHODE CABLE 16G 1W 120"
62	P0911062	HIGH VOLTAGE CABLE 7W, 4.2 X 3050MM
63	P0911063	HIGH VOLTAGE CONNECTOR 22.6MM
64	P0911064	KEYED ALIKE CAM LOCK
65	P0911065	L-HANDLE SPRING PLUNGER
66	P0911066	RECESSED PULL HANDLE
67	P0911067	ACCESS DOOR HINGE
68	P0911068	RUBBER GROMMET 24MM
69	P0911069	DOOR SUPPORT CARIBINER
70	P0911070	STEEL CHAIN 1/8" X 1/4" X 12"
71	P0911071	ACORN NUT M5-.8
72	P0911072	LOCK WASHER 5MM
73	P0911073	FLAT WASHER 5MM
74	P0911074	BUTTON HD CAP SCR M4-.7 X 8
75	P0911075	LOADING DOOR HINGE
76	P0911076	HEX NUT M6-1
77	P0911077	FLAT HD SCR M5-.8 X 14
78	P0911078	HEX NUT M5-.8
79	P0911079	CAP SCREW M4-.7 X 12
80	P0911080	STRUT STUD M5-.8
81	P0911081	CAP SCREW M5-.8 X 16
82	P0911082	CAP SCREW M5-.8 X 14
83	P0911083	CAP SCREW M6-1 X 20
84	P0911084	CAP SCREW M6-1 X 10
85	P0911085	CAP SCREW M5-.8 X 25
86	P0911086	CAP SCREW M4-.7 X 14
87	P0911087	FLANGE SCREW M4-.7 X 14
88	P0911088	CAP SCREW M3-.5 X 10
89	P0911089	CAP SCREW M5-.8 X 10
90	P0911090	FLAT WASHER 4MM
91	P0911091	FLANGE BOLT M6-1 X 14
92	P0911092	LIMIT SWITCH HIGHLY VS10N021C2
93	P0911093	CASTER 4", SWIVEL
94	P0911094	FOOT PAD M24-2.5

Gantry

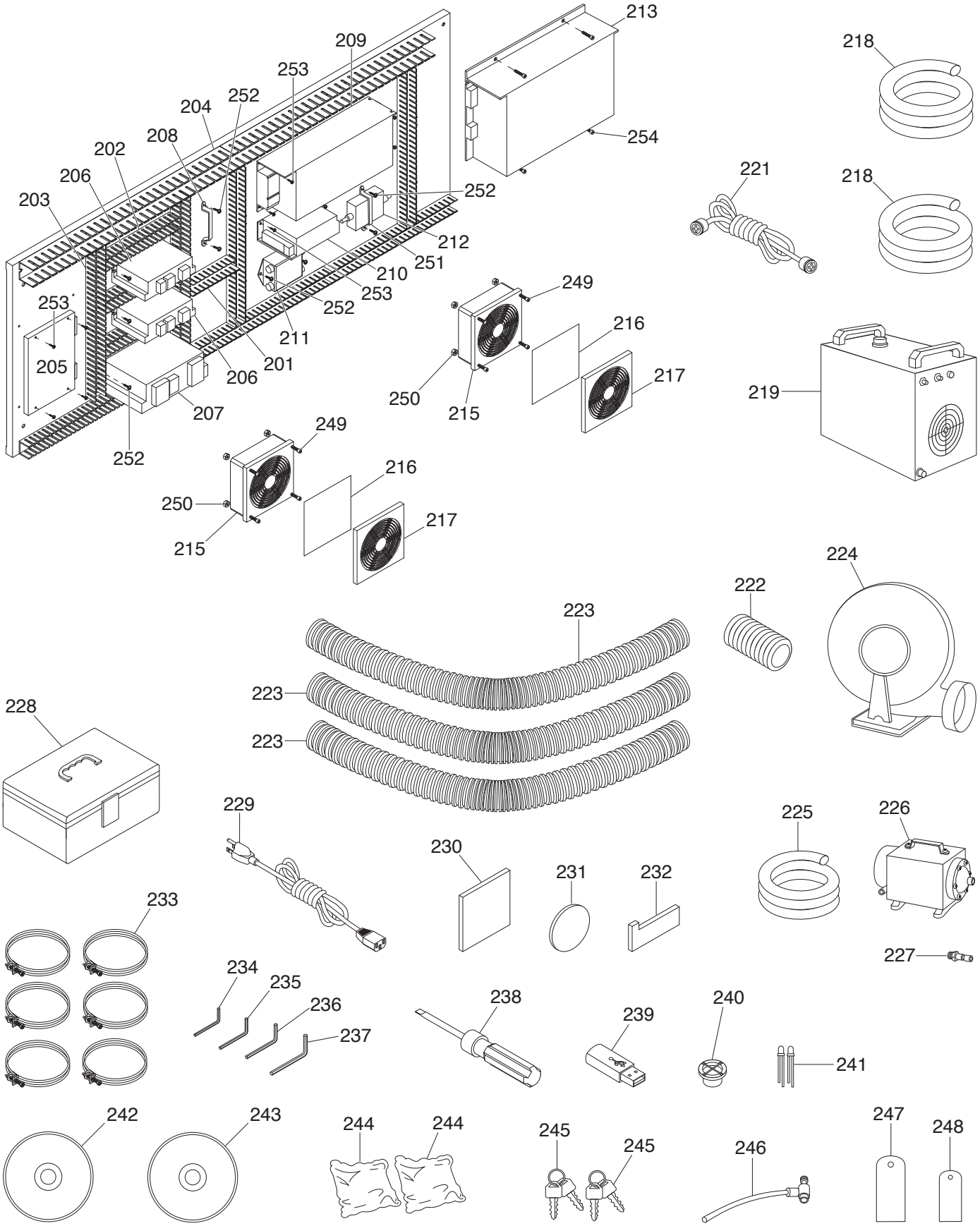


Gantry Parts List

REF	PART #	DESCRIPTION
101	P0911101	MIRROR ASSEMBLY #2
101-1	P0911101-1	MIRROR HOUSING
101-2	P0911101-2	PLANO MIRROR 25MM
101-3	P0911101-3	VERTICAL ADJUSTMENT PLATE
101-4	P0911101-4	COMPRESSION RING 25MM
101-5	P0911101-5	COMPRESSION SPRING 1 X 7.5 X 24
101-6	P0911101-6	KNURLED THUMB SCREW M7-1 X 14, D10
101-7	P0911101-7	KNURLED PANEL NUT M7-1
101-8	P0911101-8	CAP SCREW M4-.7 X 25
101-9	P0911101-9	UPPER ADJUSTMENT PLATE
101-10	P0911101-10	LOWER ADJUSTMENT PLATE
102	P0911102	TENSIONER PULLEY
103	P0911103	Y-AXIS SUPPORT BEAM (LEFT)
104	P0911104	TENSIONER PULLEY MOUNTING BRACKET
106	P0911106	LASER HEAD ASSEMBLY
106-1	P0911106-1	COMPRESSION RING 25MM
106-2	P0911106-2	45 DEG ADJUSTMENT PLATE
106-3	P0911106-3	45 DEG MIRROR HOUSING
106-4	P0911106-4	FIXED FOCUS BARREL
106-5	P0911106-5	PLANO MIRROR 25MM
106-6	P0911106-6	LASER HEAD MOUNTING PLATE
106-7	P0911106-7	90 DEG AIR ELBOW ADAPTER 1/8 NPT
106-8	P0911106-8	SILICONE WASHER 22MM
106-9	P0911106-9	FOCAL LENS 63.5 (ENGRAVING)
106-10	P0911106-10	COMPRESSION RING 22MM
106-11	P0911106-11	TELESCOPING FOCUS BARREL
106-12	P0911106-12	BARREL RING
106-13	P0911106-13	AIR NOZZLE
106-14	P0911106-14	AUTO-FOCUS BRACKET
106-15	P0911106-15	AUTO-FOCUS SENSOR
106-16	P0911106-16	BUTTON HD CAP SCR M3-.5 X 6, NYLON
106-17	P0911106-17	CAP SCREW M3-.5 X 14
106-18	P0911106-18	KNURLED THUMB SCREW M7-1 X 14, D10
106-19	P0911106-19	KNURLED PANEL NUT M7-1
106-20	P0911106-20	CAP SCREW M4-.7 X 25
106-21	P0911106-21	COMPRESSION SPRING 1 X 7.5 X 24
106-22	P0911106-22	KNURLED THUMB SCREW M4-.7 X 6, D10
106-23	P0911106-23	CAP SCREW M4-.7 X 12
106-24	P0911106-24	CAP SCREW M4-.7 X 10
106-25	P0911106-25	FLAT WASHER 4MM
107	P0911107	LINEAR GUIDEWAY EGU15CAOBZU607
108	P0911108	LED WORKLIGHT STRIP
110	P0911110	X-AXIS SUPPORT BEAM
111	P0911111	PULLEY U-MOUNT BRACKET
112	P0911112	GEARBOX MOUNTING PLATE
113	P0911113	MOTOR MOUNTING PLATE
114	P0911114	STEPPER MOTOR LS 573S15-L NEMA23
115	P0911115	FLEXIBLE SHAFT COUPLING 12MM
116	P0911116	FLEXIBLE SHAFT
117	P0911117	GEARBOX PULLEY
118	P0911118	PULLEY MOUNTING BRACKET
119	P0911119	IDLER PULLEY 24T
120	P0911120	MOUNTING PAD
121	P0911121	STEPPER MOTOR LS 573S15-L NEMA23
122	P0911122	DRIVE PULLEY 24T
123	P0911123	TIMING PULLEY 72T
124	P0911124	IDLER PULLEY 24T
125	P0911125	IDLER PULLEY MOUNT
126	P0913126	MIRROR ASSEMBLY #2 (G0913/G0914)
128	P0911128	Y-AXIS SUPPORT BEAM (RIGHT)
129	P0911129	PULLEY MOUNTING BRACKET
130	P0911130	SUPPORT BEAM MOUNTING BRACKET

REF	PART #	DESCRIPTION
131	P0913131	LASER HEAD ASSEMBLY (G0913/G0914)
132	P0911132	LINEAR GUIDEWAY EGU15CAOAFF20A
133	P0911133	LINEAR GUIDEWAY BLOCK
134	P0911134	MIRROR ASSEMBLY #1
134-1	P0911134-1	ANTI-REFLECTIVE LENS HOUSING
134-2	P0911134-2	ANTI-REFLECTIVE LENS
134-3	P0911134-3	COMPRESSION RING 25MM
134-4	P0911134-4	PLANO MIRROR 25MM
134-5	P0911134-5	MIRROR MOUNTING PLATE
134-6	P0911134-6	MIRROR ADJUSTMENT PLATE
134-7	P0911134-7	MIRROR SUPPORT PLATE
134-8	P0911134-8	ADJUSTMENT ROD
134-9	P0911134-9	BASE ROD
134-10	P0911134-10	MIRROR ASSEMBLY BASE
134-11	P0911134-11	REFERENCE LASER ADJUSTMENT PLATE
134-12	P0911134-12	REFERENCE LASER 650NM
134-13	P0911134-13	REFERENCE LASER MOUNTING PLATE
134-14	P0911134-14	BUTTON HD CAP SCR M3-.5 X 6, NYLON
134-15	P0911134-15	KNURLED THUMB SCREW M3-.5 X 18, D8
134-16	P0911134-16	COMPRESSION SPRING 1 X 5 X 12
134-17	P0911134-17	CAP SCREW M3-.5 X 8
134-18	P0911134-18	CAP SCREW M4-.7 X 14
134-19	P0911134-19	FLAT WASHER 4MM
134-20	P0911134-20	CAP SCREW M4-.7 X 10
134-21	P0911134-21	KNURLED THUMB SCREW M7-1 X 14, D10
134-22	P0911134-22	KNURLED PANEL NUT 7MM
134-23	P0911134-23	CAP SCREW M4-.7 X 25
134-24	P0911134-24	COMPRESSION SPRING 1 X 7.5 X 24
135	P0913135	MIRROR ASSEMBLY #1 (G0913/G0914)
136	P0911136	TIMING BELT 300-3M
137	P0911137	TIMING BELT 228-3M
138	P0911138	TIMING BELT 3M-15 15 X 2032MM
139	P0911139	TIMING BELT 3M-15 15 X 3250MM
140	P0911140	BELT CLASP
141	P0911141	BELT BRACKET
142	P0911142	BELT TENSIONER 15MM
143	P0911143	BELT END PLATE
144	P0911144	CABLE CARRIER
145	P0911145	CABLE CARRIER MOUNTING BRACKET
146	P0911146	CABLE CARRIER TRACK
147	P0911147	PROXIMITY SWITCH OMRON TL-Q5MCI-Z
148	P0911148	CAP SCREW M3-.5 X 18
149	P0911149	PROXIMITY SWITCH BRACKET
150	P0911150	CAP SCREW M3-.5 X 6
151	P0911151	EXT RETAINING RING 8MM
152	P0911152	EXT RETAINING RING 12MM
153	P0911153	BUMPER STOP
154	P0911154	CAP SCREW M4-.7 X 8
155	P0911155	CAP SCREW M6-1 X 48
156	P0911156	CAP SCREW M4-.7 X 18
157	P0911157	FLANGE SCREW M3-.5 X 6
158	P0911158	ACORN NUT M3-.5
159	P0911159	CAP SCREW M5-.8 X 14
160	P0911160	FLAT WASHER 5MM
161	P0911161	CAP SCREW M6-1 X 14
162	P0911162	FLAT WASHER 6MM
163	P0911163	CAP SCREW M6-1 X 18
164	P0911164	FLANGE NUT M6-1
165	P0911165	CAP SCREW M3-.5 X 8
166	P0911166	HEX NUT M3-.5
167	P0911167	CAP SCREW M4-.7 X 16
168	P0911168	FLAT WASHER 4MM

Electrical & Accessories

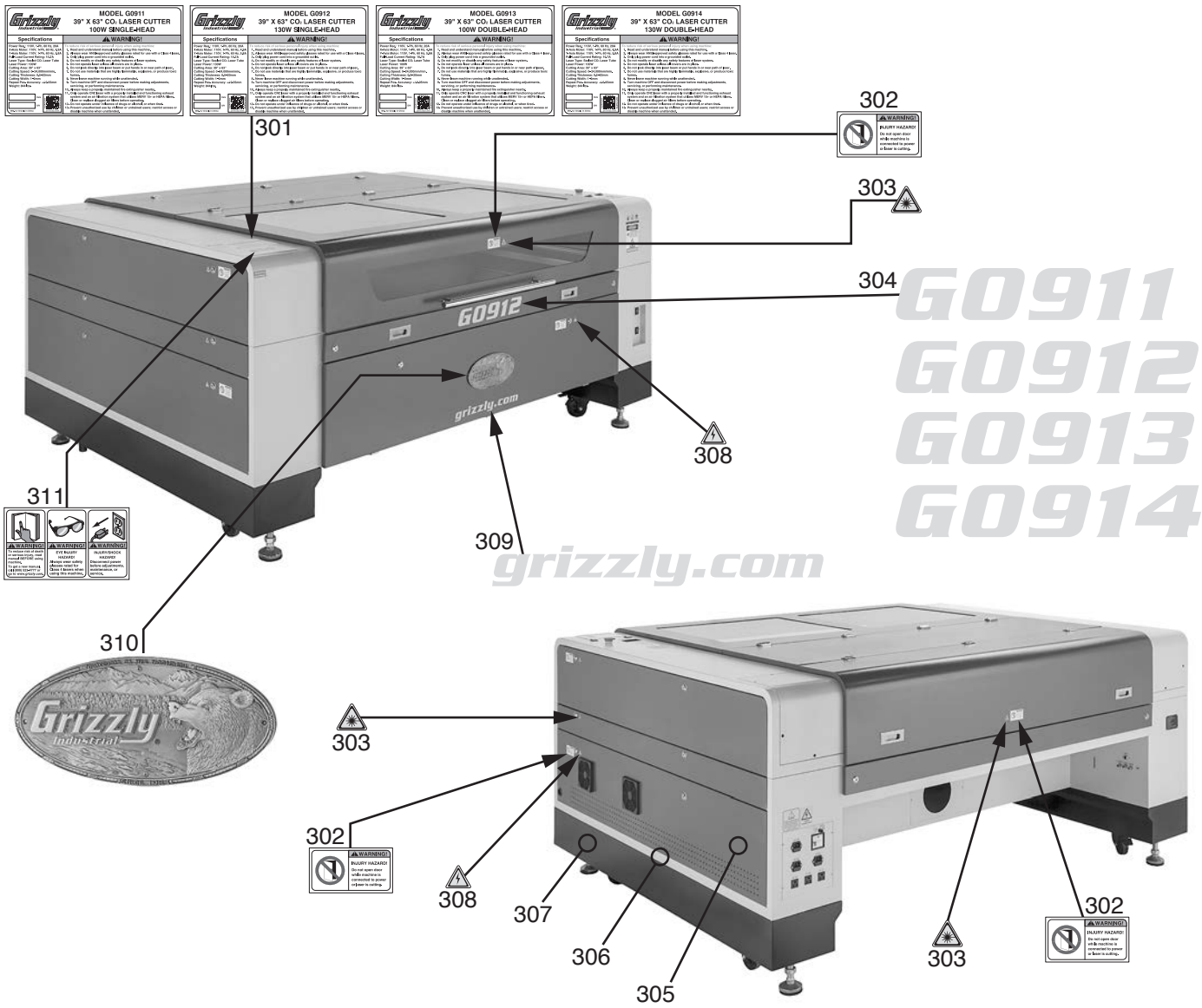


Electrical & Accessories Parts List

REF	PART #	DESCRIPTION
201	P0911201	WIRE LOOM 50 X 75MM
202	P0911202	WIRE LOOM 50 X 240MM
203	P0911203	WIRE LOOM 50 X 450MM
204	P0911204	WIRE LOOM 50 X 1000MM
205	P0911205	CONTROLLER RUIDA RDC6442S-B (EC)
206	P0911206	STEPPER DRIVER LEADSHINE 3DM580
207	P0911207	STEPPER DRIVER LEADSHINE DMA860H
208	P0911208	CHASSIS GROUND BAR
209	P0911209	POWER SUPPLY TL-POWER TL-400S-48
210	P0911210	POWER SUPPLY TL-POWER TL-25D-C
211	P0911211	EMI FILTER FILTEMC FT127-10
212	P0911212	REFERENCE LASER POWER SUPPLY
213	P0911213	POWER SUPPLY MYJG100W-Y-1 (G0911/G0913)
213	P0912213	POWER SUPPLY MYJG130W-Y-1 (G0912/G0914)
215	P0911215	ELECTRICAL COOLING FAN GBOC 12025HSL
216	P0911216	ELECTRICAL COOLING FAN FILTER
217	P0911217	ELECTRICAL COOLING FAN COVER
218	P0911218	SILICONE TUBING 8ID X 11OD X 1725L
219	P0911219	WATER CHILLER CW-5200 (G0911/G0912)
219	P0913219	WATER CHILLER CW-5202 (G0913/G0914)
221	P0911221	SIGNAL CORD 20G 4W 78"L
222	P0911222	COLLAPSIBLE DUCTING 6" X 24"
223	P0911223	FLEXIBLE DUCTING 6" X 60"
224	P0911224	EXTRACTION FAN YONGCHENG CZ-TD550
225	P0911225	SILICONE TUBING 8ID X 11OD X 1420L
226	P0911226	AIR PUMP HAILEA AC0-009E
227	P0911227	STRAIGHT BARBED FITTING 1/2" NPT

REF	PART #	DESCRIPTION
228	P0911228	TOOLBOX
229	P0911229	POWER CORD 18G 3W 72" 5-15P
230	P0911230	MIRROR ALIGNMENT GAUGE
231	P0911231	LASER CUTTING DEPTH GAUGE
232	P0911232	FOCUS GAUGE
233	P0911233	WIRE HOSE CLAMP 6"
234	P0911234	HEX WRENCH 2MM
235	P0911235	HEX WRENCH 2.5MM
236	P0911236	HEX WRENCH 3MM
237	P0911237	HEX WRENCH 5MM
238	P0911238	FLAT HD SCREWDRIVER 1/8"
239	P0911239	USB FLASH DRIVE 512MB
240	P0911240	LASER BEAM ALIGNMENT GAUGE
241	P0911241	RED LED
242	P0911242	SOFTWARE INSTALLATION DISC
243	P0911243	USER MANUAL DISC
244	P0911244	OPTICS COTTON ROLLS
245	P0911245	LOCKING DOOR KEYS (2-PC SET)
246	P0911246	ADJUSTABLE AIRFLOW ADAPTER
247	P0911247	OPTICS DISASSEMBLY TOOL (LARGE)
248	P0911248	OPTICS DISASSEMBLY TOOL (SMALL)
249	P0911249	FLAT HD SCR M4-.7 X 14
250	P0911250	HEX NUT M4-.7
251	P0911251	MOUNTING BRACKET
252	P0911252	FLANGE SCREW M4-.7 X 8
253	P0911253	FLANGE SCREW M3-.5 X 8
254	P0911254	CAP SCREW M4-.7 X 8

Labels & Cosmetics



REF	PART #	DESCRIPTION
301	P0911301	MACHINE ID LABEL (G0911)
301	P0912301	MACHINE ID LABEL (G0912)
301	P0913301	MACHINE ID LABEL (G0913)
301	P0914301	MACHINE ID LABEL (G0914)
302	P0911302	DON'T OPEN DOOR LABEL
303	P0911303	LASER WARNING LABEL
304	P0911304	MODEL NUMBER LABEL (G0911)
304	P0912304	MODEL NUMBER LABEL (G0912)
304	P0913304	MODEL NUMBER LABEL (G0913)

REF	PART #	DESCRIPTION
304	P0914304	MODEL NUMBER LABEL (G0914)
305	P0911305	TOUCH-UP PAINT, GRIZZLY GREEN
306	P0911306	TOUCH-UP PAINT, GRIZZLY BEIGE
307	P0911307	TOUCH-UP PAINT, GLOSSY BLACK
308	P0911308	ELECTRICITY LABEL
309	P0911309	GRIZZLY.COM LABEL
310	P0911310	GRIZZLY NAMEPLATE - SMALL
311	P0911311	COMBO WARNING LABEL

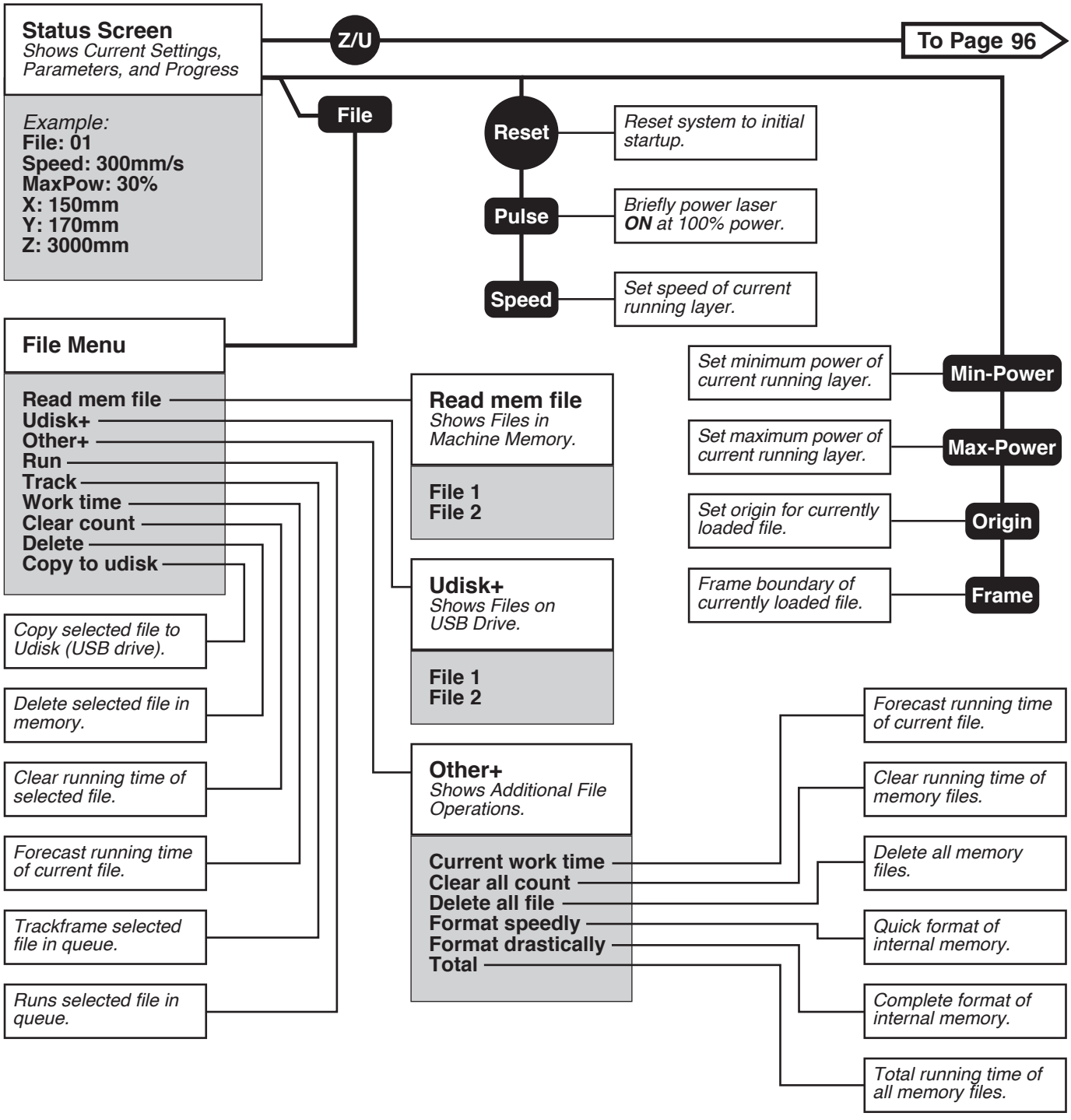
⚠WARNING

Safety labels help reduce the risk of serious injury caused by machine hazards. If any label comes off or becomes unreadable, the owner of this machine MUST replace it in the original location before resuming operations. For replacements, contact (800) 523-4777 or www.grizzly.com.

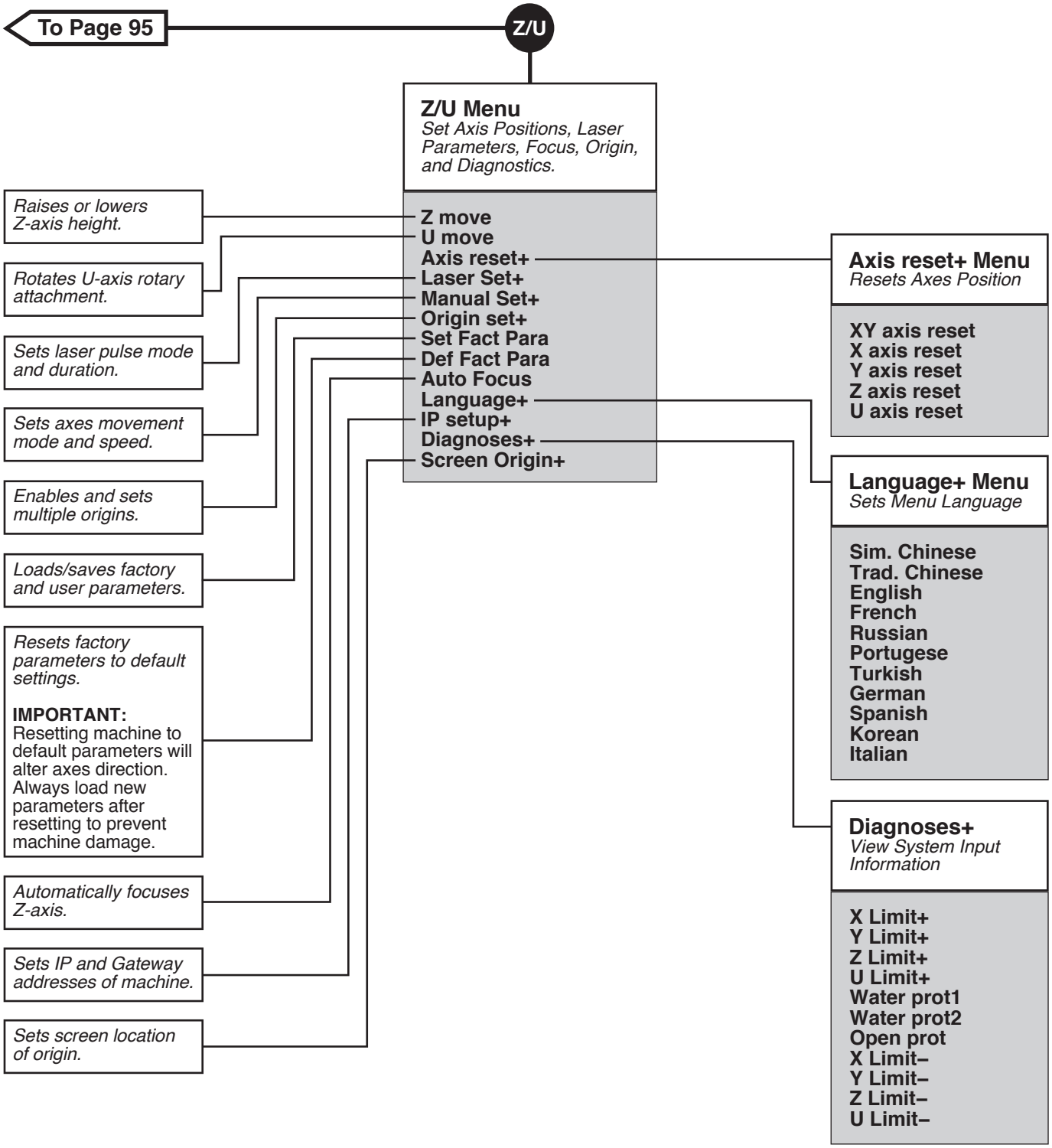
SECTION 10: APPENDIX

Command Tree

This section is an overview of the menus and features used to control this machine. For instructions on navigating the interface and the basics of operation, refer to **Controls & Components** on **Page 5**. Since software changes can affect the user interface, check **www.grizzly.com** for an up-to-date command tree if this one seems out of date.



Command Tree (Cont.)



WARRANTY & RETURNS

Grizzly Industrial, Inc. warrants every product it sells for a period of **1 year** to the original purchaser from the date of purchase. This warranty does not apply to defects due directly or indirectly to misuse, abuse, negligence, accidents, repairs or alterations or lack of maintenance. This is Grizzly's sole written warranty and any and all warranties that may be implied by law, including any merchantability or fitness, for any particular purpose, are hereby limited to the duration of this written warranty. We do not warrant or represent that the merchandise complies with the provisions of any law or acts unless the manufacturer so warrants. In no event shall Grizzly's liability under this warranty exceed the purchase price paid for the product and any legal actions brought against Grizzly shall be tried in the State of Washington, County of Whatcom.

We shall in no event be liable for death, injuries to persons or property or for incidental, contingent, special, or consequential damages arising from the use of our products.

The manufacturers reserve the right to change specifications at any time because they constantly strive to achieve better quality equipment. We make every effort to ensure that our products meet high quality and durability standards and we hope you never need to use this warranty.

In the event you need to use this warranty, contact us by mail or phone and give us all the details. We will then issue you a "Return Number," which must be clearly posted on the outside as well as the inside of the carton. We will not accept any item back without this number. Proof of purchase must accompany the merchandise.

Please feel free to write or call us if you have any questions about the machine or the manual.

Thank you again for your business and continued support. We hope to serve you again soon.

To take advantage of this warranty, you must register it at **https://www.grizzly.com/forms/warranty**, or you can scan the QR code below to be automatically directed to our warranty registration page. Enter all applicable information for the product.