



**FiberStar® CNC
Workstation
7604 Series
Operation
& Maintenance Manual**



HARNESSING THE POWER OF HOT LIGHT™

If you have additional questions about your device or would like to provide feedback, a testimonial or present your applications results, please reach out — we'd love to hear from you!

LaserStar Technologies: Important Contacts		
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Declaration of Conformity

Manufacturer Name: LaserStar Technologies Corporation®
Manufacturer Address: 1717 Diplomacy Row
Orlando, Florida 32809, USA
Phone / Fax: PH: (407) 248-1142 FX: (866) 708-5274
Designation: FiberStar® 7604 Series Workstation
Model Number(s): 5xx-76x
Year of Manufacture: 2026
EC Directive(s): 2014 / 35 / EU (Low Voltage Directive)
2014 / 30 / EU (EMC Directive)

Standard(s) to which Conformity is Declared:

IEC 60825-1:2014 Ed. 3.0
IEC 61010-1:2010, Ed. 3.0
EN 61000-6-2:2019
IEC 61000-6-4:2007 +A1:2010
IEC 61000-6-4:2019

This declaration is issued under the sole responsibility of LaserStar Technologies Corporation®.
The object of this declaration is in conformity with relevant Union harmonization legislation.

I, the undersigned, hereby declare that the equipment specified above conforms to the above identified standards and fulfills the provisions of the EU directive(s).

A handwritten signature in black ink, appearing to read "James E. Gervais", written over a horizontal line.

James E. Gervais
President and Chief Operating Officer

Date: January 04, 2026



Declaration of Compliance

United States and Canada

Manufacturer Name: LaserStar Technologies Corporation®

Manufacturer Address: 1717 Diplomacy Row
Orlando, Florida 32809, USA

Phone / Fax: PH: (407) 248-1142 FX: (866) 708-5274

Designation: FiberStar® 7604 Series Workstation

Model Number(s): 5xx-76x

Year of Manufacture: 2026

Standard(s) to which Compliance is Declared:

Code of Federal Regulations (CFR), Title 21; Part 1040.10, 1040.11 for Laser Products

FCC 47CFR; Part 15, Subpart B (2017): Unintentional Radiators, Class A Verification

I, the undersigned, hereby declare that the equipment specified above conforms to the above identified standards and fulfills the provisions of the EU directive(s).

A handwritten signature in black ink, appearing to read "James E. Gervais", written over a horizontal line.

James E. Gervais
President and Chief Operating Officer

Date: January 04, 2026



UK Product Declaration of Conformity

LaserStar Technologies Corporation, hereby declare that the product described below:

Product Name: FiberStar® 7604 Series Workstation, **Model Number:** 5xx-76x,
Description: Fiber Laser Welder and Adjustable Stand, **Intended Use:** Laser welding of metallic components

is in compliance with the following UK regulations:

- Electrical Equipment (Safety) Regulations 2016
- Electromagnetic Compatibility Regulations 2016

The product meets the essential requirements of the following UK directives:

- Low Voltage Directive (LVD)
- Electromagnetic Compatibility (EMC) Directive
- Laser Safety

We confirm that the necessary assessments have been carried out, and the product conforms to the standards set out by the UK government for safety, health, and environmental protection.

UKCA Marking

This product is marked with the UKCA mark, indicating compliance with UK legislation and is authorized for sale in Great Britain (England, Wales, and Scotland).

Affixed Location of UKCA Mark: On product label designating system model and serial number.

Manufacturer Name: LaserStar Technologies Corporation, 1717 Diplomacy Row Orlando, Florida 32809, USA

Authorized Representative: GVUK Design, Suite 2C, The Leys, Leyton Road, Harpenden, Hertfordshire ALF 2TL, UK

Signed for and on behalf of LaserStar Technologies Corporation

A handwritten signature in black ink, appearing to read "James E. Gervais".

James E. Gervais
President and Chief Operating Officer

Date: January 04, 2026

LaserStar Technologies Corporation®

Library Publication Data

FiberStar® 7604 Series Welding Workstation Operation & Maintenance Manual

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I. Introduction

Equipment Overview

The FiberStar® 7604 Series workstation is a highly specialized, portable, stand-alone, single-user operated laser welder designed for metalworking and fabrication. This versatile welding workstation, which is capable of quickly and precisely welding almost any metal or metal alloy, is well-suited for the industrial workspace and a wide variety of complex assembly applications, including spot and seam welding, mold repair, and micro-welding (applicable for industries including, aerospace engineering, computers and information technology, automotive, and medical device technologies).

With welding applications, the workpieces that are to be joined are manually arranged within the welding work area, and are then welded together by means of one or more high-intensity laser pulses.

The welding workstation is equipped with a stereo microscope with cross-hair, a specialized component within the welding chamber that allows for precise control and positioning of workpieces or parts for achieving consistently reliable welding applications results. The cross-hair marks the exact position of the laser pulse spot on the workpiece.

With any welding application, in order to achieve optimal finalized results, the workpiece must be properly positioned within the focusing area of the laser beam; positioning and workpiece height are determining factors that affect the results and outcome. The workpiece height is correct when the surface of the part is in focus while under the stereo microscope.

Laser pulse energy is another factor that can have a direct influence on the quality of the final weld; this setting can be adjusted using the software.

With certain materials, the quality of the weld can be improved by using argon (inert) gas. **Note: This laser system is equipped with an internal argon (inert) gas valve.**

The vapor produced during the welding process can be extracted from the lasing chamber and operator's work station using an external exhaust system.

The welding workstation is equipped with a stereo microscope with cross-hair, a specialized component within the welding chamber that allows for precise control and positioning of workpieces or parts for achieving consistently reliable welding applications results. The cross-hair marks the exact position of the laser pulse spot on the workpiece.

The laser welding workstation is equipped with a foot pedal switch (with two [2] operating positions) that is capable of firing single or multiple laser pulses. The first position (pedal switch slightly depressed) enables the inert gas supply, and the second position (pedal switch fully depressed) releases the laser pulse.

Fiber Medium Laser: Advantages of Ownership

★ Flexible Fiber

The inherent properties of light ensure that it can be easily delivered to a movable focusing element, which is important for laser cutting, welding, and folding of metals and polymers.

★ Sustained Output Power

Fiber lasers can have active regions several kilometers long, and so can provide extraordinarily high optical gain. They can support kilowatt levels of continuous output power because of the fiber's high surface area to volume ratio, which allows efficient cooling.

★ Superior Optical Quality

The fiber's wave guiding properties reduce or eliminate thermal distortion of the optical path, typically producing a diffraction-limited, high-quality optical beam.

★ Conveniently Compact

Fiber lasers are compact compared to rod or gas lasers of comparable power, because the fiber can be bent and coiled to save space.

★ Unwavering Reliability

Fiber lasers exhibit high vibrational stability, extended lifetime, and maintenance-free, turnkey operation.

- High peak power and small pulses enable effective marking and engraving.
- Additional power and improved beam quality provide cleaner cut edges and faster cutting speeds.
- Lower cost of ownership.

FiberStar® 7604 Series Workstation: External Components and Body Configuration



Figure 1
(FiberStar® 7604 Series)

(for a visual reference of the individual components noted below, see the diagram on page 15)

1. Stereo Microscope
2. System Key Switch
3. Exhaust Outlet (rear of the machine) and Filter (located inside the welding work chamber)
4. Touchscreen Display
5. Observation Window
6. Hand Opening
7. Removable Access Panel with Optional Interlocks
8. Welding Chamber Enclosure
9. Embedded Computer & Controls System (located inside the main body cabinet) and Fiber Laser Source
10. Adjustable Stand
11. Wheel Locks (x4)

The **stereo microscope (1)** facilitates effortless positioning and adjustment of parts for welding applications.



Caution!

Indicates a potential threat or danger to health or life. Failure to heed this advisory can result in serious damage, critical injury, and death.



Warning!

Indicates a potentially dangerous situation. Failure to heed this advisory can result in minor injury or property damage.



Indicates helpful tips or other important guidelines for correct use of the laser system. Failure to heed this advisory can result in malfunctions or problems with the device and additionally, can result in damage to areas or property in close proximity to the laser system.



Indicates safe operating guidelines, tips and recommendations, and particularly useful details that will help you to better utilize all of the functions of your laser system.

Technical Specifications

The modular construction of the LaserStar® Workstation facilitates efficient, time-saving repairs by allowing for replacement of individual failed modules (non-functional units), as opposed to more intricate repairs that can require extensive downtime and dismantling of the entire laser system.

The welder consists of the following modules, which are configuration dependent:

- Fiber Engine
- Embedded Computer
- Power Supplies
- Inert (argon) Gas Supply
- Foot Pedal Switch (for triggering laser pulses and inert [argon] gas supply)

LaserStar® Workstation - Laser Specifications	
A typical system includes a variety of standard and optional components	
Standard Mode Maximum	15 Joules
Micro Mode Maximum	22.5 Joules
Max Avg. Radiant Power (Standard Mode)	150 Watts
Maximum Peak Power (Standard Mode)	1500 Watts
Max Avg Radiant Power (Micro/CW Mode)	250-300 Watts (Model Dependent)

FiberStar® 7604 Workstation: Table Specifications

A typical system includes a variety of standard and optional components

Laser Medium	Ytterbium Fiber
Weld Laser Wavelength	1070 nm (infrared)
Laser Class	Class 4
Beam Divergence (minimum; prior to beam-expanding and focusing optics)	<1 mRad
Red Aim Beam Wavelength	650nm
Red Aim Beam Power	<5mW (Class 3R)
Pulse Energy (minimum)	Joules (model dependent)
Rated power	Watts (model dependent)
Pulse Power (maximum)	1.5 kW
Single or Continuous Pulse	Selectable Option
Pulse Length (Standard)	0.2 to 50 ms
Pulse Length (Micro)	0.2 to 75 ms / CW
Ambient Conditions: Operating Temperature	5°C to 30°C (41°F to 86°F)
Ambient Conditions: Storage Temperature	-10°C to 70°C (14°F to 158°F)
Humidity (operating & storage)	10% to 95% (non-condensing)
Elevation (above sea level)	0 to 6,562 feet (0 to 2,000 meters)
Noise Level (dB)	Varies (model dependent)
Degree of Protection	IPX0
Workstation "Footprint" Dimensions (Without Stand)	38"L x 24"W x 19.3"H 964mm x 602mm x 491mm
Approximate Weight	180 lbs. / 80 kg
L x W x H (Table - Tallest Position)	30" x 24" x 33" 762mm x 610mm x 839mm
Electrical Requirements: Table	120-240 VAC, 1PH, 50/60 Hz, 10 Amps (10 Amps is worst-case if plugged to 120VAC)
Laser System Electrical Requirements	120-240 VAC, 1PH, 50/60 Hz, 20 Amps (20 Amps is worst-case if plugged to 120 VAC)

Cooling

- Ambient Temperature: 30°C (86°F; maximum)

Inert Gas: Pressure & Flow Regulation		
Operating Pressure (maximum)	Operating Pressure (minimum)	Flow Range (typical)
3.8 bar (55 psi; 0.38 MPa)	0 bar (0 psi; 0 MPa)	10 to 30 CFH

(Note: To increase cost-savings and offset the expense for inert (argon) gas, the flow rate should be adjusted to the lowest setting possible for achieving the necessary surface finish.)

Noise Levels

The audible noise that is continuously produced by the welder can range in decibels (dB) and is model specific.

Embedded Computer

The embedded computer is connected to the internal controls circuitry and is used for programming and setting welding parameters.

Controls Circuits

The controls circuits ensure that the welder components are started and stopped in a safe manner (for both the equipment and operator).

Various controls circuits exist for the following parts:

- External Safety Contacts
- Laser Disable/Enable
- View Shutter (located underneath the Stereo Microscope)
- Supply Voltage
- System Ready

Optical Viewing System

The welder is equipped with an advanced optical viewing system (stereo microscope) with cross-hair functionality. The stereo microscope is a specialized component within the laser welding chamber, and allows for precise positioning of parts for consistently reliable welding applications results. A variety of optical viewing systems and magnification strengths are available.

Components and Function

- Welding Shield With Window (used for viewing and observation of application processes at the welding area)
- Illuminated Welding area with Adjustable Brightness (by means of the controls on the remote delivery system)
- View Shutter (shutter closes automatically for a short time with each laser pulse)

(Note: In an effort to shield and protect the operator's eyes, the view shutter will close automatically for a short duration with each laser pulse. Welding workstations with a flat-screen viewing system are not equipped with a view shutter.)

Fundamentals of Laser Light: View Path and Beam Path

To produce a beam of coherent, monochromatic light, the laser requires an active medium (in this case, optical fibers that have been doped with rare-earth elements), which is positioned between multiple reflectors (mirrors and lenses). These reflectors, which help to perpetuate and distribute the laser’s light energy, also ensure the beam continues traveling along its pre-determined path.

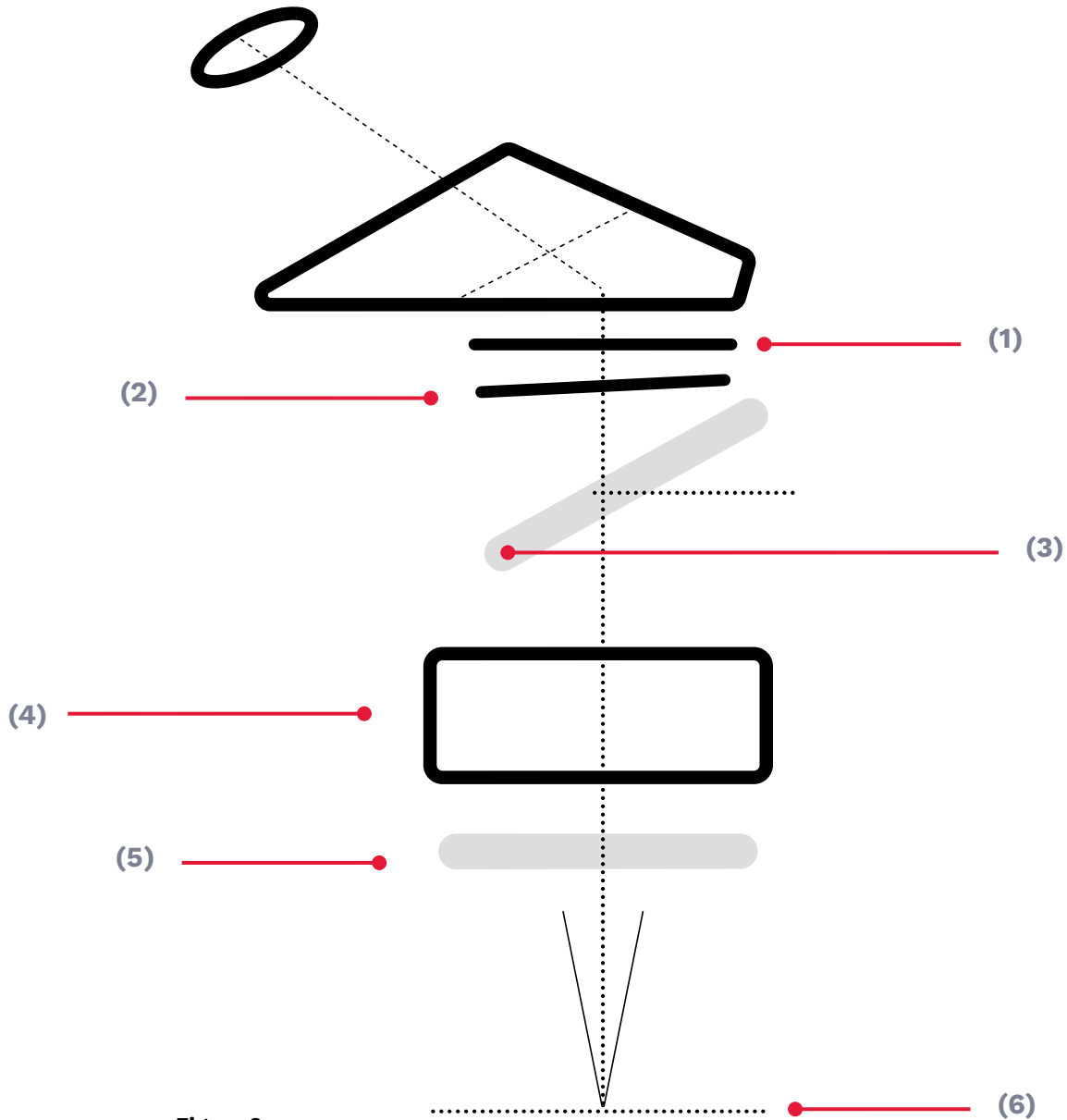


Figure 2
(View path and beam path)

- The laser beam is channeled through the optical path of the stereo microscope by means of a **highly reflective mirror (3)**.
- A specialized **focusing lens (4)** concentrates the laser beam and directs its focus onto the surface of the **workpiece (6)** that has been positioned within the laser’s focusing plane. Additionally, this lens also acts as the focusing lens for the stereo microscope.
- The **focusing lens (4)** is safeguarded from dust and metal splashing that is produced during the welding applications process with the aid of a **protective glass lens (5)**.
- The **view shutter (2)** shields and protects the operator’s eyes from harmful laser radiation, as well as the ultraviolet (UV) component of plasma light that results from a laser pulse during the welding applications process. With each laser pulse, the **view shutter (2)** will close automatically, obstructing the operator’s field of view for a short duration. If there is an interference and the **view shutter (2)** does not properly close, as a precautionary measure, the laser pulse will not be released. (Note: Workstations with a flat-screen viewing system are not equipped with a view shutter.)
- Like the **view shutter (2)**, the **IR absorbing filters (1)** protect the operator, blocking out harmful laser radiation and the ultraviolet (UV) component of plasma light to prevent contact with or damage to the eyes.

Components, Features & Additional Functionality

- ★ Storage of Operating Parameters
- ★ Beam expander (motor-driven [for welding-point diameter])
- ★ Multi-Hole Steel Plate (used for securing and stabilizing larger workpieces)
- ★ Inert (argon) Gas Supply (with adjustable nozzle [nozzle is located inside the welding work chamber and positioned in close proximity to the workpiece])

Two-stage Laser Pulse Triggering	
The method below utilizes the foot pedal switch to initiate a laser pulse.	
Stage 1 (pedal partially depressed)	Stage 2 (pedal fully depressed)
Inert (argon) Gas Supply	Laser Pulse Triggering

Laser Delivery System

Standard Optical Rail Components & Configuration

The components for this high-intensity pulse laser are mounted on an optical rail. Individual components are explained below with numbers (#) that correspond to each module's position along the rail system.

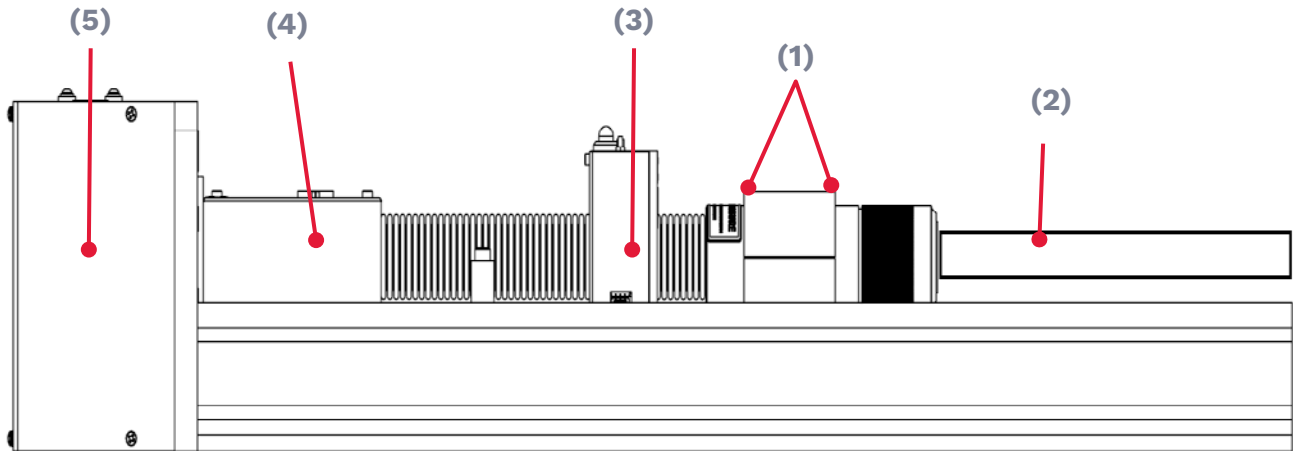


Figure 3
(Optical Rail Configuration)

Optical Rail Components

- The **collimator and mounting block (1)** collects the laser pulse emitted by the **fiber optic cable (2)** and collimates it so the beam is neither converging nor diverging.
- While in a closed state, the **safety shutter (3)** prevents the transmission of harmful radiation to the welding work chamber. The **safety shutter (3)** remains closed if there is a system fault.
- The diameter of the laser beam can be set by means of the **beam expander (4)**, which is driven by a stepper motor. When making adjustments, both the diameter of the laser pulse spot and the energy density for the laser beam are affected.
- The **beam bender (5)** redirects the laser downward, toward the lens.

External Control Elements

Computer Controls Unit

The computer controls unit is mounted inside the power supply unit. If maintenance or service-related tasks are needed, the controls board is easily accessible from the front of the power supply unit.

The controls unit is used to control and operate the following components:

1. Operating Elements
2. Warning Indicators
3. Safety Components
4. Interlock Circuits Safety Checks

Diagnostics and Self-Checks

To ensure the welder is functioning correctly, a series of diagnostics or self-tests are performed each time the laser system is powered “on.”

During start-up, the following self-checks are routinely performed by this device:

- Maintenance Timers
- Laser Status

While the testing sequence is being carried out, the electronic components, power supply, laser status (enabled/disabled), and safety shutter are monitored to ensure they are properly functioning. If there is an error or malfunction, the power supply will shut down and lasing functions will be deactivated.

When a malfunction occurs, an alert will appear on the screen. When all faults have been eliminated, the power supply can be switched “On” again.

Inert Gas and Compressed Air Supply (optional)

The device has a connecting socket for inert gas (argon, nitrogen, etc.). The remote delivery system has a flexible gas nozzle.



Caution!

Use of controls or adjustments to performance or procedures other than those specified within this manual could result in hazardous radiation exposure; use caution when operating this device.

Touchscreen Display and Settings

The display layout is shown in the image below. The first row shows recipe location, description of the recipe and messages; the second row displays operational / mode choices, Arrow Keys, Set Recipe, and current Recipe. The third row Green buttons display weld parameters-Joules (or %), Pulse Length (ms); Pulse Rate (Hz) or Burst Mode; Beam Diameter; and Shape. The fourth row displays Laser Enable/Disable status, System Ready, OK status button, Clear faults, help and Menu. **(Note: When the OK button indicator is green, the welder is ready to weld. The Laser Enable/Disable button is used to enable and disable the laser and displays the status.)**



Figure 4
(Touchscreen Display)

All parameters can be set using the touchscreen display.



Attention: To preserve the touchscreen display and extend the life of this digital device, you should refrain from using inappropriate items (i.e. pencils, pointers, pens, etc.) to press buttons or interact with the digital display. Using these and other unsuitable items can cause the touchscreen display to malfunction, resulting in erratic or faulty operation. This will reduce the lifetime of the touchscreen device and also void the laser system's warranty.

Fingers (not finger nails) are the only acceptable instruments that should be used when interacting with the touchscreen display.

Electronic Beam Diameter Adjustment

The electronic beam diameter is controlled by the touchscreen display. The beam diameter range is model dependent.

Foot Pedal Switch

The welder workstation is equipped with a foot pedal switch for triggering laser pulses and the inert gas. The foot pedal is connected to the laser system via several flexible cables and can be moved or repositioned by the operator, as needed.

The foot pedal switch has two (2) operating positions with the following functions:

Stage 1:

- Depress the foot pedal, partially, until you notice initial resistance; this will trigger the inert (argon) gas supply to switch “on.”

Stage 2:

- Depress the foot pedal, fully, until it reaches the floor; this will trigger a laser pulse. If the inert gas supply is connected to the welder, it will remain “on” until the foot pedal has been fully released.

When releasing pulses consecutively, the following options are available:

- The foot pedal can be alternated between stages 1 and 2 to continuously provide inert cover gas while selectively firing the laser.
- If the pulse frequency is set for continuous-pulse mode (Hz), the laser can release a continuous series of pulses by depressing and holding down the foot pedal.
- If a Burst count is set, the laser will fire at the set frequency until the burst count is reached or the foot pedal is released.

Remote Interlock Connector

In addition to the foot pedal switch connector, there is a remote interlock connector available to readily connect the device to a secondary interlock circuit (such as an entry door) into a specific laser room. The remote interlock can be bypassed by using the remote interlock shorting cap, p/n 101-36-0036. Refer to **“Installation” on page 41** for instructions on connecting or bypassing this feature. For the location of the remote interlock connector, refer to **“Section B: Rear System Overview, External Connections, and External Fuse Replacement” on page 105**.

Locking Brake

The front wheels of the laser system are equipped with a locking brake to secure the laser system against unintentional movement at the installation site. Pressing the brake lever down will activate the brake. The adjustable stand has 4 leveling wheels which can be set to level the table and lock its position. Twisting the knob at each wheel will set the position.



Figure 5

(Adjustable Stand Brakes: [Model might not match])

Internal Control Elements

On the rear left wall of the welding chamber are the rotary argon (inert) gas flow control, rotary brightness control, and joystick; these control elements are used to adjust the laser pulse intensity, pulse length, and other similar factors.



Figure 6

(Internal control elements; inside the welding chamber)

II. Safety

Overview and Fundamentals

Radiation produced by laser light is capable of melting, burning, or vaporizing almost any material. The composition of the workpiece also dictates the vapor or gases that are generated; therefore, appropriate safety precautions are essential and critically important.

The LaserStar® Workstation is designed exclusively for welding applications, including both metals and metal alloys. To use the system for any purpose beyond what has been outlined in this operation manual is to use it improperly. **LaserStar Technologies Corporation® will not accept liability for damages resulting from improper use or negligence.**

Proper use of this system includes:

- Following all instructions and procedures and heeding all precautions, warnings, and important safety guidelines provided throughout this manual.
- Ensuring inspections and routine maintenance is scheduled and completed on-time to maintain the system and preserve the equipment in its optimal condition.

In addition to general information and specified mandatory regulations that help to ensure safe operation of this device, this section also outlines information on potential risks and associated dangers when using the system, which cannot be eliminated (either because of design or structural means). These advisories are marked with varying safety symbols (examples follow) and are a mandatory requirement set forth by OSHA and CDRH.



Caution!

Indicates a potential threat or danger to health or life. Failure to heed this advisory can result in serious damage, critical injury, and death.



Warning!

Indicates a potentially dangerous situation. Failure to heed this advisory can result in minor injury or property damage.



Indicates helpful tips or other important guidelines for correct use of the laser system. Failure to heed this advisory can result in malfunctions or problems with the device and additionally, can result in damage to areas or property in close proximity to the laser system.



Indicates safe operating guidelines, tips and recommendations, and particularly useful details that will help you to better utilize all of the functions of your laser system.

General Information

This laser system incorporates a **class 4 laser** (solid-state) with a high-powered optical output. **This device emits both visible and invisible radiation; the invisible radiation generated during use produces a wavelength of 1050–1090nm (near infrared range) and is outside the visible spectrum.** In addition, the visible secondary radiation that is emitted from this device can cause dazzle effects when viewed for any length of time.



When working with direct access to the laser beam (for general use, maintenance or repair) appropriate laser protective eyewear must always be worn. Intense radiation is capable of destroying the delicate tissues of the eye. When infrared light is transmitted from the cornea to the lens of the eye, it's multiplied (concentrated by up to 100,000 times). The light is then narrowly focused on the retina, causing burning and lesions. Because the tissue of the retina cannot be repaired, damage is permanent, resulting in a reduction or loss of eyesight (these effects may not be apparent for many years).

Always follow OSHA regulations, ANSI Z136.1-2014, Safe Use of Lasers or the equivalent national or international regulations (e.g. IEC/EN Standard 60825-1:2014) to ensure accident prevention and reduce your risk of exposure to radiation when working with laser equipment.



If modifications are made to this device that affect performance, software or intended function (as described in ANSI Z136.1-2014, Safe Use of Lasers and outlined in official documentation for laser standards classification), the individual or organization responsible assumes the status of manufacturer and must obtain a new classification and appropriate labeling for the device.

When operating laser equipment, appropriate protective eyewear - which protects against direct, reflected, and scattered radiation, is required; however, even while wearing protective eyewear, you should remain cautious, never looking directly into the laser beam, as intense laser light is capable of destroying the delicate tissues of the eye. (Note: With **class 4** operation, protective eyewear will normally shield against the hazards of collateral radiation [which includes ultraviolet, visible, and infrared radiation], however, if a concern exists that the accessible collateral radiation might be hazardous, the end-user is responsible for review and consideration of the MPE values required for the various materials being processed.)

While operating the equipment, all persons in the Nominal Ocular Hazard Zone (NOHZ) are required to wear appropriate laser protective eyewear (OD>6.5). This protective eyewear must meet applicable safety requirements based on the laser's output power and wavelength.



Warning!

The NOHZ, MPE (Maximum Permissible Exposure) and other safety criteria depend on system configuration. The information in this warning was calculated from model 524-764-151-1-120T-32-60-* as evaluated through ANSI Z136.1 - 2022. Modifying the system (removing the final focus lens, for example) can change the evaluation. The maximum permissible exposure (MPE) is 110μJ. The Nominal Ocular Hazard Distance (NOHD) is 9.25 meters from the laser's focus.

All safety decisions and concerns are the responsibility of the on-site LSO (laser safety officer).



Warning!

Although the skin can withstand considerably higher radiation intensity than the tissue of the eye, burning destroys tissue. The severity and extent of damage depends on the period of exposure and the intensity of the irradiation. Appropriate protective clothing should be worn to protect the skin whenever necessary.

If a laser injury (or a suspected laser injury) occurs while using the laser system, be sure to complete the following steps right away:

- Turn “off” the device's **mains power switch**
- Notify your Safety Officer or safety specialist
- Consult a doctor or go to the hospital

Fire Hazard

The intense power output from this **Class 4** laser can pose a fire hazard; a wide range of materials are susceptible to catching fire and **precautions must be taken to prevent fires while the laser beam is active**. Paper items (including diagrams, leaflets or even posters on the wall), curtains lacking fire retardant, wooden panels or other similar materials can be easily set on fire by direct or reflected laser radiation.

Containers holding flammable or explosive chemical agents (e.g. used for cleaning and maintenance tasks) should be kept away from the areas that are exposed to the laser beam. When using solvents or cleaning agents, be sure to heed relevant warnings. Significant explosions, fires, and other dangers can result if such containers are inadvertently exposed to or destroyed by the intense invisible laser beam.

Fundamental Safety Information

The guidelines below ensure safe operation when using the laser system:

- Read this manual; it contains guidelines and important information for ensuring the safety of the operator and outlines procedures for proper use of the system.
- Anyone who works with or operates the laser system must be informed of pertinent safety information and applicable safety regulations; this is a prerequisite for safe, trouble-free operation of this system.
- Anyone who works with or operates the system is expected to follow (and be knowledgeable in) the outlined operational procedures; especially the guidelines for safety.
- Mandatory regulations and requirements for ensuring safety and accident prevention (that are relevant for the current place of installation) must be complied with. In addition, all regulations set forth by OSHA, ANSI Z136.1-2014, Safe Use of Lasers or equivalent national or international regulations (e.g. IEC/EN Standard 60825-1:2014) are especially critical and must be strictly adhered to. Lastly, be sure to stay informed on all required state, municipalities, and local regulations and requirements.

Organizational Measures

Specific guidelines and policies must be upheld to ensure the safety and wellbeing of personnel who work with and operate the system. Organizational responsibilities and expectations are as follows:

- The employer must provide necessary personal safety equipment (in this case, laser protective eyewear is required only for maintenance purposes) whenever there is direct access to the laser beam.
- Regulations and requirements outlined in accordance with OSHA regulations, ANSI Z136.1-2014, Safe Use of Lasers or equivalent national or international regulations (e.g. IEC/EN Standard 60825-1:2014) must also be fulfilled.
- The laser system must be serviced at regular intervals and maintained as instructed within this manual.

Employer Requirements

Only authorized personnel who have received adequate training are permitted to work with and operate the system. Employers are responsible for ensuring that all operating personnel:

- Have familiarity with important regulations regarding workplace safety and accident prevention; employees must also have received instruction on the use of the laser system;
- Have read and understood the chapter in this manual concerning safety and be familiar with relevant warnings; employees should sign and acknowledge that these requirements have been met
- Receive training and instruction on the dangerous effects of laser radiation in accordance with OSHA regulations, ANSI Z136.1-2014, Safe Use of Lasers or equivalent national or international regulations (e.g. IEC/EN Standard 60825-1:2014) to ensure accident prevention when working with laser equipment;
- Receive ongoing training at regular intervals on relevant topics, such as operation, safety, and best practices for using the laser system.

Personnel Requirements

Employees who are trained and authorized to work with the laser system are expected to:

- Comply with important regulations concerning workplace safety and accident prevention for laser radiation, OSHA regulations, ANSI Z136.1-2014, Safe Use of Lasers or the equivalent national or international regulations (e.g. IEC/EN Standard 60825-1:2014).
- Have read and understood the chapter within this manual regarding safety and be familiar with the warnings detailed throughout this manual; employees should sign and acknowledge that these requirements have been met.

Potential Equipment Dangers

This laser system is a state-of-the-art device, **meticulously designed and engineered to meet and exceed standards for safety and approved operation and safety regulations**. Nevertheless, use of this equipment can still endanger life and limb (both the operator and third parties) or damage products and other material assets.



The laser workstation must only be used for its intended purpose as outlined in this manual (see details on proper usage). In addition, the laser system must also remain functionally sound (and in optimal condition) from the standpoint of safety. If a malfunction occurs that creates an unsafe condition or negative consequence, it must be corrected right away.

Protective Devices

- Before each use, the safety mechanisms for the laser system must all be checked to ensure that they are functional and appropriately affixed to the device.
- Safety mechanisms may only be removed when the laser system has been switched “off” and appropriate measures have been taken to prevent the laser system from being restarted. **(Note: The interlock switches can be bypassed by our service technicians and authorized specialists, if needed, but only while making adjustments and carrying out maintenance and other service-related tasks.)**

Informal Safety Measures



The operating instructions for the workstation must remain at the installation site. In addition to the instructions, applicable regulations for ensuring safety when working with or operating laser equipment (including applicable local regulations for accident prevention and environmental protection) must be complied with. Regulations set forth by OSHA, ANSI Z136.1–2014, Safe Use of Lasers or the equivalent national or international regulations (e.g. IEC/EN Standard 60825–1:2014) are also critically important.

All safety information and warning labels that are attached to the laser system must remain intact, legible, and accessible (see the section entitled “Important Safety & Informational Labels” on page 37).

Personnel Training



Only qualified personnel who receive adequate training and instruction on accident prevention and associated dangers when working with laser radiation (as required by OSHA, ANSI Z136.1–2014, Safe Use of Lasers or the equivalent national or international regulations [e.g. IEC/EN Standard 60825–1:2014]) are permitted to operate the laser system.

Trainees are only permitted to use the laser system while under the supervision of an experienced user.

Safety Measures for Normal Use

- Before using the laser system, you must verify that all of the safety mechanisms (remote interlock, chamber enclosure, front door safety interlock, laser protective eyewear, etc.) are in proper order and functional.
- Be sure to check the laser system at least once a week for external damage and to ensure soundness of all safety mechanisms and other components are properly functioning (e.g. splash-protective observation window, laser protective window, interlock circuits, chamber enclosure, chamber access door). **The laser system must only be used after routine safety checks are performed and the laser system is deemed to be in safe and operable condition.**

Electric Shock Danger

Only authorized personnel are permitted to carry out maintenance on the power supply.



Warning!

The housing for the internal components must remain closed at all times. Only authorized personnel who are specially trained (and possess the appropriate tools) are permitted to open the housing and perform maintenance on the internal components.

If work is to be carried out on voltage-carrying parts, a second person must be present who can switch the device “off” using the power switch, if necessary (see section entitled “Maintenance Intervals” on page 84).

Particularly Dangerous Points

Particularly dangerous points must be labeled as such; various warning labels and their location on the laser system are described in the section entitled, “Important Safety & Informational Labels” on page 37.



Warning!

The laser integrates a class 4 laser; therefore, appropriate safety eyewear is required and must be worn at all times.

Above all, never operate the laser while your hands, fingers, or other body parts are positioned directly inside or beneath the cross-hair or path of the laser beam.

Emission of Noxious Gases and Vapors

Avoid inhalation of vapors produced during the applications process with correct use of the argon (inert) gas.



Radiation produced by laser light is capable of melting, burning, or vaporizing almost any material. The composition of the workpiece also dictates the vapor or gases that are generated; therefore, appropriate safety precautions are essential and critically important. The operator should filter the air exhausted as required by OSHA regulations (for further details, reference the section on “Installation” on page 41).

Never use this device on non-metallic materials, especially plastics, without the use of an approved external fume and heavy particle exhaust filtration system.

Equipment Modifications

- ★ **Never attempt to make additions or modifications to this equipment (structural or otherwise); any alteration requires mandatory written approval from LaserStar Technologies Corporation®.**
- ★ **It's important that this laser system be maintained as intended and kept in safe and operable condition. Be sure to immediately replace all parts that are not in optimal working condition. Never purchase or install components from other manufacturers; use only LaserStar Technologies Corporation® replacement and consumable parts.**

Important Advisory

Parts ordered from LaserStar Technologies Corporation® meet stipulated requirements for safety and performance; **there is no guarantee for parts purchased from companies other than LaserStar Technologies Corporation® will meet stipulated requirements.**

Safety Officer

When class 4 laser equipment is installed, the employer must appoint a competent Laser Safety Officer; this action must be recorded in writing. In the case of **class 1** laser devices, the Laser Safety Officer need only be present while the service technician is carrying out service or maintenance on the equipment (and only when there's direct access to the laser beam). This assumes that the service technician bypasses the interlock switches or removes the protective covers from the laser system.

With ongoing training and experience in the field of laser radiation, the Laser Safety Officer should be fully competent in operating the workstation. In addition, this person should **be knowledgeable and informed on all important safety protocols for the laser system, as the Laser Safety Officer bears full responsibility for the safe operation of the laser equipment and correct implementation of mandatory safety measures.**

When completing training for proper use of the laser system, the Laser Safety Officer may elect to receive instruction from an approved body (e.g. an institution providing insurance against occupational accidents) or alternatively, can purchase and enroll in training provided by LaserStar Technologies Corporation®.



Authorized personnel with responsibilities for the operation, maintenance, or repair of this system must read and understand both the safety protocols and operating instructions for the equipment. Be sure to use this device only for its intended purpose; never aim the laser's beam in the direction of or directly at humans or animals.

What To Do If You Receive A Burn

If a laser pulse has burned your fingers or hand, you must be sure to have the wound treated. Depending on the severity of the burn, medical treatment may be necessary. Although a small burn is not particularly critical, it must still be monitored to be sure there is no resulting infection.

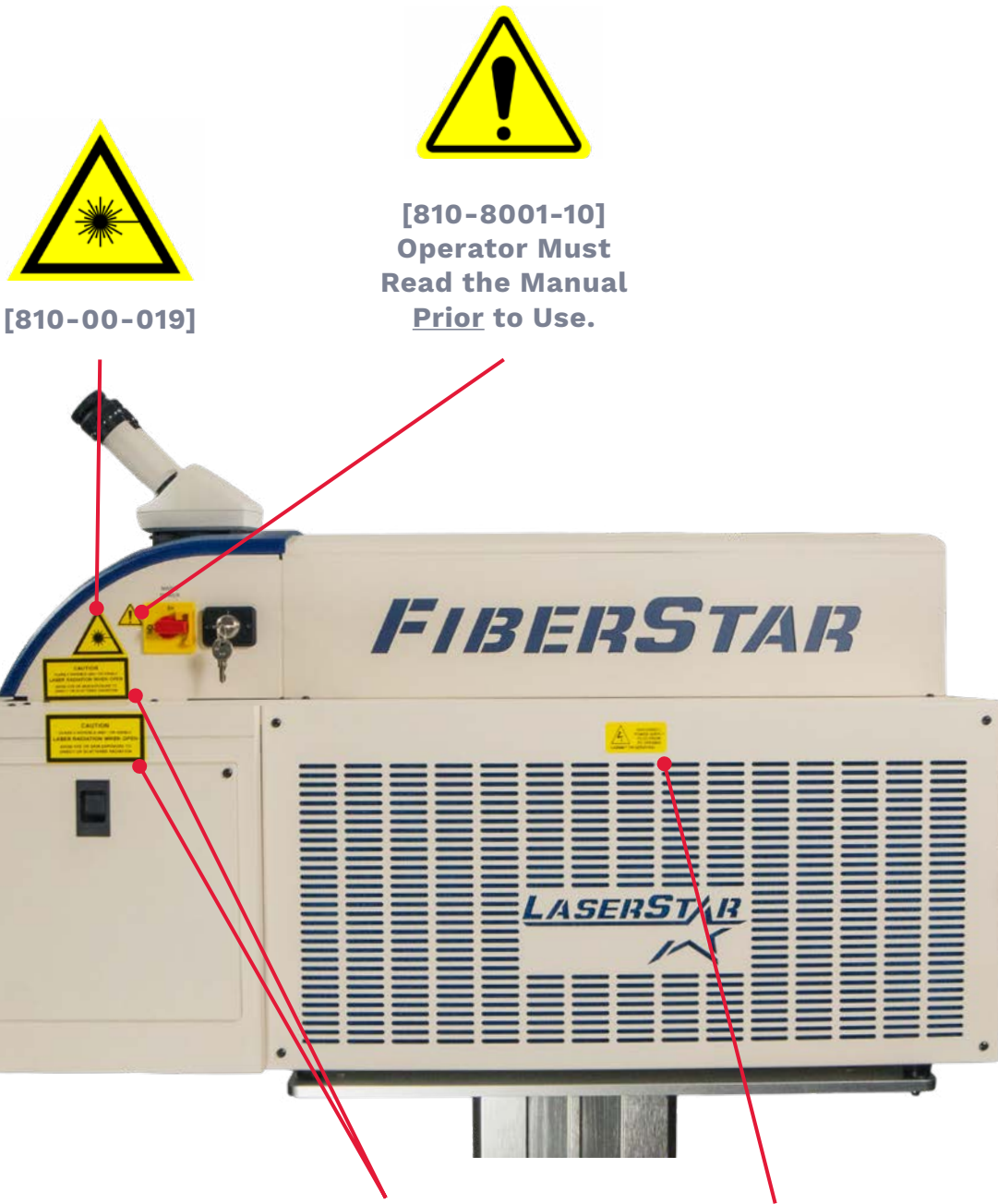
Scattered Radiation!



Scattered radiation can also cause minor burns on the skin of your hand. Depending on the material, its reflective properties, and the selected pulse energy, scattered radiation can also be dangerous. Only under very unfavorable circumstances will the scattered radiation reach intensities that can cause slight burns; this is because individual laser pulses are very short.

Normal exposure of the skin to low levels of scattered radiation (at a wavelength of 1070nm) is regarded as physiologically safe; in this instance, infrared light is comparable with radiation from the sun.

Important Safety & Informational Labels





[810-00-019]


[810-8001-10]
Operator Must
Read the Manual
Prior to Use.

Figure 7
(7604 Series; laser
right view)

[01-40028]*


[01-40010]


***If the interlock system is purchased, all [01-40028] labels are replaced with [48-40001] and [48-40003].**



[01-40010]

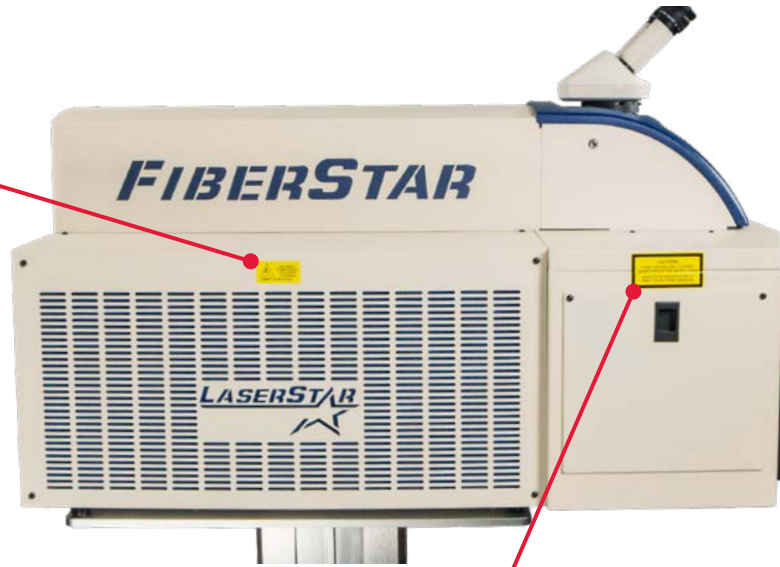


Figure 8
(7604 Series;
laser left view)

[01-40028]*



Figure 9
(7604 Series; Front)



[01-40026]

[01-40028]*



***If the interlock system is purchased, all [01-40028] labels are replaced with [48-40001] and [48-40003].**

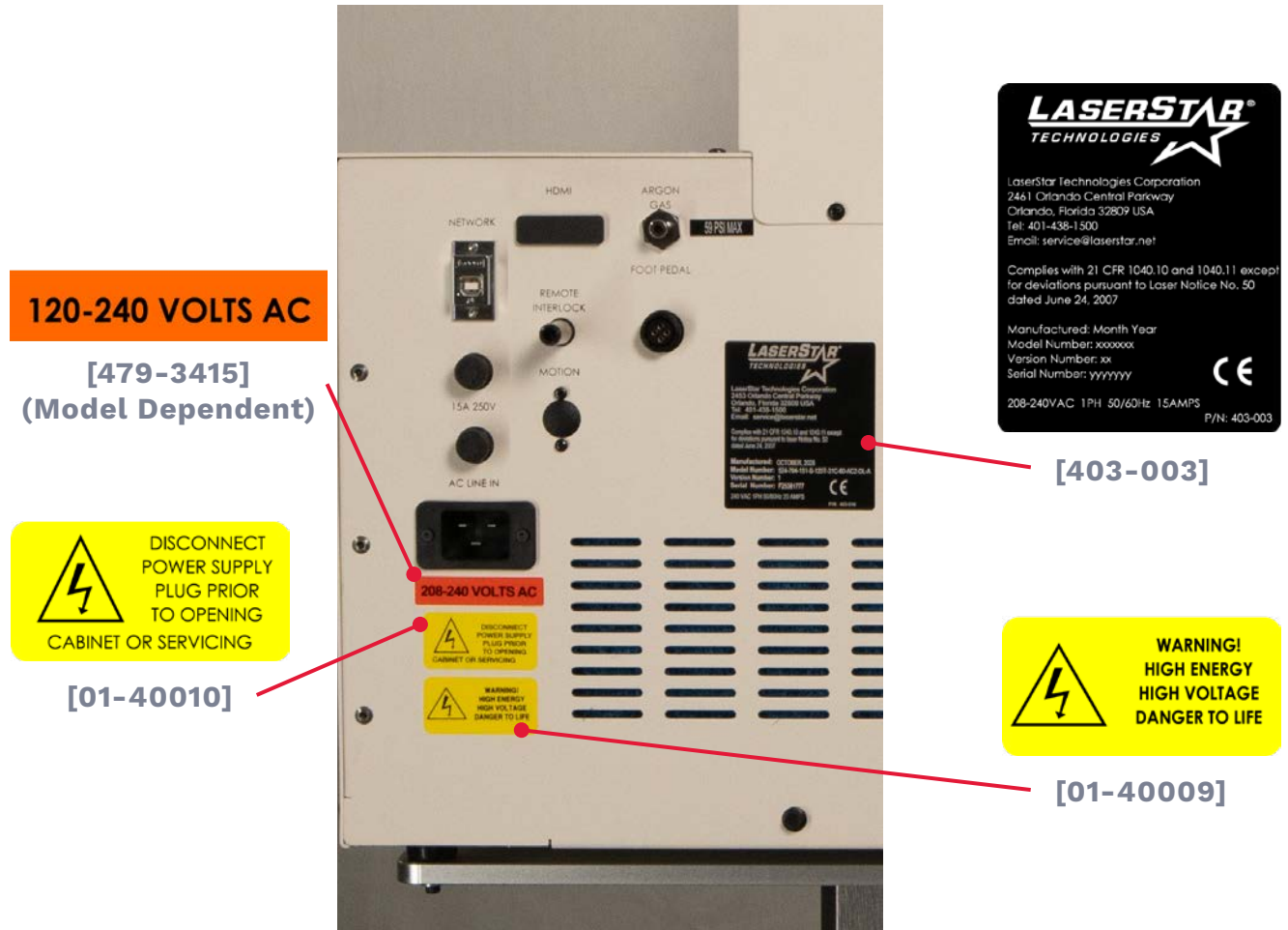


Figure 10
(7604 Series; back, bottom)

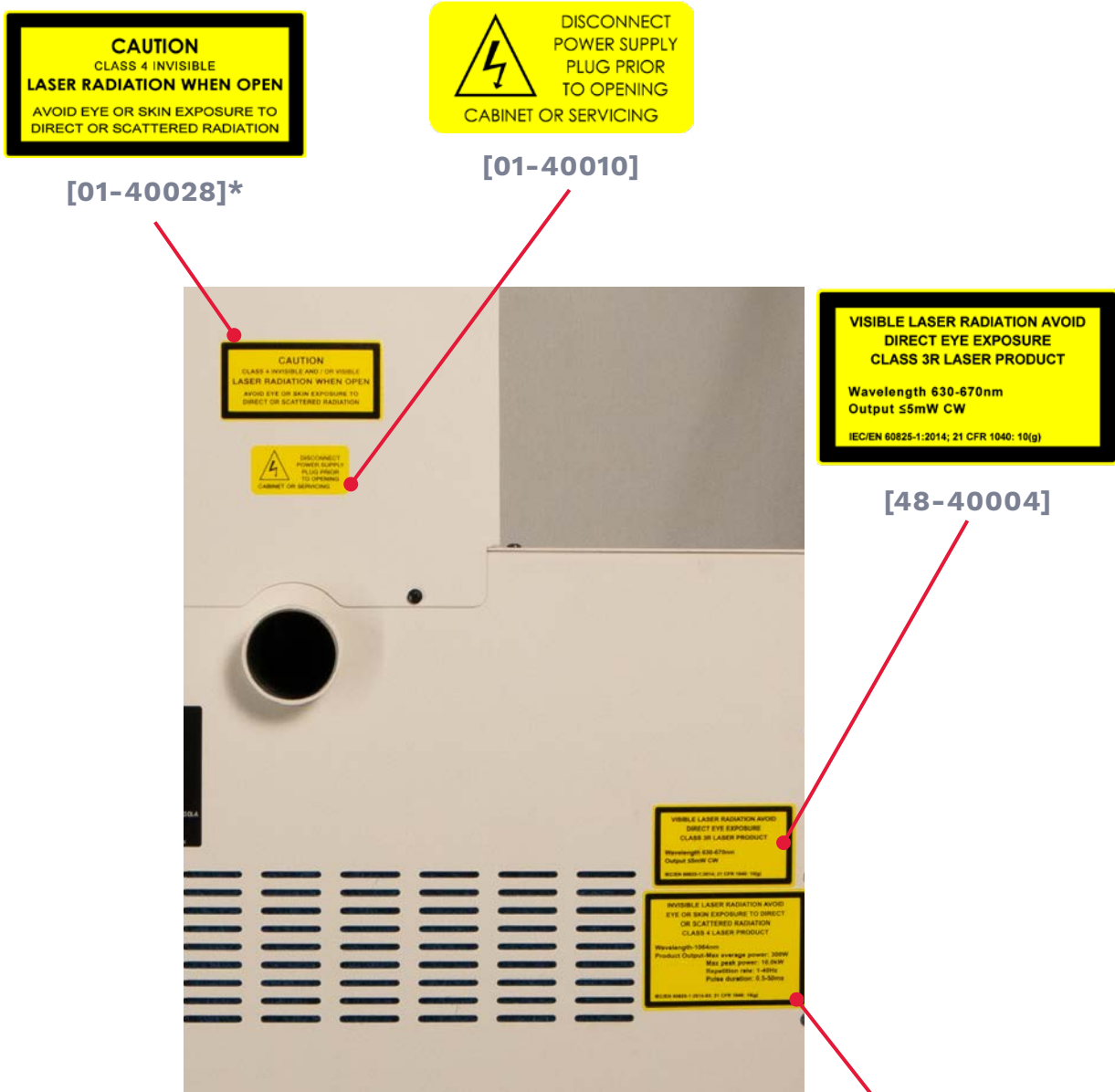


Figure 11
(7604 Series; back, top)



[48-40001]



[48-40003]



[48-40004]

[13-40011]

***If the interlock system is purchased, all [01-40028] labels are replaced with [48-40001] and [48-40003].**

III. Installation

Overview & Requirements

This section describes the requirements that must be fulfilled to ensure faultless operation of the laser system. Details for installation, setup, and transport are detailed in this chapter and **“Quick Setup Guide” on page 127.**

Safety Guidelines

To ensure faultless operation of this system, specific measures must be implemented to promote safety and encourage sound operational practices. In an effort to safeguard against accidents, an installation site must meet and abide by the following rules and requirements:

- The system should be installed and remain in a location that is as dust-free as possible.
- Never expose this system to direct sunlight.
- To ensure proper ventilation, a **required clearance between this device and any wall surface must be a minimum of at least 12” (300mm) from the back and sides.**
- Never position the laser in a way that makes it difficult to access or operate the laser system’s disconnecting device.
- **This device is required to be connected to an approved external filtration and fume exhaust system** (either purchased separately or sold through LaserStar Technologies Corporation®). For additional details about this requirement, be sure to reach out to your sales representative.



Warning!

When choosing an installation site, be sure to take into account for maintenance, the ability to limit laser area is required (see regulations set forth by OSHA regarding accident prevention for laser radiation, ANSI Z136. 1–2014, Safe Use of Lasers or equivalent national or international regulations (e.g. IEC/EN Standard 60825–1:2014).

Ambient Conditions

Operating Temperature:

(reference **“FiberStar® 7604 Workstation: Table Specifications” on page 18**)

Storage Temperature:

(reference **“FiberStar® 7604 Workstation: Table Specifications” on page 18**)

Environmental Conditions

Elevation:

(reference “**FiberStar® 7604 Workstation: Table Specifications**” on page 18)

Relative Humidity:

(reference “**FiberStar® 7604 Workstation: Table Specifications**” on page 18)

Unpacking



Before shipping, this system underwent a thorough inspection process and rigorous software testing. This system has been delivered to the shipping carrier in faultless condition. Before opening the shipping container, be sure to thoroughly inspect the outside of the crate for indications of damage that may have occurred in transit.

- If possible, use the supplied skid to transport the device to its final destination (the intended installation site).
- When unpacking the equipment and removing components from the shipping container, packaging, and skid base, be sure to use exceptional care.
- For helpful tips and step-by-step instructions on setup, be sure to reference the “**Quick Setup Guide**”, which you can access by scanning the QR Code provided with your laser system and/or by going to **page 127** of this manual.

Standard Shipping Container Contents

- LaserStar® Workstation on adjustable stand; standalone
- Viewing System
- Basic Device Components and Hardware

(Note: Orders can include additional accessories [add-ons that were purchased separately]. Following delivery, be sure to reference the included packing slip and compare with parts received.)

Initial Power Connections



The activities described in this section should only be performed by trained service technicians who are affiliated with LaserStar Technologies Corporation® or other authorized personnel who are trained and qualified. Warranty claims for damage to persons or property that are the result of an improperly connected device will not be honored.



Check the VAC label and device's certificate or ID label (located on the rear of the laser system) and compare with the power requirements at the installation site.

AC Voltage Input (AC disconnect)

The AC voltage input is used to supply AC power to the workstation; removing this plug will disconnect the AC power from the equipment. Each of the laser system's switches (**mains power switch** and **system key switch**) should be in the "off" position before applying AC voltage.

The laser system's model determines the AC requirements; check that the AC supply agrees with the specifications on the identification label (located on the rear of the system). This label includes important information for your laser system, including the device's model number, serial number, and AC requirements. **Attention: Make sure the laser system is grounded; the ground wire must be connected for safe and reliable operation. When power requirements exceed 1kV on the AC line, surge suppression is required.**

When replacing the detachable mains supply cord, it's important that the new cord be appropriately rated and suitable for the required or anticipated electrical load. Be sure to check the rating for the replacement cord before purchase; **never use or purchase cords that lack an appropriate rating.**

Remote Interlock Connector

The laser system is equipped with a remote interlock connector for connecting to a secondary interlock system or remote interlock circuit (such as an entry door into a specific laser room). **The system will not generate a laser pulse unless the remote interlock connector is closed.** For the location of the remote interlock connector, reference the section for **Figure 50 on page 106.**

When connecting the remote interlock to a secondary interlock circuit, the following requirements must be met:

- ★ Before wiring, the shorting jumper (under the plastic cover of the connector) must be removed.
- ★ The wiring should be routed away from all power cords and should not exceed thirty (30) feet or nine (9) meters in length.
- ★ The interlock must be a voltage-free, form-a contact (normally open) that is held closed to enable operation of the laser.
- ★ The shorting connection in the connector must be removed and wired to the secondary interlock circuit.
- ★ A licensed professional in compliance with and knowledgeable of applicable electrical codes must perform the wiring procedure.

If you are not connecting the remote interlock to a secondary interlock system; the shorting connector must be installed on the device to enable operation of the laser.

The shorting connector and keys for the **system key switch** are included inside the bag within the work chamber.

1. To enable operation of the laser, insert the shorting connector into the remote interlock connector (located on the controls panel; rear of the laser system).
2. Manually tighten the connector locking ring, turning clockwise, until finger tight.

External Exhaust System

All laser systems are equipped with an exhaust connection (2" or 50.8mm) at the rear of the system. We recommend the use of an external exhaust system with the appropriate air filtration (dependent on the type of material being used) and a fume extractor or vacuum (when determining the required "CFM" [200 to 400CFM is the typical range; application dependent], the device's power output and enclosure size should be taken into account). The Exhaust must have a minimum WC of 30Hg.



Processing vapors with particulates can be an explosive or fire hazard (depending on the particulate material and concentration). Consult your organization’s internal safety department for details on regulations and concentration levels of fumes with particulates (for your specific material processing) and for requirements set by your local authority for permissibility and safety limits to ensure the lasing equipment is adequate for your application.

Inert Gas: Pressure & Flow Regulation		
Operating Pressure (maximum)	Operating Pressure (minimum)	Flow Range (typical)
2 bar (29 psi; 0.2 MPa)	0 bar (0 psi; 0 MPa)	10 to 30 CFH

(Note: To increase cost-savings and reduce the expense for inert (argon) gas, the flow rate should be adjusted to the lowest setting possible for achieving the necessary surface finish.)

Electromagnetic Compatibility

This device meets EMC standards listed in the **“Declaration of Conformity”** and **“Declaration of Compliance”** in the beginning of this manual.

The limiting values for the generation of electromagnetic disturbance will be exceeded at both ends of the frequency spectrum whenever this device is operated within locations for residential, office, or trade and commerce districts.

Disassembly and Transport

To prepare the equipment for transport over short distances, you will only need to unplug the power supply and other relevant cables. Then, with at least two people, the laser can be carried to its desired location.

Preparing for Storage

The equipment must be stored in a clean environment that meets specified storage temperature and humidity requirements. These details can be found in **“Technical Specifications” on page 17.**

Locking Brakes



Caution!

The FiberStar Welding System should be installed vertically. Once the laser is wheeled to the final location, the brakes can be set. To set the brakes, spin the cog in a clockwise motion (as seen from above). To release the brakes, spin the cog in a counter-clockwise motion. The brakes also serve as levelling feet, which are adjusted by further engaging each brake.



Caution!

All four brakes should be fully disengaged prior to moving the laser. Pushing or moving the laser with the brakes engaged may cause damage to the brakes.

Engagement Cog

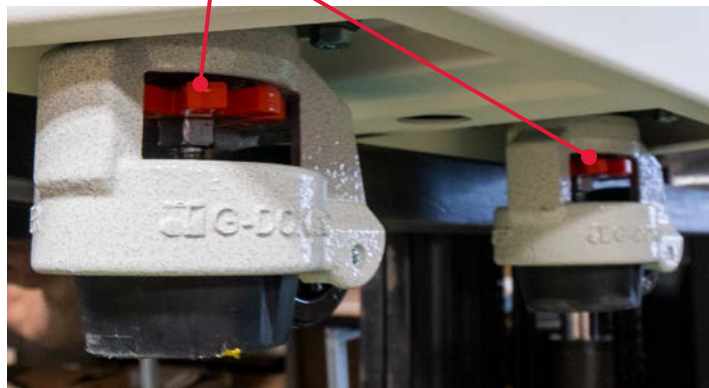


Figure 12

(Adjustable stand Brakes: Model might not match)

Viewing System Installation

Model dependent. Actual equipment may not look as shown.

The lens can be screwed into the laser head. The microscope can be installed by placing it into the hole on top of the laser head and tighten the screws on either side of the mounting ring.

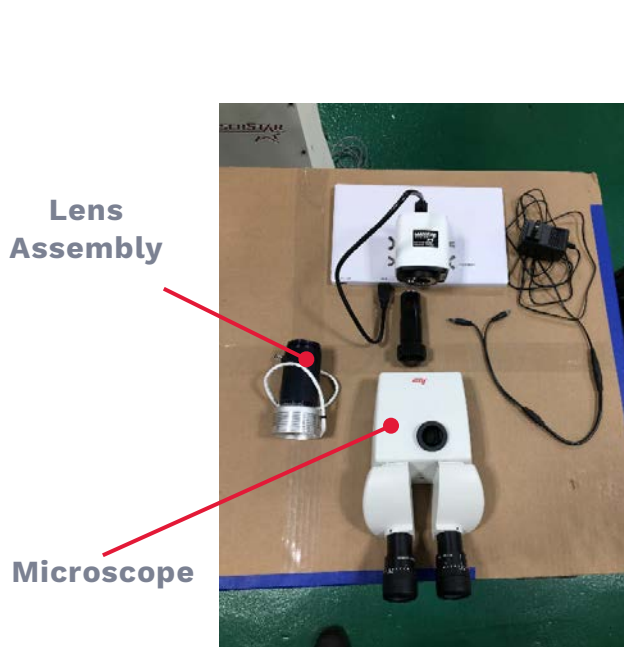


Figure 13
(Viewing System, Separated)

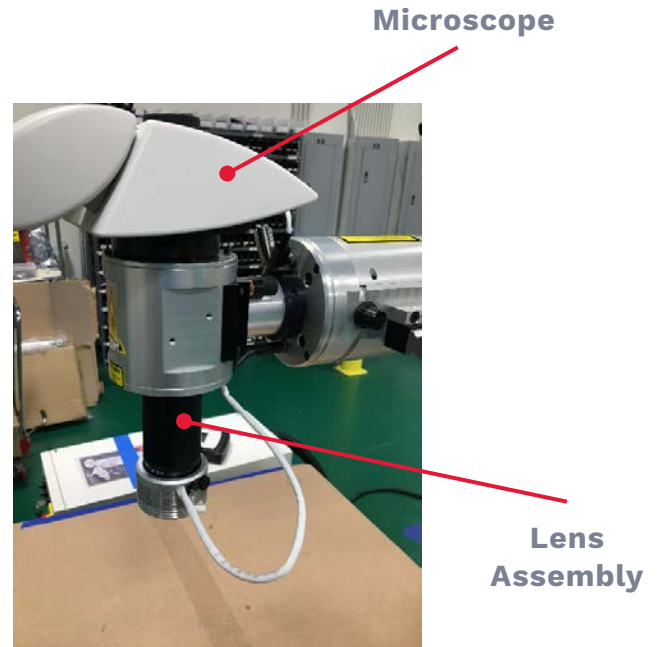


Figure 14
(Viewing System, Installed)



Figure 15
(Microscope Screen [optional])



Figure 16
(Microscope Screen; Installed)

IV. Operation

Overview & Fundamentals

This section describes systems operations. The (>) symbol notes actions that must be carried out by the operator. In most cases, these actions (in any form) will result in responses or reactions from the device; these responses are noted with a (⊗) symbol. The welder can be operated using the touchscreen display. The buttons on the touchscreen (each represented with an icon, pictogram or text) are used to initiate an action or function when pressed.



Caution!

Whenever adjustments are made to this device that alter performance or use of the controls (adjustments which affect safety or interfere with standard operating protocols), this can result in hazardous radiation exposure. If this device is operated in a manner that has not been approved by the manufacturer, the equipment protections could fail, compromising the safety of the operator and others who are nearby. Before operating this device, all users must be sure to read the section within this manual on “II. Safety” on page 28.



Attention: To ensure optimum performance, the laser source should be turned on and allowed time to warm up for at least 5 minutes; this warm-up period is important, as it affects final power output. (Note: Some applications will not be sensitive to the output variation.) Details for the warm-up period applicable for this laser system can be found in “Technical Specifications” on page 17.



Attention: In an effort to preserve the touchscreen display and extend the lifetime and functionality of the workstation, you should refrain from using inappropriate items (pencils, pens, pointer devices) to press buttons or interact with the digital display. Using these and other items not intended for use with digital devices can cause the touchscreen display to malfunction. This can result in erratic or faulty operation and will also void the laser system’s warranty. When pressing buttons and interacting with the touchscreen display, be sure to use only your fingers (not finger nails).

Operating Modes (pulse and CW)

While operating the welding workstation, there are two (2) options for pulse mode that can be utilized - STD and Micro-pulse mode (CW).

When using STD pulse mode, maximum peak power is delivered while the laser is in use, however, maximum pulse duration and maximum duty-cycle are limited to specific values. Conversely, Micro-pulse mode (CW) uses a lower peak power, but this mode supports any available pulse profile shape (reference the section on Pulse Performance (P³) Technology.)

(Note: When using Micro-pulse mode (CW), there’s an option to enable Continuous Wave (CW) pulse mode. While enabled [and when the foot pedal is depressed], this device will generate continuous peak power output [shown in watts (W) on the touchscreen display]).

With STD pulse mode, there are four (4) pulse shapes available for use: Basic, Ramp Down, Spike, and Burst.

- STD pulse mode: With this mode, maximum peak power is considerably higher than with Micro-pulse or Continuous mode, however, maximum pulse duration and duty-cycle are both limited to specific values. With STD mode, output energy is measured in joules (J).
- Micro-pulse mode: In this CW mode, maximum peak power is reduced, while average power is increased.

While using micro-pulse mode, there are two (2) variations for the pulse mode that can be utilized:

- Micro-pulse (CW): All P³ technology pulse shapes can be used in this mode. With Micro-pulse (CW), the output energy is measured in joules (J).
- Continuous (CW): With Continuous mode, the laser generates a continuous output while the foot pedal is depressed. The output power for Continuous (CW) is measured in watts (W).

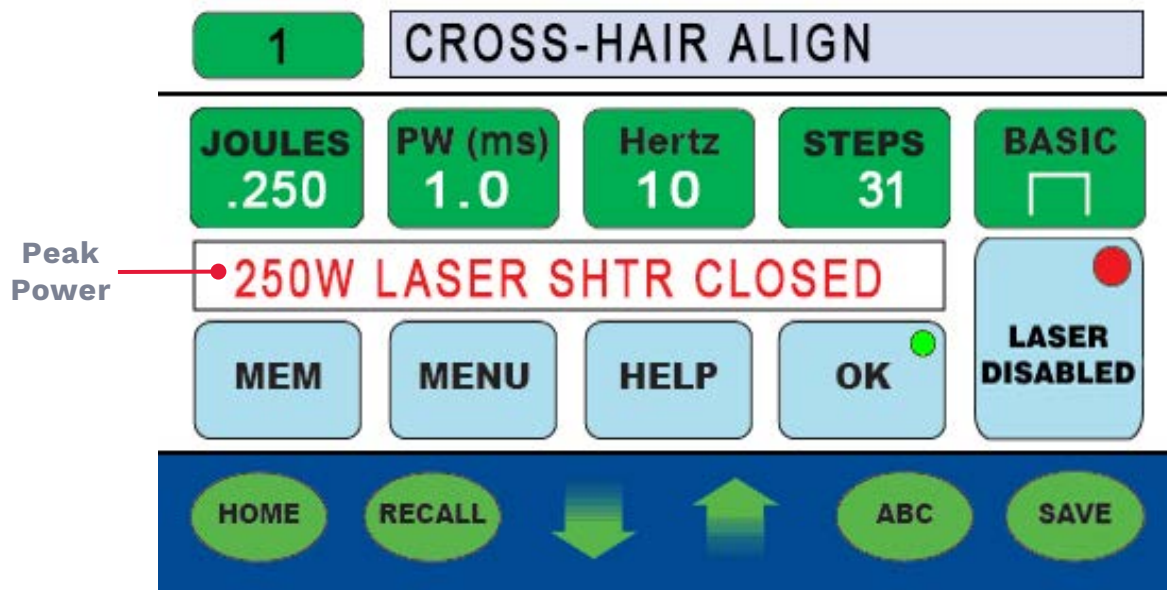


Figure 17
(Software Screen: Main Menu)

Switching from Micro-pulse Mode to STD Pulse Mode

Press the **Menu button** > Press the **down arrow**; select **STD pulse mode** > Press the **Enter button** > Press the **up** or **down arrows**; scroll to “STD” > Press the **Enter button** > Press the **Exit button** twice (2) to return to the **main menu**.

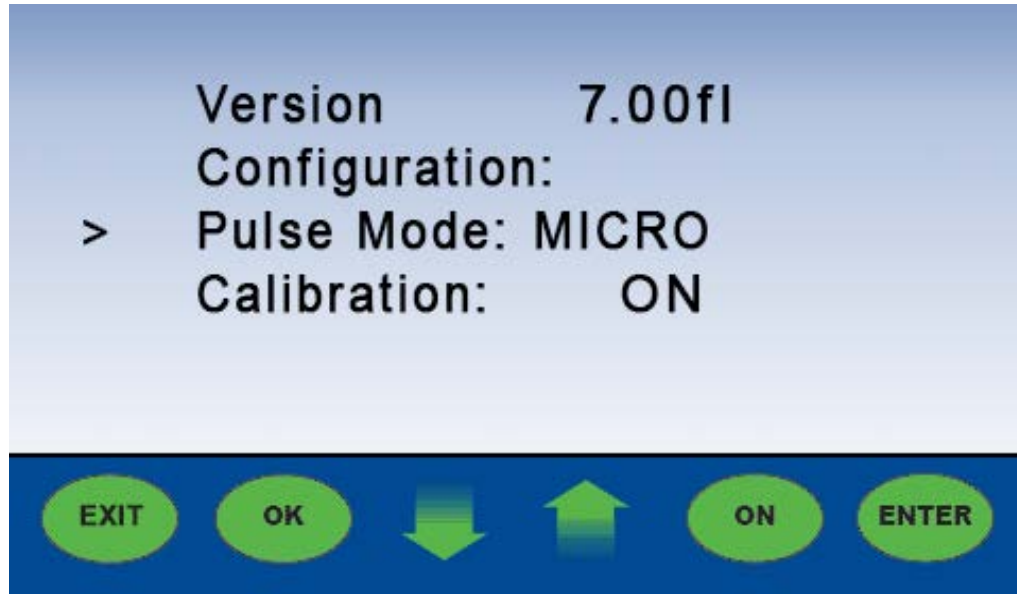


Figure 18

(Micro-Pulse Mode Selected)

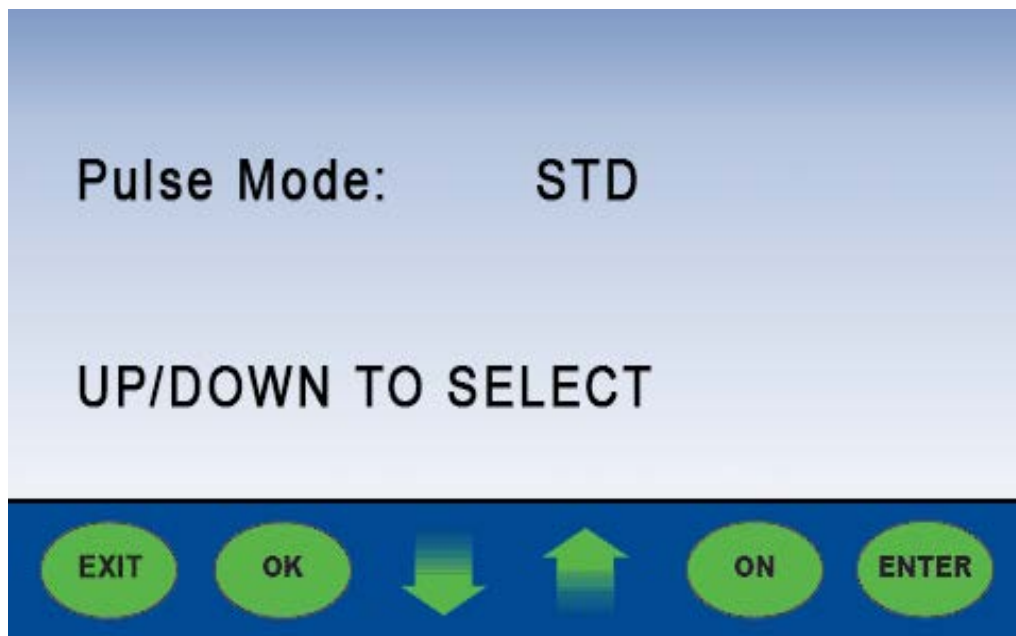


Figure 19

(Pulse mode changed; micropulse mode to STD)



Figure 20
(STD pulse mode selected)

With **STD (single-pulse) mode**, there are four (4) available pulse profiles to select from: **basic**, **ramp down**, **spike**, and **burst**; each of these profiles utilizes **Pulse Performance Profile (P³) Technology**.

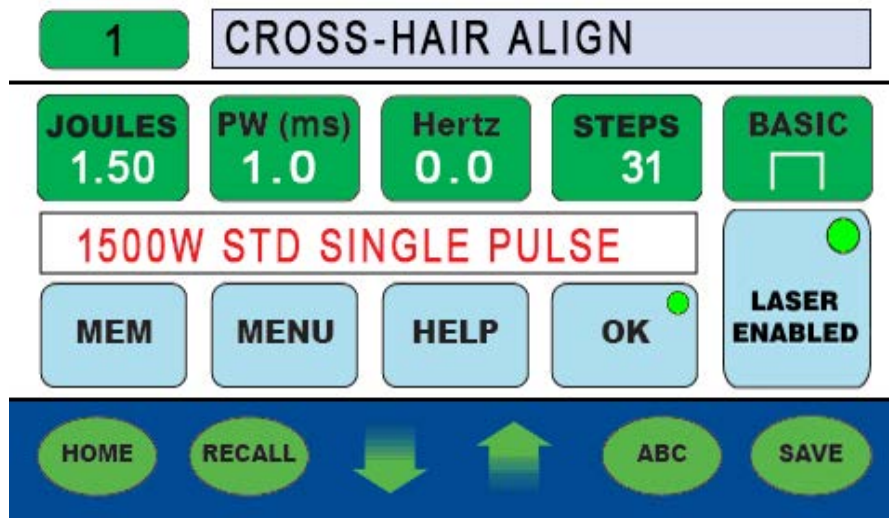


Figure 21
(STD [single-pulse] mode)

With **STD (multi-pulse) mode**, there are four (4) available pulse profiles to choose from. Just like with **STD (single-pulse) mode**, available pulse profiles include: **basic**, **ramp down**, **spike**, and **burst**. Each of these options also make use of **Pulse Performance Profile (P³) Technology**.

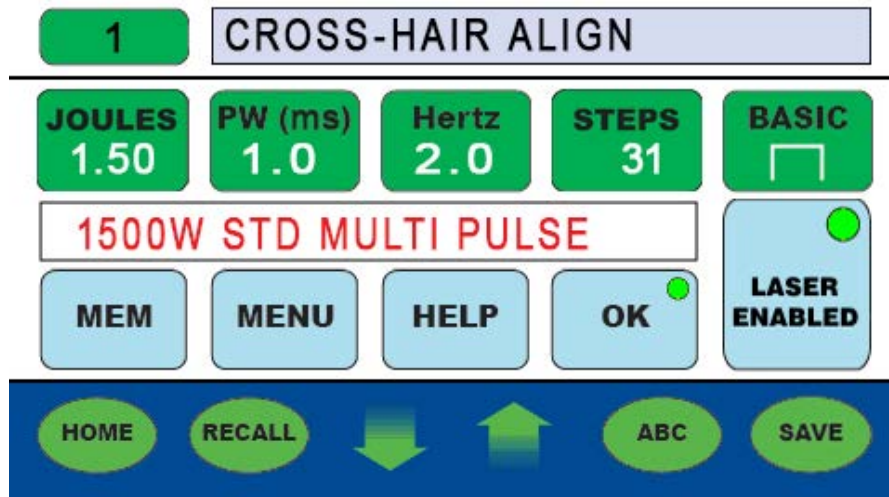


Figure 22
(STD [multi-pulse] mode)

Enabling Micro-pulse Mode

Press the **Menu button** > Select **STD pulse mode** > Press the **Enter button** > Press the **up** or **down arrows**; scroll to “Micro” > Press the **Enter button** > Press the **Exit button** twice (2) to return to the **main menu**.



Figure 23
(STD pulse mode selected)



Figure 24
(Pulse mode changed; STD to Micro-pulse mode)



Figure 25
(Micro-pulse mode selected)

Using Micro (single-pulse) Mode

With **Micro (single-pulse) mode**, all available pulse profiles (utilizing **Pulse Performance Profile [P³] Technology**) may be used. While in this mode, pulse width can range, however, once pulse width exceeds 50ms, only the **Basic** and **Burst profiles** are made accessible.



Figure 26
(Micro [single-pulse] mode selected)

Using Micro (multi-pulse) Mode

Similar to **Micro (single-pulse) mode**, with **Micro (multi-pulse) mode**, all available pulse profiles (utilizing **Pulse Performance Profile [P³] Technology**) may be used. While in this mode, pulse width can range, however, once pulse width exceeds 50ms, only the **Basic** and **Burst profiles** are made accessible.

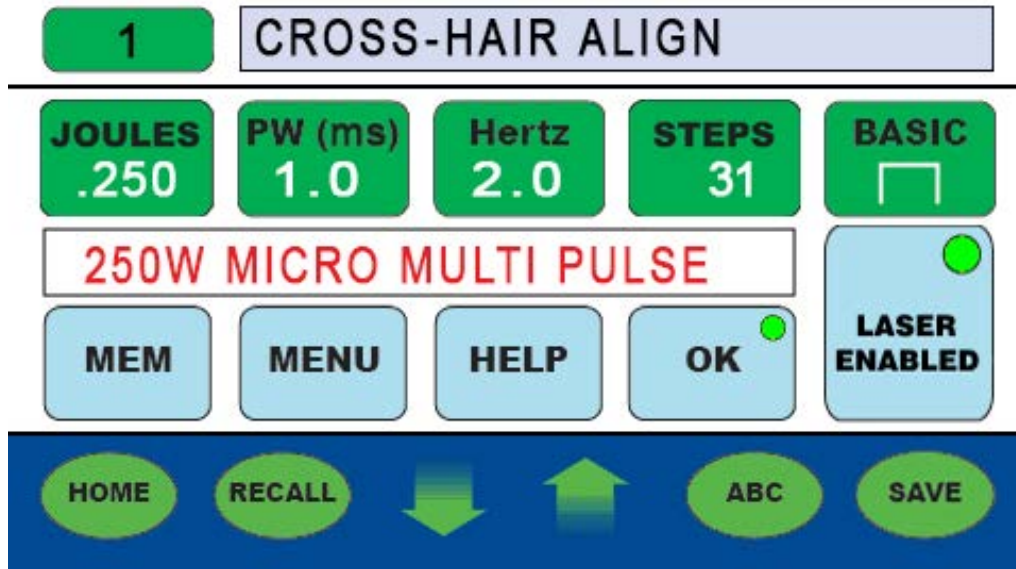


Figure 27
(Micro [multi-pulse] mode selected)

Using Continuous Wave (CW) Mode

When accessing **Continuous Wave (CW) mode**, you must first select **Micro-pulse mode**. Next, using the **up arrow**, scroll through the available options until “CW” is displayed on the PW (ms) button. (Note: The last number that displays on the **PW button** [before entering CW mode] is 75 ms.) The message area on the touchscreen display will show the current selection - **Continuous Wave (CW) mode**. While in this mode (and when the foot pedal is depressed), this device will generate continuous peak power output (shown in watts [W] on the touchscreen display).

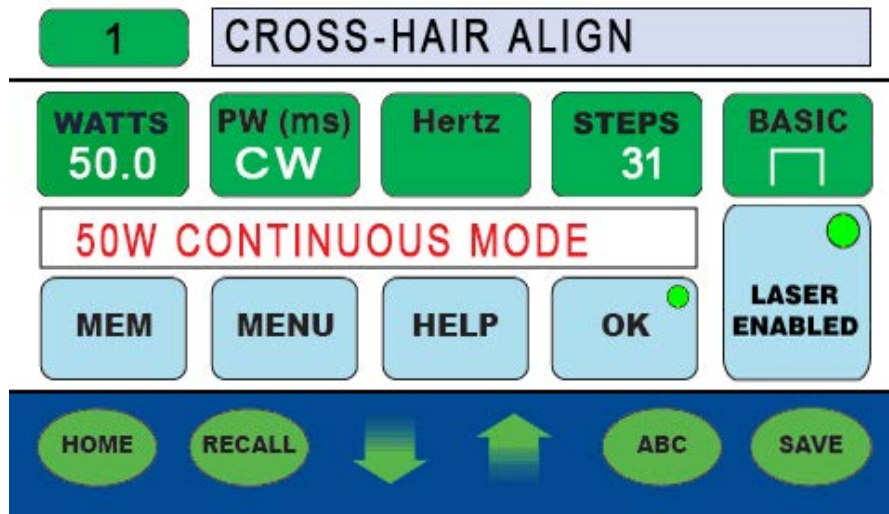


Figure 28
(Continuous Wave [CW] mode)

Initial Operation

After having read and understood this chapter, and additionally having completed all steps described in **“III. Installation” on page 41**, the welder is ready for use. For detailed instructions on enabling power to the workstation, reference the diagrams below and the table on the next page.



Figure 29
(Switching “ON”)

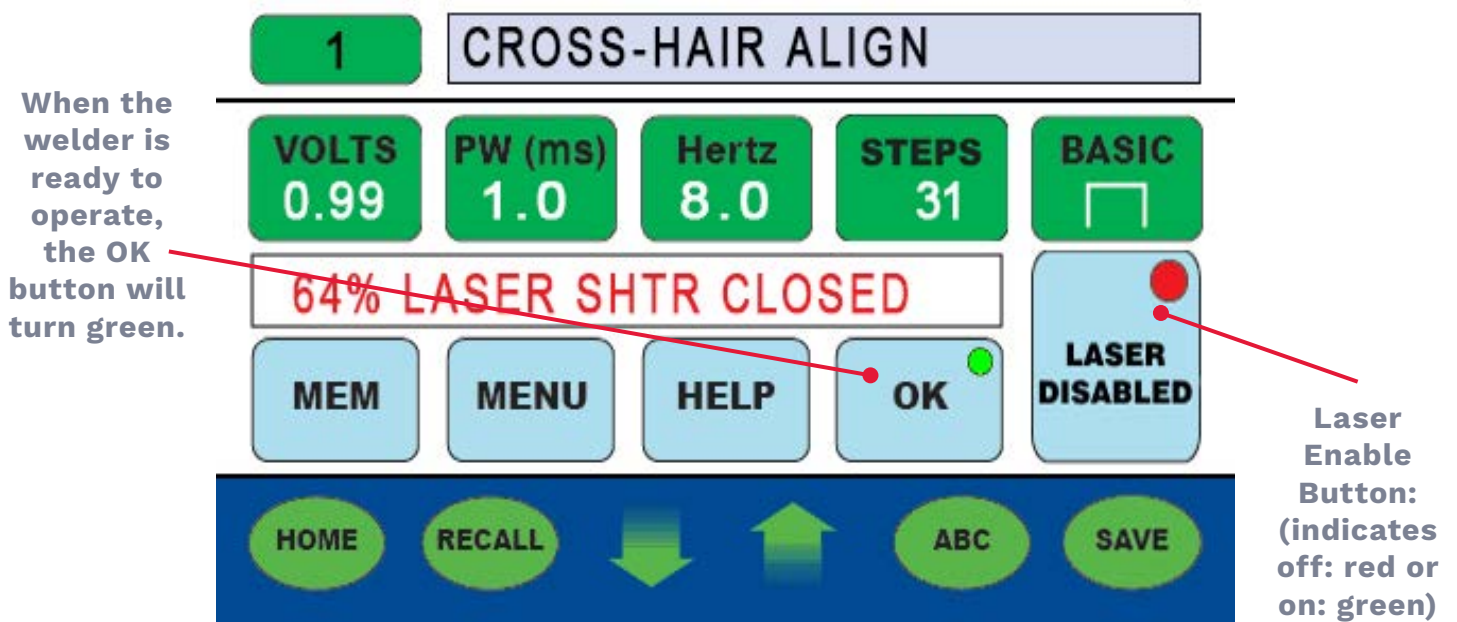


Figure 30
(Main Menu; Touchscreen Display)

Switching the Welder “ON”

Operator Action >	System Response ⊗
<p>Make sure the system key switch is in the “off” or “0” position (see Figure 29 on the previous page).</p>	
<p>Turn the mains power switch “on” or to the “1” position (see Figure 29 on the previous page).</p>	<p>The touchscreen display will turn “on.”</p> <p>(Note: If the system key switch is not immediately turned “on” after the mains power switch, an error will appear on the touchscreen display. To clear the error and resume powering “on” the device, turn the system key switch to the “on” or “1” position. Next, press the Home button.)</p>
<p>Turn the system key switch “on” or to the “1” position (see Figure 29 on the previous page).</p>	<p>The welder is powered “on” and a series of self-tests are carried out - these self-tests check the device for malfunctions and ensure it’s working properly. If a failure or system fault occurs during this process, an error message will appear on the touchscreen display (see “Troubleshooting” on page 90 for more information).</p> <p>(Note: Depending on the dimmer settings selected, you may notice the lights above the welding table turn “on”)</p>
<p>Wait for the self-test to complete before using the laser system (see Figure 30 on the previous page).</p>	<p>When the welder is ready for use, the indicator on the OK button will change from red to green.</p>
<p>Press the laser enable/disable button (located on the touchscreen display; see Figure 30 on the previous page).</p>	<p>When the laser is enabled, the indicator on the laser enable/disable button will change from red to green and say “laser enabled.”</p>
<p>The welder remains idle for an extended period; the laser system enters energy-saver or sleep mode (see Figure 31 on page 59 on the next page).</p>	<p>If the welder is left idle for an extended period of time (≥15 minutes), it will enter sleep mode; sleep mode helps to reduce the device’s energy consumption.</p>

Energy Saver or Sleep Mode

This mode reduces the energy consumption of the laser system. Press the **“on” button** to return to the main screen.



ENERGY SAVER / SLEEP MODE
Touch “ON” Key to Power Up



Figure 31

(Energy Saver or Sleep Mode)

Flexible Gas Lines



The flexible gas lines, are made from plastic and are vulnerable to concentrated heat and prolonged extreme temperatures. Check to be sure the gas lines are not positioned near the workstation lights (most especially the halogen lights), as they are susceptible to melting and could catch fire or drip hot liquified plastic onto the operator's hands, arms, and/or workpieces.

Flexible
Gas Line



Figure 32
(7604 Interior)

Adjusting the Stereo Microscope

The stereo microscope is factory-adjusted for operators without vision impairments or abnormalities. Adjustments to the microscope, focus, and cross-hair will likely be necessary for any operator who wears (and reliably depends on) glasses or contacts to see and perform normal activities.

- Switch the welding workstation “on,” using only the **mains power switch**; position “1”.
- Adjust the eyepieces, setting each to the zero (0) mark, and ensuring they're secured and fully inserted into their respective tubes.
- Place a sample workpiece into the visual field of the microscope. With the right eye open and the left eye closed, examine the workpiece through the right eyepiece. Check to be sure that the part appears sharp and in focus when viewed through the microscope.
- Look with the left eye through the left eyepiece. Turn the left-side adjustment ring so that the cross-hair appears in focus when viewed through the microscope's left eyepiece.
- Using the lower portion of the eyepiece, rotate the component to orientate the cross-hair to the desired position. Check to be sure that the cross-hair is still in focus and adjust, if needed.

- Adjust the distance between both eyepieces so that the visual fields for both overlap (with the eyes in a relaxed state, observe the sample workpiece); a single rounded visual field should be present.

After finalizing all adjustments, the sample workpiece and cross-hair should appear sharp and in focus while looking simultaneously through each of the microscope's eyepieces.

Mounting the Stereo Microscope

When completing the steps below for microscope mounting and optical alignment, be sure to reference the **optical alignment diagram** on the next page.

1. Place the stereo microscope into the mounting bracket.
2. Secure the microscope to the body of the welder by tightening the two (2) mounting screws. The mounting screws are located between the center, left, and right adjustment screws (see the diagram on the next page for details and a visual reference).
3. Plug the microscope into the power input (located on the back, left-hand side of the welder; opposite the **mains power switch**).

Optical Alignment and Cross-hair Adjustment

1. Using an adjustable lab jack (tabletop scissor-lift platform) or equivalent device, bring the steel plate into focus.
2. Adjust the parameters to one of the following (the setting should be provided on recipe #79):
 - o **0.230J 2.0ms 0 Hz 2.0 ms 20s Basic**
 - o **0.090J 0.6ms 0 Hz 2.0 ms 20s Basic**
3. Fire a single laser pulse onto the steel plate; leave the plate in place and do not move.
4. Using the three (3) adjustment screws (refer to the diagram on the next page for placement), align the laser pulse position within the center of the cross-hair. **Caution: Be careful not to remove or overtighten the adjustment screws.**
5. Fire an additional single laser pulse onto the steel plate, testing to ensure that all adjustments for alignment are correct.

(Note: Be sure to re-check the alignment periodically; adjustments may also need to be made for workpieces that differ in size or structure.)

Optical Alignment Diagram

NOTES:

DO NOT REMOVE OR LOOSEN SCREWS LABELED. (1)

TO REMOVE MOUNTING BRACKET, LOOSEN CAPTURED SCREWS IN HOLES LABELED. (2)

(SCREWS WILL LOOSEN, BUT WILL NOT COME OUT) .

ADJUSTMENT SCREW
MOVES CROSS HAIR
IN THIS DIRECTION

ADJUSTMENT SCREW
MOVES CROSS HAIR
IN THIS DIRECTION

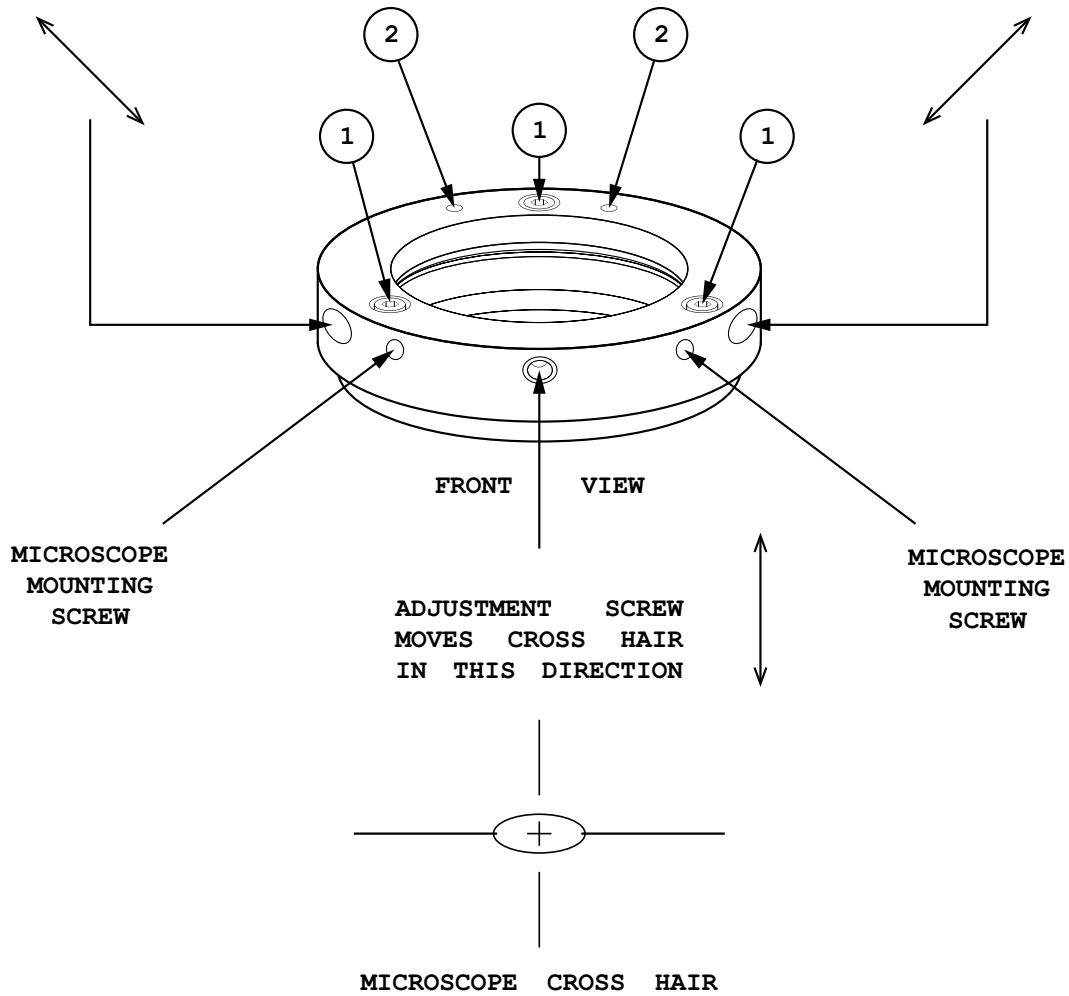


Figure 33
(Optical alignment diagram)

Setting Operating Parameters

Setting operating parameters can be achieved using the touchscreen display.

(Note: The laser enable/disable button allows for specialized functions, which are defined in more detail later in this chapter.)

Touchscreen Display Operation

When pressing buttons on the touchscreen display, be sure to press directly in the center off-center button pressing can result in unintended or undesirable actions.

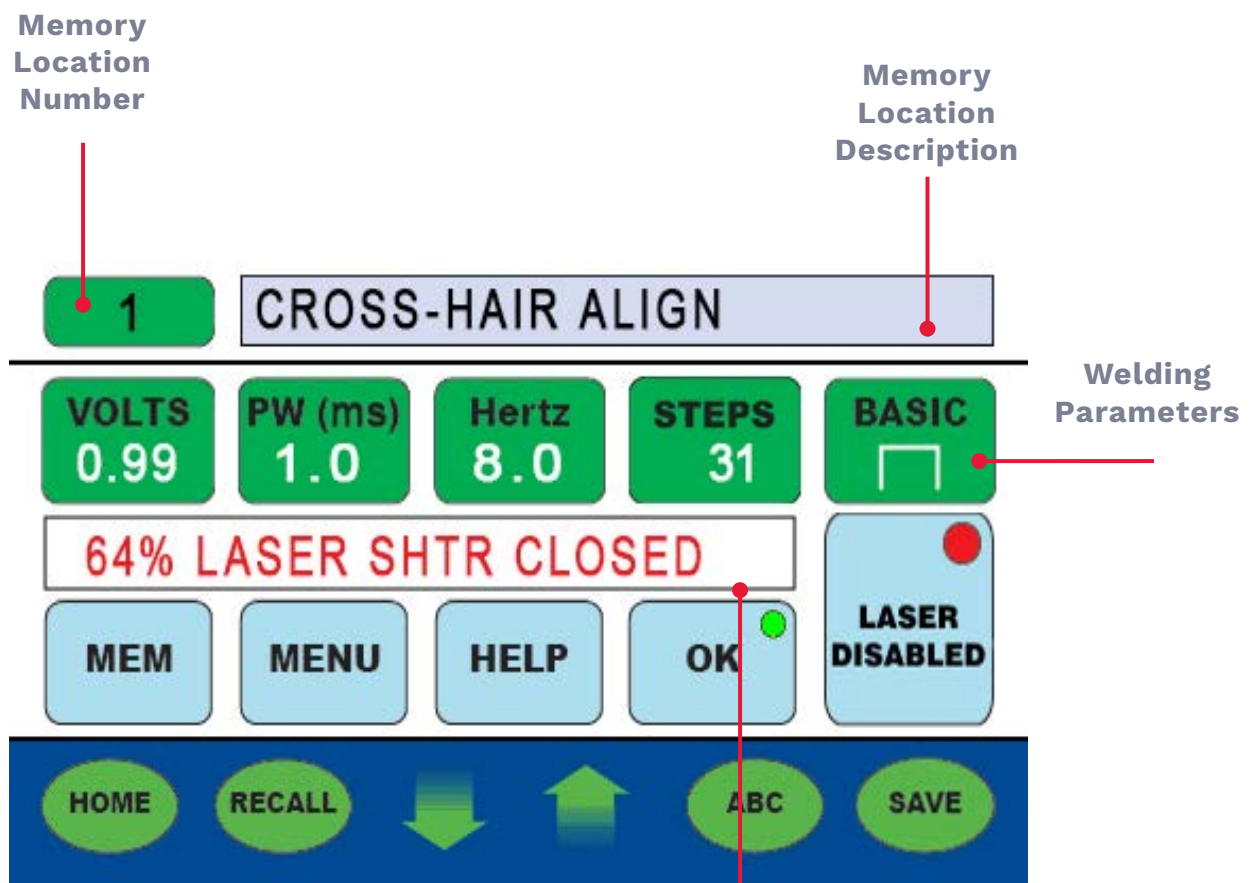


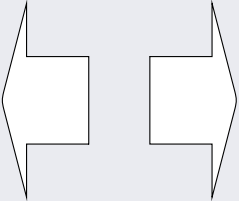
Figure 34
(Touchscreen Display)

Messages,
Alerts, and
Status

Messaging & Touchscreen Display Operation

Touchscreen Display Commands	
Buttons and Indicators	System Response
OK (see Figure 34 on page 63 on the previous page)	Pressing the OK button confirms the current selection and parameters displayed; returns to the main screen.
OK (Red)	The system is <u>not</u> ready to operate; the laser can <u>not</u> fire.
OK (Green)	The system is ready to operate; the laser can fire.
Laser Disabled (Red)	When the indicator for the laser enable/disable button is red, the laser is inactive. Press the laser enable/disable button so the laser is ready to fire.
Laser Enabled (Green)	When the indicator for the laser enable/disable button is green, the laser is active. Press the laser enable/disable button so the laser does not fire.
Memory Location Number	<p>Press the memory location number button to change the memory location number - the display will blink. Use the up or down arrows to change to the desired memory location number. Then, press OK (confirms selection; blinking stops). Press the recall button twice (×2) to load the stored values into the weld parameters.</p> <ul style="list-style-type: none"> • Yellow (indicates the weld parameters are from this memory location) • Gray (indicates the weld parameters are not from this memory location) <p>(Note: Memory locations may be loaded with factory defaults.)</p>
Menu	Press this button to navigate to the version or configuration display screen.

Touchscreen Display Commands	
Buttons and Indicators	System Response
<p>Menu Display Screen:</p>	<p>Use the up or down arrows to move the cursor (>) to the selected item. Press the enter button to enter the mode. Use the up or down arrows to change the mode (toggling “on” or “off”) or value (i.e. -0.50s). To store changes, press Enter. Press the exit button to return to the main menu.</p> <p>Version: xxxxxx Device Configuration: Version: Alphanumeric Pulse Mode: STD or Micro</p> <p>Weld Gas: “ON” or “OFF” (use the up or down arrows to adjust; press Enter)</p> <p>Pre-weld Gas: 0.00s (use the up or down arrows to adjust; press Enter)</p> <p>Post-weld Gas: 0.00s (use the up or down arrows to adjust; press Enter)</p> <p>Sleep Mode: Not applicable</p> <p>Pulse Count: 0 (use the up or down arrows to adjust)</p> <p>Hours On: 4.3 (no actions possible)</p> <p>Pulse Total: 0 (use the up or down arrows to adjust)</p>

Touchscreen Display Commands	
Buttons and Indicators	System Response
Version or configuration display screen (next page)	
OK	Pressing this button enters the selected item. Use the up or down arrows to change the mode. Then, press the enter button to store the results.
ON	Pressing this button will reset the pulse count, when the pulse count is selected.
Esc	Press this button to return to the device's main menu .
Clear	Pressing this button completely clears the memory location description.
	Pressing these arrows to select the alpha numeric characters.
Save	Press this button to save the memory location description.
BS	Press this button to delete the last character.
CAP	Press this button to change from upper or lowercase letters.
123	Press this button to change back and forth between letters and numbers.

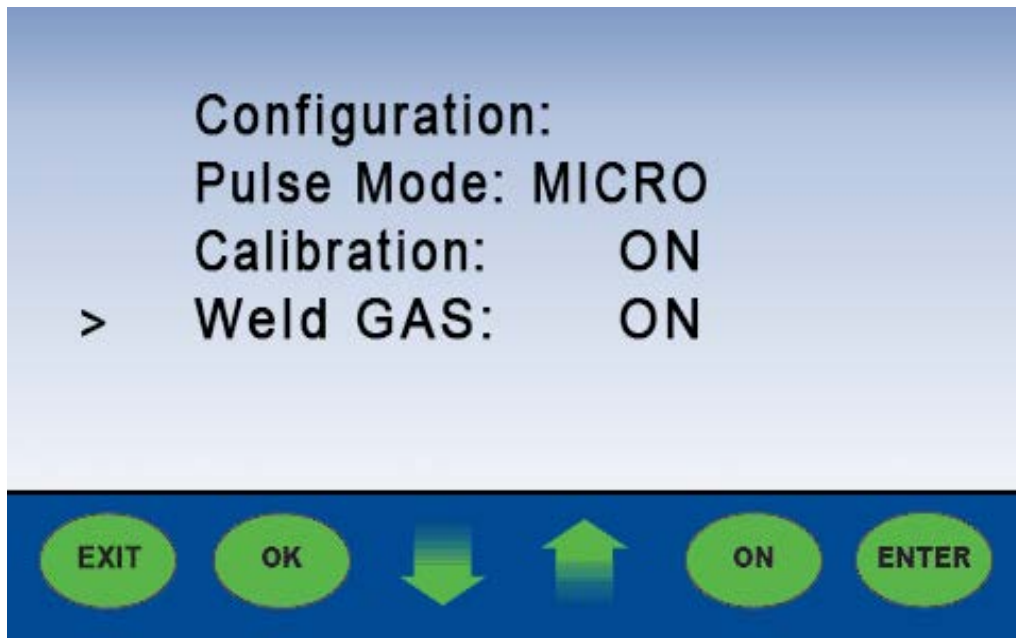


Figure 35
 (Menu Screen; Scroll to Weld GAS)

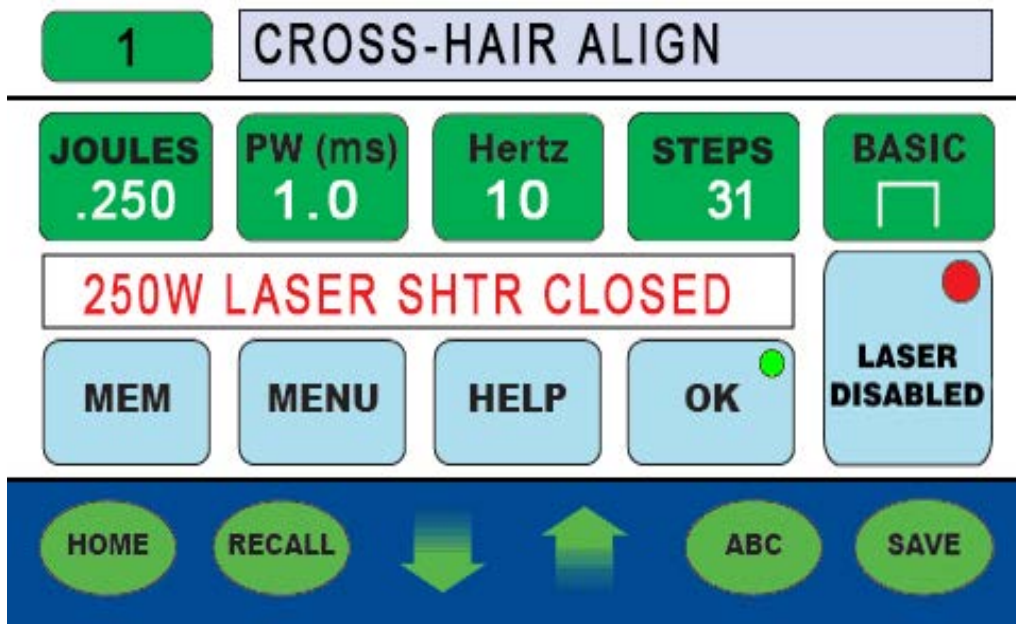


Figure 36
 (Main Menu)

Touchscreen Display Commands	
Buttons and Indicators	System Response
<p>Memory Location Description</p>	<p>Displays the weld parameter description.</p> <ul style="list-style-type: none"> ★ Yellow (indicates the weld parameters are from this memory location) ★ Gray (indicates the weld parameters are not from this memory location)
<p>Welding Parameters</p> <ul style="list-style-type: none"> • Joules (J) or Watts (W) • Pulse Width (PW [ms]) • Hertz or Burst (optional and model specific) 	<p>Displays the current weld parameters:</p> <p>Joules: Press to change the value - the display will blink. Use the up or down arrows to adjust. Then, press OK. (Note: Valid for all modes except CW Mode.)</p> <p>Watts: Press to change the value - the display will blink. Use the up or down arrows to adjust. Then, press OK. (Note: Valid only for CW Mode.)</p> <p>PW (ms): Press to change the value - the display will blink. Use the up or down arrows to adjust. Then, press OK.</p> <p>Hertz or Burst: (Note: Use the up or down arrows to select Hertz or Burst.)</p> <ul style="list-style-type: none"> ★ Hertz: Press to change the value - the display will blink. Use the up or down arrows to adjust. Then, press OK. ★ Burst: Press to change the value - the display will blink. Use the up or down arrows to adjust. Then, press OK.

Touchscreen Display Commands	
Buttons and Indicators	System Response
Menu Display Screen (continued)	<p>Fault Lists: (to view or clear, press the “on” button)</p> <p>Restore Default Memory: (use the up or down arrows to select an option)</p> <ul style="list-style-type: none"> • NO: No change; press enter. • ALL: Reloads LST data with no change to user-defined memory locations; press the enter button. • LST: Reloads LST data and clears user-defined memory location; press the enter button. <p>Energy Usage: 0 (use the up or down arrows to select an option)</p> <ul style="list-style-type: none"> • SHOW: Press the enter button. • SYS: Press the enter button. • CLEAR: Press the “on” button. <p>Frequency Adjustment: xx (use the up or down arrows to select an option)</p> <p>Beam Expander Offset: ± 12 (use the up or down arrows to select an option; press the Enter button)</p> <p>Password Summary: 9 (use the up or down arrows to select an option; press the Enter button)</p> <p>Diag: Press the On button.</p> <p>Back: Press the Enter button.</p> <p>(Note: If adjustments are not made within a reasonable timeframe, the device will return to the main screen.)</p>
Enter	Pressing the enter button confirms a user selection. If necessary, changes can also be made using either the up or down arrows or by pressing “on.” To store results, press enter.

Touchscreen Display Commands	
Buttons and Indicators	System Response
Exit	Press this button once (×1) or twice (×2) to exit the version or configuration display screen and return to the main screen.
Welding Parameters <ul style="list-style-type: none"> • Pulse Spot Size (DIA [mm]) • Pulse Shape (see the section on Pulse Performance Profile [P³] Technology) 	<p>DIA (mm): Press to change the value - the display will blink. Use the up or down arrows to adjust. Then, press OK.</p> <p>Pulse Shape: Press this button to change the value - the display will blink. Use the up or down arrows to adjust. Then, press OK.</p> <p>(Note: If OK is not pressed, the selected operation will time out; the change will be stored.)</p>
Messages	Displays the laser system’s status; lists details regarding error messages, memory parameters, laser status, etc.
MEM (memory features) (see the next page that follow after these listed touchscreen display commands)	<p>Displays stored parameters and a description for the memory location number, which can be found in the upper left-hand corner of the touchscreen display.</p> <p>Pressing the clear button allows the operator to clear the parameters and description for a selected memory location.</p> <p>Attention: All information in this memory location, including factory defaults will be erased. To restore defaults, on the touchscreen, navigate to main menu > restore default memory > LST.</p> <p>Displays a message to verify that the operator intends to clear the selected memory location.</p> <p>Pressing the clear button again will delete the memory. To return to the main menu without clearing the memory location, press the home button.</p>

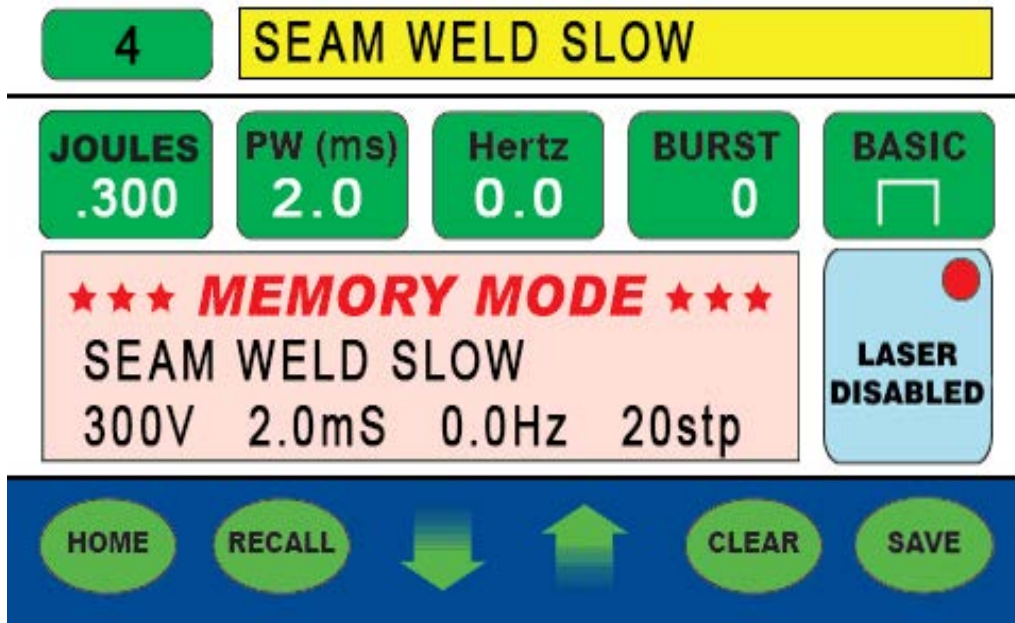


Figure 37
(Memory Mode)

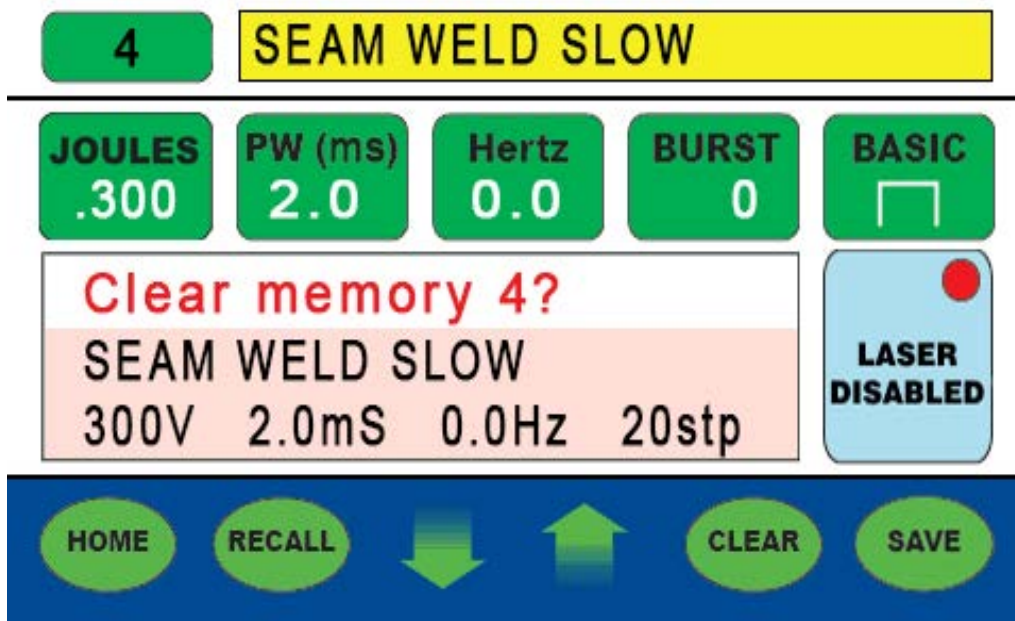


Figure 38
(Clear Memory; press CLEAR)

Touchscreen Display Commands	
Buttons and Indicators	System Response
Help	<p>Press this button to view the following:</p> <ul style="list-style-type: none"> ★ LaserStar Technologies Corporation® Contact Details ★ Device Model Number ★ Device Serial Number ★ Tools & Helpful Information (to aid the operator)
Home	<p>Pressing this button returns the system to the main menu.</p>
<p>Recall (see Figure 39 on page 72 & Figure 40 on page 73)</p>	<p>After selecting the memory location, press the recall button twice (x2).</p> <p>(Note: The second button activation is in response to a question: “Recall memory xx?”)</p> <ul style="list-style-type: none"> • gray (indicates the weld parameters are not from this memory location) • yellow (indicates the weld parameters are from this memory location)

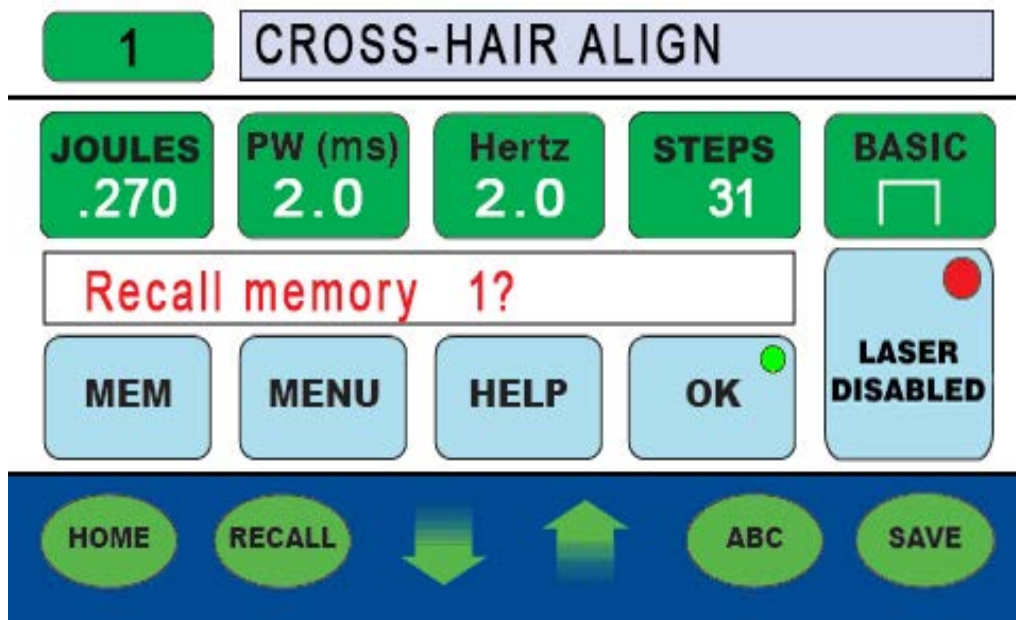


Figure 39
(Recall Memory)

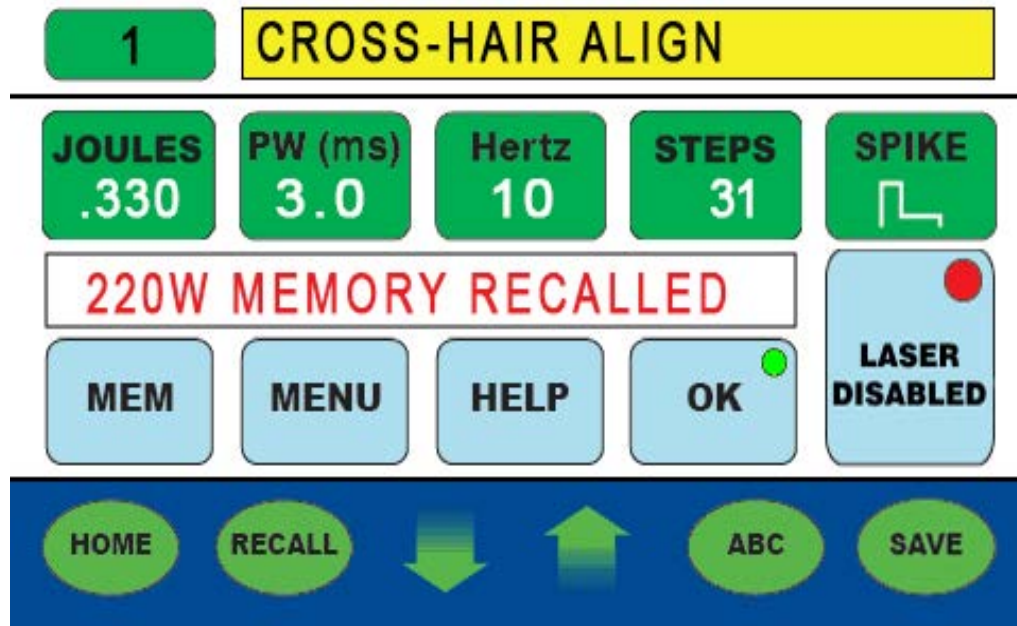

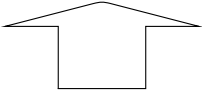


Figure 40
(Memory Recalled)

Touchscreen Display Commands	
Buttons and Indicators	System Response
Down 	Press this button to decrease the selected parameter value or memory location number, and/or navigate to the < (menu) function.
Up 	Press this button to increase the selected parameter value or memory location number, and/or navigate to the < (menu) function.
ABC / 123 (see Figure 43 & Figure 44 on page 75 that follow after these listed touchscreen display commands)	Press this button to switch to the alphanumeric keypad; the alphanumeric keypad is used to name a weld parameter within a specific memory location.
Save (see Figure 43 & Figure 44 on page 75 that follow after these listed touchscreen display commands)	Pressing this button twice (x2) will store the welding parameters shown into the selected memory location number (located in the upper left-hand corner of the touchscreen display). (Note: The second button activation is in response to a question: “Store in memory xx?”.)

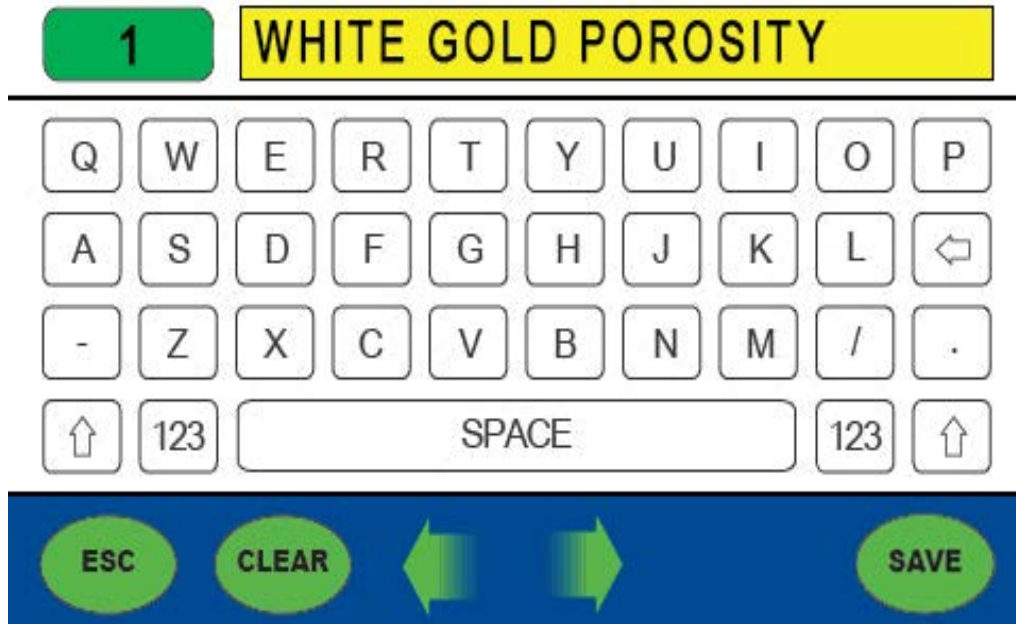


Figure 41
(ABC Keypad)

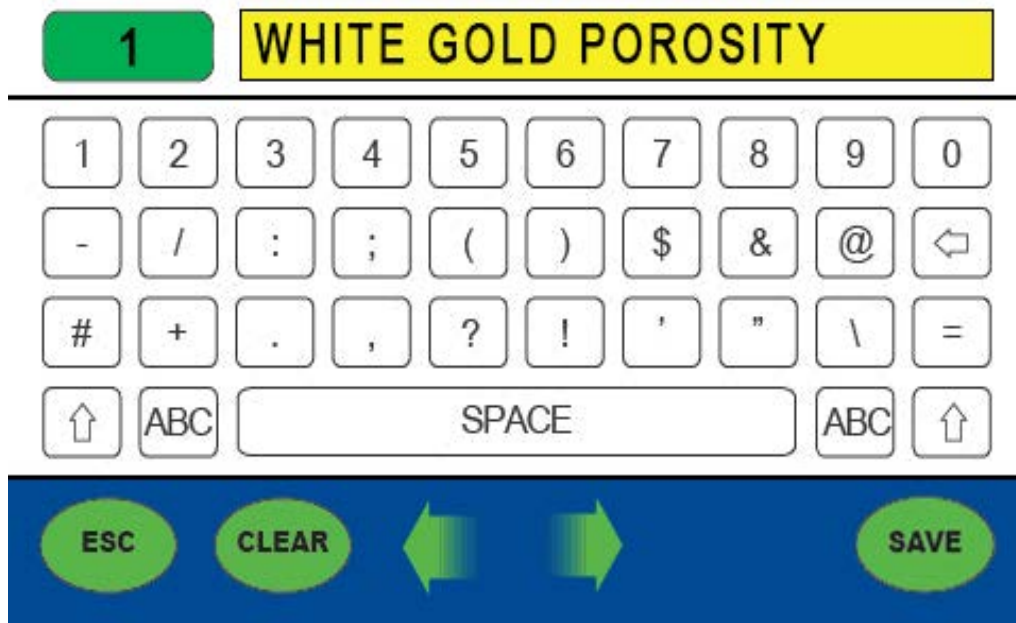


Figure 42
(123 Keypad)

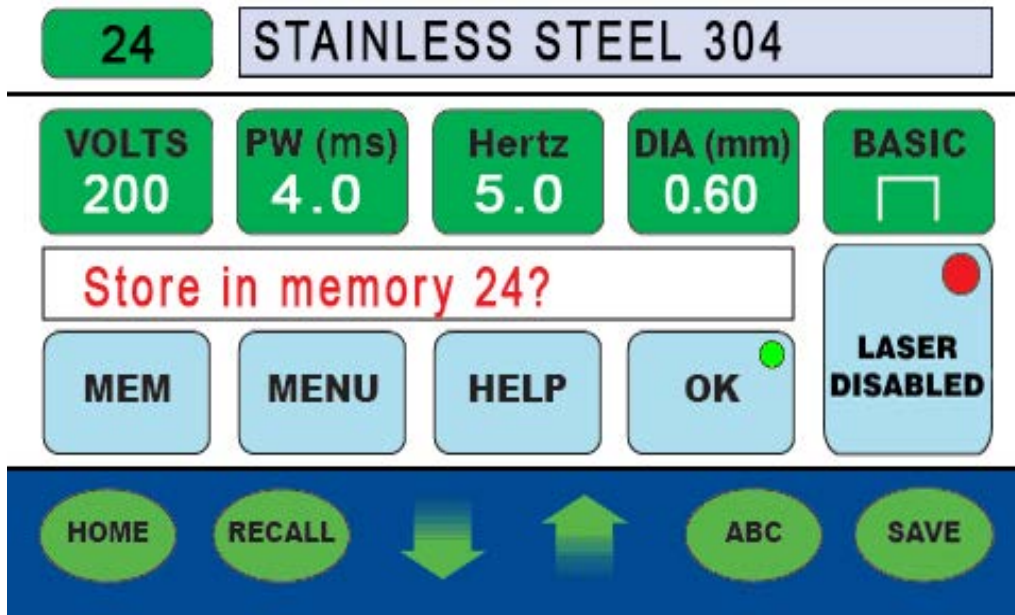


Figure 43
(Save Process)

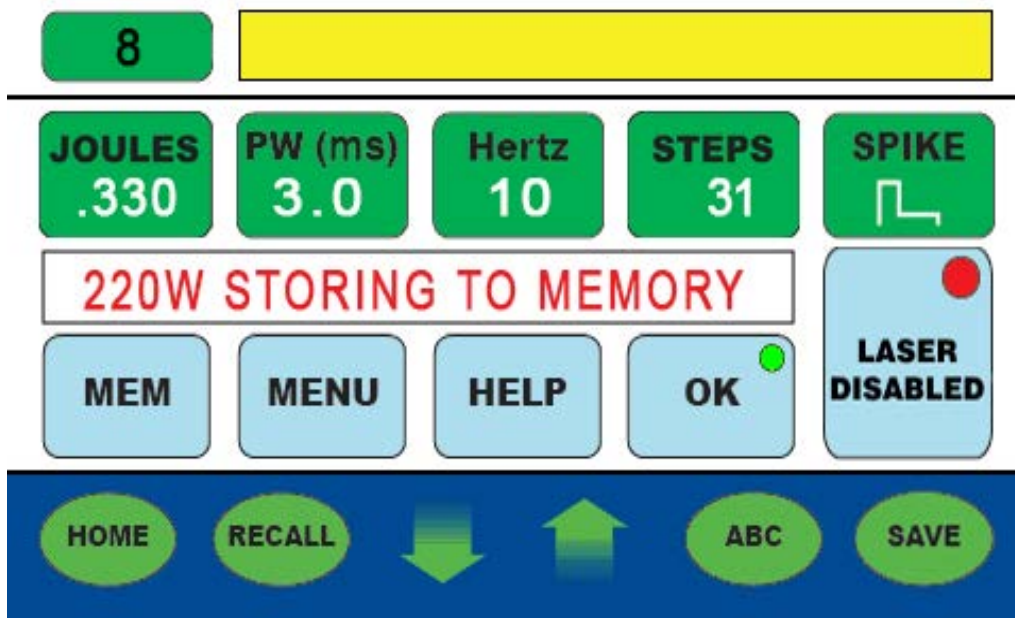


Figure 44
(Storing to Memory)

Storing Parameters

The device's controller has stored memory locations with sets of predefined or pre-programmed operating parameters - each optimized for a specific application or material. Selecting from these predefined parameter settings allows the operator to utilize the same tried-and-tested operating data that previously yielded good results. These memory locations will already have default designations, but this can change, as needed. In order to better identify various memory locations, the operator can rename each, giving each a new text-based name or descriptor. If necessary, it's also possible to restore or recover the default memory names and locations in the future. When restoring defaults, it's important to note that all parameters that were added previously by the user will be erased.

A stored set of parameters consists of the following:

- Joules (J) or Watts (%)
- Pulse Width (PW [ms])
- Hertz (single pulse [≥ 0 Hz]; multi-pulse [≥ 0.5 Hz])
- Burst (At 0, it will match the frequency/pulse width. At 1 or higher the system will cease firing after the laser has fired [Burst] number of shots in a single fire signal.)
- Focus Setting (Dia [mm] or Steps)
- Beam expander Offset

(Note: The beam expander offset allows the user to maintain the same on-screen value for the focus setting (Dia [mm]), despite that the beam diameter is actually the screen value \pm the offset value.)

Important Advisory:

- When selecting a specific memory location and opting to store parameters, the beam expander offset values displayed on the touchscreen menu (at that time) will be stored in this chosen memory location.
- If the operator has not chosen from a set of predefined parameters within a specified memory location, it's possible that the defined beam expander offset values displayed are from the last recalled memory value.
- Restoring factory defaults for the memory will erase modifications that were saved or altered by the user. **(Note: The operator should keep a back-up copy of all memory location settings and operating parameters.)**

Using the touchscreen display, the operator can save parameters into a specific memory location. Pressing the **save button** will allow the operator to retain their applied settings, storing sets of parameters for future use with their applications.

Operator Action	System Response
See methods below for details on storing parameters	
Select the memory location to be utilized by pressing the Memory Location Number button - the display will blink. Use the up or down arrows to change to the desired memory location number.	The selected memory location number is displayed.
To store the values, press the Save button on the touchscreen display (or alternatively inside the welding work chamber) twice (×2).	The values for pulse shape are stored with the welding parameters; these settings are viewable on the touchscreen display main menu .

(Note: On the touchscreen display, when storing parameters with text, use the [ABC] or alternatively, switch to [123] on the alphanumeric keypad.)

Recalling Stored Recipes

The touchscreen display can be used to recall operating parameters (recipes) that have been previously stored into a specific memory location (see the section detailing steps for **“Storing Parameters” on page 76**).

Operator Action	System Response
See methods below for details on storing parameters	
Select the memory location number to be utilized by pressing the memory location number button (located in the upper left-hand corner of the touchscreen display). Use the up or down arrows to change to the desired memory location number. Then, press the recall button twice (×2) to load the stored values into the welding parameters.	The welding parameters for the selected memory location are visible only while the memory location number is blinking (when the blinking stops, the parameters revert back to their previous values).
Press the recall button on the touchscreen display (or alternatively inside the welding work chamber) twice (×2).	The recalled welding parameters are displayed; the memory location description will change from gray to yellow.



If there are no parameter values stored in the selected memory location number, the set values will remain unchanged. If the capacitor bank voltage is reduced as a result of the values selected, it is automatically reduced to the new value by pulse discharge.

Welding Applications

Operator Action	System Response
See methods below for details on storing parameters	
Place the workpiece on the work area.	
Set or adjust the weld parameters (recipe), optimizing for the selected material. (Note: Use the touchscreen display.)	The done button will appear. The alphanumeric keypad will appear Figure 41 on page 74 The parameter settings will turn green this indicates that the recipe has been set
Press the laser enable/disable button on the touchscreen display (the indicator will change to green).	The up and down arrows will be highlighted. The set recipe button will be highlighted.
Depress the foot pedal switch ; the will enable the laser and allow it to fire.	A laser pulse is released.



While the foot pedal is engaged, you should never place your hands or other body parts directly inside or beneath the path of the laser’s cross-hair; when a laser pulse is released (and with skin contact), there’s potential risk for serious injury, including severe burns.

The dimmer control, which is located inside the welding work chamber, can be used to adjust the brightness level inside the work chamber and better illuminate a workpiece or part. Check the brightness using the stereo microscope; appropriate brightness is dependent on the material and properties of the workpiece.

(Note: If the reference value for joules has been reduced, for safety reasons, the laser will remain disabled.)

When welding (and while using inert gas), keep in mind that the gas outlet (located at the end of the gas tubing) should be positioned near the laser’s focal point. For most applications, adequate positioning is at the edge of the visual field (above the focal plane) for the stereo microscope.

Optimizing Welding Results

With welding applications, in order to optimize results, workpieces must always be properly positioned within the focusing area of the laser beam; this is a determining factor that affects weld quality and the final outcome. For inert gas welding, the gas outlet at the end of the gas tube is to be positioned near to the laser focal point. A position adequate for most applications is at the edge of the visual field of the stereomicroscope above the focal plane.

Operator Action	System Response
Proper positioning for workpieces - both horizontal and vertical, is important.	
Look through the stereo microscope and join the workpieces together - adjust the workpieces, as needed.	The cross-hair indicates the exact position of the laser's pulse spot.
When the welding point appears sharply in focus (and within the cross-hair), partially press down the foot pedal switch .	The inert gas supply will be enabled.
Depress the foot pedal switch down fully.	The view shutter will close automatically for a short duration; this occurs with each laser pulse.
To release consecutive laser pulses (with single-pulse mode), the foot pedal switch must be partially released, then fully (and repeatedly) depressed down. With continuous pulse mode, laser pulses are fired consecutively (for as long as the foot pedal switch remains fully depressed).	A laser pulse is released; this can be single or consecutive, depending on the operator's chosen action.
When you have finished with the welding application, be sure to place all workpieces down inside the work chamber to cool.	



In some instances, and with specific materials, determining suitable parameters (joules, pulse length, pulse frequency, beam diameter, and pulse shape), and additionally, the flow rate for the argon (inert) gas is based on a period of trial and error. In many cases, the quality of a weld point can also be vastly improved when the laser pulses are fired consecutively, and within a short span of time.

Following each laser pulse, and after adjustments are made to the joules value, the indicator on the **OK button** will switch to red. When the laser is ready to fire again, the indicator on the **OK button** will change to green. This recovery period can range between 0.1 and three (3) seconds, depending on the values that have been set for joules and laser pulse length.

Setting Operating Parameters

The view shutter is controlled electronically. A laser pulse will only be released if the view shutter is operating properly. Additionally, there is an optical filter in the viewing optic that blocks UV and laser light.

Resetting Pulse Count

For information on resetting pulse count, reference **“MEM (memory features)” on page 70.**

Text Input Mode

For information on using text input mode, see **Figure 41 & Figure 42 on page 74.**

Switching “Off”

Before the welding workstation can be powered down and switched “off,” the laser system must be allowed to cool for **ten (10) minutes**. During this period, the **system key switch** and **mains power switch** should remain “on.”

1. Turn the key in the **system key switch** to the **left**.
2. Turn the **mains power switch** to the **left** (position “0”).
3. Close and turn **“off”** the inert gas valves (gas cylinder valve).

Remove the key from the **key switch** and be sure to store it securely; it should only be accessible to authorized personnel.

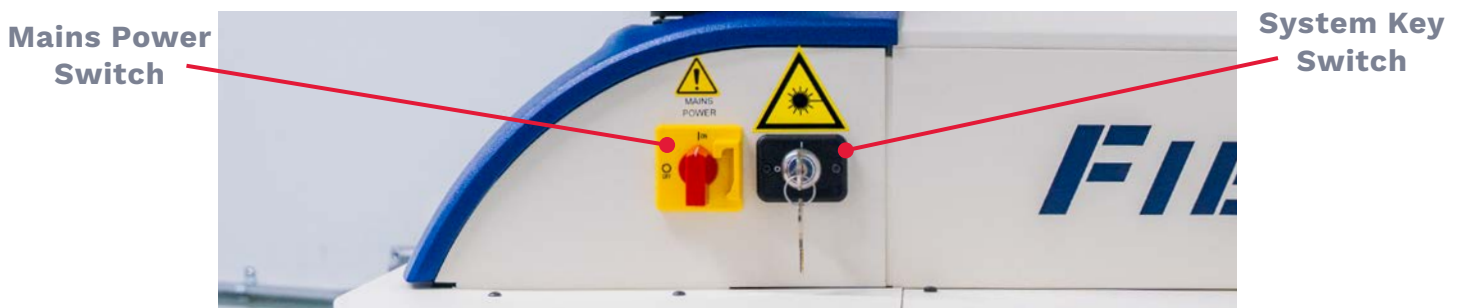


Figure 45
(Switching “OFF”)

Status Monitoring and Indicators

During the self-test diagnostics, which begin immediately after the device has been switched “on,” and during operation, the current status of the laser is indicated by plain-text messages that are viewable on the touchscreen display. If the indicator on the **ok button** is green, the device is operable, and the laser is ready to weld.

The micro-controller monitors the conditions for pulse release on the basis of the following criteria:

- If the laser is enabled, a laser pulse can only be released via the foot pedal switch.
- If the laser is disabled, a laser pulse cannot be released (this helps to safeguard the operator, as well as others who are nearby - ensuring that unexpected or unplanned laser pulses are avoided.)

Floor Stand Operation

This system is intended to be sold with an adjustable floor stand, which the system will ship already installed on. The floor stand is motorized and controlled via a pendant. In the vent that the laser must be separated from or installed on the floor stand, refer to the respective setup guide.



Figure 46

(Floor Stand Power Plugs, connections, and control pendant)

Passwords and Restricted Access

(Model & option dependent; factory installed - Reference Appendix, section B)

Important Advisory:

The restricted access feature is intended to prevent unauthorized changes to the device's welding parameters; this feature is installed prior to shipping from LaserStar Technologies Corporation®. The operator can choose to enable or disable restricted access and password protection whenever they choose.

LaserStar Technologies: Important Contacts		
Sales & Training	Service & Support	Corporate Office
(407) 248-1142 sales@laserstar.net	1-888-578-7782 service@laserstar.net	2461 Orlando Central Pkwy. Orlando, Florida 32809, USA

V. Maintenance

Overview & Requirements

Routine maintenance is a requirement for ensuring the safe and optimal operation of the laser system. Regular maintenance intervals must be scheduled in accordance with the manufacturer's recommendations and requirements. **(Note: When working with an open device, be sure always to wear appropriate laser protective eyewear.)**

Before maintenance can be carried out, the following safety measures must be observed and followed:

- Disable all systems, subsystems, and auxiliary equipment by turning “OFF” and disconnecting from power sources or live components.
- Verify that all disconnected equipment has been secured against being switched “ON” again (whether automatically [e.g. vibration] or inadvertently [e.g. operator error]). Secure the **Mains Power Switch** with a padlock (you may use the mechanical locking device provided) or alternatively, remove the fuses. Check all warning indicators to be sure they're functional and remain alert while maintenance is being carried out.
- Using a voltage meter or voltage tester, check whether the equipment is “live.” Measure the conductors against one another and also against the protective ground conductor.
- When reconnecting the equipment, **remember, you should always ground first.** When service has been concluded, be sure to remove the grounding and shorting jumpers.



While working with an opened device, regulations set forth by OSHA regarding laser safety (or equivalent national or international regulations [e.g. EC Directive 608 or IEC Publication 825]) must be adhered to. Also remember to wear protective eyewear.

- If there's a risk of touching “live” components while at the worksite, and it's not possible to disconnect these components from their voltage source, they must be covered with a reliable and sufficiently strong insulating material. If the components cannot be covered, another method must be used to prevent direct contact. Once precautions are in place, be sure also to cover the workspace with plastic sheeting, paneling, or a rubber mat.
- After maintenance has been concluded, the service personnel must verify that the equipment is safe to operate.
- When replacing components, use only Laser Star Technologies Corporation® approved parts and accessories.



While performing maintenance tasks, be sure never to work alone. A second person familiar with the risks posed by high-voltage electricity and laser radiation should be present. In the event of an emergency, this person will provide support, disabling power sources, and administering first aid, if necessary.



This device complies with all generally recognized technical standards and regulations, including those set forth by OSHA, EC, EN, DIN, and VDE. The laser is ignited and operated using dangerous high voltage (>1 kV) and special care must be taken when working inside the control box. When recording measurements for electrical or electronic components (and while the laser system is “on,”) it is critical to maintain required clearances (for details, see “III. Installation” on page 41). When working with electrical equipment of this kind, you must comply with relevant safety regulations (OSHA, or the equivalent national or international standards).

Maintenance Intervals



To optimize performance and minimize premature system failure, maintenance routines should be carried out at the recommended intervals.

The welding workstation is programmed to alert the operator about upcoming or anticipated maintenance requirements. Maintenance reminders will appear on the touchscreen display, as indicated in the table below, which lists these tasks and their anticipated intervals.

Maintenance Intervals: Alert Reminders			
Use only LaserStar Technologies Corporation® approved parts and accessories.			
Alert Notification	Interval	Hours (based on general usage within an 8-hour work day)	Reset Method
Protective Disk (cleaning)	7 day	56 hours	Press the laser enable/disable button to reset
Welding Table (cleaning)	30 days	240 hours	Press the laser enable/disable button to reset
Air Filters(s) (change)	90 days	720 hours	Press the laser enable/disable button twice (x2) to reset



The maintenance schedule is dependent on both the environment and general usage. The operator should determine the appropriate maintenance intervals.

Daily: (a)

1. The outside surface of the enclosure, the work chamber, and safety material (surrounds the outside of the observation window) should be cleaned using a cloth that's been dampened with water or another non-abrasive cleaner. **If you choose to use 70% isopropyl alcohol, a flammable liquid, be sure there's no contact with the device's touchscreen display; this will damage the display. Additionally, you should never use strong cleaning agents, such as powders or solvents to clean the equipment.**
2. The observation window should be visually checked for cracks, voids or other damage. **If you discover damage, be sure to replace the splash-protective observation window before using the device.** (For additional details on this process, be sure to refer to the section entitled **“Observation Window: Cleaning & Care” on page 88.**)
3. The protective disk, which is located inside the work chamber, should be unscrewed from the focus lens and cleaned with a lens cleaning solution. We recommend LaserStar Technologies Corporation® cleaning solution (part number: 810-2353), which can be conveniently purchased from our [e-store](#). If you prefer to use cleaning wipes (part number: 810-2356 [quantity: 1]) or 810-2354 [quantity:90]), these are also available to purchase from our [e-store](#). **(Note: If opting for 70% isopropyl alcohol, be sure to use with a lint-free cleaning cloth. After cleaning, polish with a clean, lint-free wipe to remove any hazy residue.)**

Over time, and with continued use, you will notice metal splashes adhering to the surface of the **protective disk**; there is a danger of local heating at these splash points that can result in cracking or possible destruction of the **focus lens**. Eventually, the **protective disk** will need to be replaced. **Caution: When replacing the protective disk, always replace with a new component; never reinstall the protective disk with the side that has metal splashes facing upward.**

Weekly: (b)

1. Check the alignment of the cross-hair with the device's pulse spot. (for additional details and step-by-step instructions on this process, see **“Optical Alignment Diagram” on page 136.**)
2. The splash-protective observation window (located behind the laser protective window) should be cleaned and checked for scratches, cracks, and holes.

Monthly: (c)

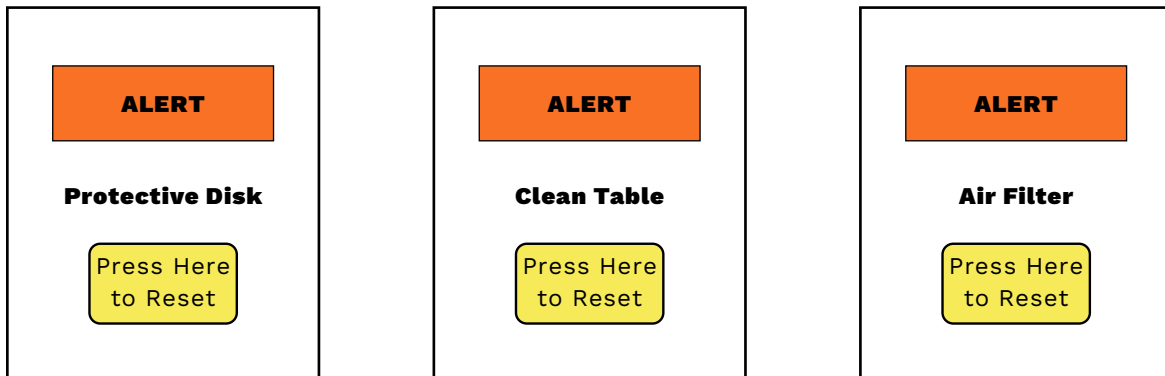
3. Inspect the welding chamber protective housing (i.e. arm cuffs, chamber door, and arm flap inserts) for damage. **This device must not be used if any of the protective housing components are damaged.** If you discover damage, be sure to contact LaserStar Technologies Corporation® Service Department for support, by calling 1-888-578-7782.
4. Check the exhaust system filter (located inside the welding chamber); if dirty, be sure to replace (refer to **“Exhaust Filter Replacement” on page 88**)
5. Check all side panel air filters; if dirty, be sure to replace.

Quarterly: (d)

Perform routine maintenance at the scheduled intervals outlined above (or as needed, in accordance with individual usage).

Maintenance Alerts

See below for a visual representation of the maintenance intervals alert reminders (details for each are noted on the previous page). Alerts will appear on the touchscreen display whenever the system requires maintenance. Pressing the reset button, as the notification indicates, will clear the alert.



Protective Disk

The protective disk, which is constructed from glass, prevents the lens from being damaged by mechanical influences, such as metal splashes or dust. An anti-reflective coating is present on both sides of the protective disk and helps to minimize the chance of loss as a result of absorption.

Protective Disk Replacement

1. Turn the **mains power switch** “off” or to the “0” position. Wait **five (5) minutes** for the chamber lights to cool.
2. Insert both hands into the hand openings on the welder’s body enclosure.
3. Remove the fixed gas nozzle by depressing the button on the left-hand side of the nozzle.
4. Remove the ring lamp by unscrewing the two (2) black thumb screws (located at 4 and 8 o’clock. **(Note: The ring lamp will also be plugged into the rail; be sure to unplug the component before attempting to remove.)**)
5. Unscrew the knurled ring from the underside of the lens; turning counter-clockwise, remove the component from the welding chamber - ensuring that it remains horizontal, if possible.
6. Replace the previous protective disk with a new one.
7. Turning clockwise, secure the knurled ring together with the new protective disk; reattach to the underside of the lens.
8. Replace the ring lamp, setting in place around the focus lens. With the ring lamp in place, tighten the two (2) black thumb screws.
9. Replace the fixed gas nozzle by pushing the component into the receptacle (you will hear the nozzle snap into place).

The observation window contains a laser safety filter, shielding the operator from dangerous reflected laser radiation while providing a view of the work chamber.

Observation Window: Cleaning & Care

When cleaning the observation window, **clean each of the components with an approved optical cleaning solution and soft, lint-free cloth.** The LaserStar Technologies Corporation® Optical Cleaning Solution (part number: 810-2353) is recommended for this.

For newly installed components, be sure to first remove the protective foils from the splash-protective observation window; clean both sides with alcohol.

(Note: If you hear clattering after installation is complete, the component has not been properly installed; be sure to reinstall the window if this is the case.)



Caution!

Use care when handling and replacing the splash-protective observation window. Be careful not to scratch the window's surface. With rough handling, there's potential to damage the component.

Exhaust Filter Replacement

1. Turn “off” the **system key switch** and **mains power switch**. Next, disconnect the main AC power source.
2. Remove the exhaust filter cover (located on the side of the laser source) by unscrewing the two (2) screws.
3. Remove the filter and replace.
4. Reinstall the filter cover and screws.
5. Reconnect the main AC power source.
6. Check to be sure the fan turns “on” and that air is being exhausted from the exhaust port located at the rear of the enclosure.



Warning!

Never attempt to clean the laser system's air filter; this component is intended for single-use and must be replaced periodically, as outlined in the section on maintenance. Never beat or blowout the filter with compressed air; this will compromise the integrity of the component and destroy the filter medium. In addition, risks are presented when pollutants that have adhered to the filter are cycled back into the air within the workspace.

Cleaning the Touchscreen Display

It's important to know, the touchscreen display is sensitive to chemicals, much as is a pair of glasses with plastic lenses (usually polycarbonate with a glare reduction coating). In fact, the cleaning kit often supplied with a pair of glasses is a great option for safely and effectively cleaning the touchscreen display; it typically includes a microfiber cloth and a gentle cleaning solution.

When attempting to clean the device's touchscreen display, be sure to keep in mind the following guidelines:

- Use a soft, lint-free cloth to clean the surface of the display (can be dry or lightly dampened with a mild cleaner or ethanol; 3M's microfiber lens cleaning cloth is recommended and does not require the use of liquid cleaners).
- Never apply liquid cleaners directly to the surface of the touchscreen display; if solution is spilled onto the display's surface, be sure to use an absorbent cloth and immediately soak up excess liquid.
- When comparing cleaning solutions and considering a purchase, keep in mind: **the selected product should be neither acidic nor alkaline - it must be pH neutral**. In addition, make sure never to use organic chemicals, such as paint thinner, acetone, toluene, xylene, propyl or isopropyl alcohol or kerosene. These and other similar products are not suitable for cleaning the touchscreen display and can result in optical impairment, which will damage the display and contribute to a reduction or loss of functionality.
- There are several pre-packaged and commercially available products that are suitable for cleaning the touchscreen display. Our recommendation, [Klear Screen™](#) is alcohol and ammonia-free, non toxic, non-damaging, and non-flammable. The other, [Glass Plus® Glass and Surface Cleaner](#) (made by Reckitt-Benckiser), is another great off-the-shelf retail alternative.
- When using cleaning products on the workstation, be sure to avoid contact with the edges of the film or glass.
- Wipe the surface of the touchscreen gently; if you notice a directional surface texture, be sure to wipe in the direction of the texture, rather than against it.

Most cleaning products contain between 1–3% isopropyl alcohol by volume (this is within acceptable limits for cleaning resistive touchscreen displays). Some products, however, contain ingredients like ammonia, phosphates or ethylene glycol, which are not acceptable for use. When purchasing products to clean the touchscreen display, be sure to carefully review all listed ingredients.



Before removing and cleaning the device's components, make sure to identify the location of the laser source (see the section under service; major components). If the laser source is removed from the clamping block, the laser's alignment will be compromised. While realignment is achievable, this process will require support from our certified technicians. For assistance, be sure to contact LaserStar Technologies Corporation® Service Department.

VI. Troubleshooting

Before troubleshooting is carried out on the laser system, be sure to reference the important safety protocols outlined in **“Maintenance” on page 83** within this manual.

Overview and Reminders

All messages, alerts, and system faults are displayed on the touchscreen display. System faults are categorized with the following criteria: **critical**, **non-critical**, and **non-faults**. If there is a fault, it must be eliminated to successfully reset the laser system and resume working. Once all faults have been eliminated, press the **reset button** in the alarm box (or turn the **system key switch** “off” and then “on” again) to reset the laser system.



Warning!

While working with an opened device, regulations set forth by OSHA regarding laser safety (or equivalent national or international regulations [e.g. EC Directive 608 or IEC Publication 825]) must be adhered to. Be sure also to safeguard your eyes and wear appropriate laser protective eyewear.

Equipment Malfunction

If you experience a malfunction with your laser system that cannot be eliminated through one of the actions outlined in the previous sections for maintenance or troubleshooting, be sure to document your results and immediately contact LaserStar Technologies Corporation® Service Department for support, by calling 1-888-578-7782.



Warning!

Service and maintenance tasks should only be performed by technicians who are affiliated with LaserStar Technologies Corporation® and who are appropriately trained; other properly trained personnel; personnel who are supervised by trained personnel (in-person or by phone); or by those who have read and understand the service-related protocols within the sections for “Maintenance” on page 83 and “Operation” on page 48.

LaserStar Technologies: Important Contacts		
Sales & Training	Service & Support	Corporate Office
(407) 248-1142 sales@laserstar.net	1-888-578-7782 service@laserstar.net	2461 Orlando Central Pkwy. Orlando, Florida 32809, USA

Diagnosing & Troubleshooting Basics

Alerts and System Messages	Possible Cause
Right-hand Sense	Right-hand proximity sensor does not detect the operator's hand inside the device.
Left-hand Sense	Left-hand proximity sensor does not detect the operator's hand inside the device.
Sensor: Right Door	Front chamber door or right-side remote interlock switch is open.
Sensor: Left Door	Front chamber door or left-side remote interlock switch is open.
Front Door: Open	Front door of the work chamber is open.
STD Mode (single-pulse)	Depressing the foot pedal switch will produce a single laser pulse.
STD Mode (multi-pulse)	Depressing the foot pedal switch will produce consecutive laser pulses (hertz [Hz] is activated).
Micro Mode (single-pulse)	Depressing the foot pedal switch will produce a single laser pulse .
Micro Mode (multi-pulse)	Depressing the foot pedal switch will produce consecutive laser pulses (hertz [Hz] is activated).
Continuous Wave Mode (CW)	When enabled (and while the foot pedal switch is fully depressed), the laser will output continuous peak power .
Burst Mode (B)	Depressing the foot pedal switch will produce the number of laser pulses that the operator has specified (burst [B] is activated).
Storing to Memory (x)?	Save button is depressed; parameters are ready to be stored into memory location (x).
Storing to Memory	Save button is depressed; parameters are stored into a memory location.
Memory Recalled	Recall button is depressed; the last saved memory location is activated.
Clear Memory (x)	Depress the Clear button ; the data in (x) memory location is erased .
Laser Disabled	Laser enable/disable button has not been pressed (pressing will allow the laser to become enabled).
Warning: Dead Battery	Control board memory battery back-up needs replacement (use either CLT# 405-3900-001 or 3V DC Lithium 2325).
5V DC Fault	5V DC power supply is out of range or has no output. Contact LaserStar Technologies Corporation® Service Department for support.

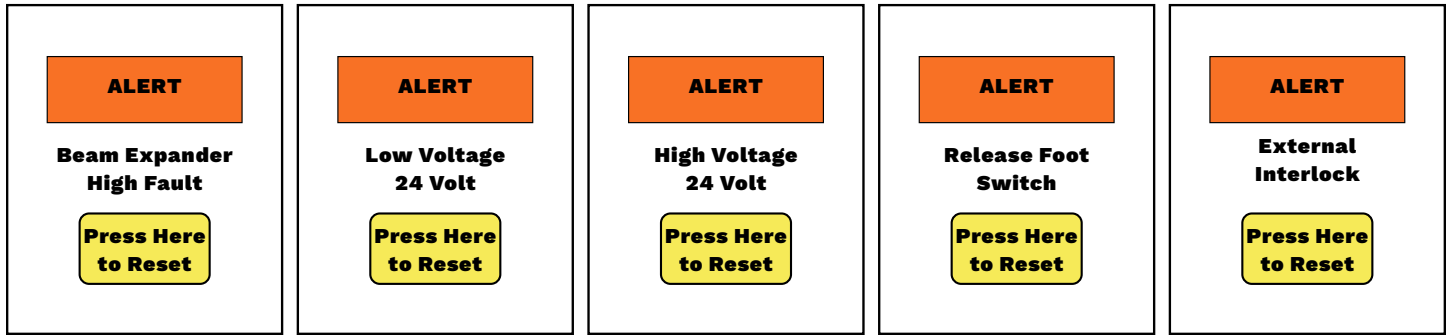
Alerts and System Messages	Possible Cause
High Voltage: 24 Volts (V)	24V DC power supply output is above the operating limit. Contact LaserStar Technologies Corporation® Service Department for support.
Low Voltage: 24 Volts (V)	24V DC power supply output is below the operating limit. Contact LaserStar Technologies Corporation® Service Department for support.
Beam Expander Fault	Beam expander “zero” signal not detected. Contact LaserStar Technologies Corporation® Service Department for support. (Note: In this instance, device operation can continue, however, the width of the beam diameter cannot be altered.)
Beam Expander: High Fault	Beam expander “full limit” signal not detected. Device operation can continue, however, beam diameter width cannot be altered or adjusted. Contact LaserStar Technologies Corporation® Service Department for support.
Beam Expander: Low Fault	Beam expander “low limit” signal not detected. Operation can continue, however, beam diameter width cannot be altered or adjusted. Contact LaserStar Technologies Corporation® Service Department for support.
Laser Fault	A laser fault has been detected. If the fault remains active, perform a power cycle to clear. If the problem persists, contact LaserStar Technologies Corporation® Service Department for support.
Release Foot Pedal Switch	The foot pedal is currently depressed or there’s a short in the switch. Be sure to contact LaserStar Technologies Corporation® Service Department for support.
Joystick Stuck	Check to see whether the joystick control is in its central position. Push the joystick in any direction and allow it to return to its starting place. If the fault remains active, perform a power cycle to clear. If the problem persists, contact LaserStar Technologies Corporation® Service Department for support.
Aiming Beam Alarm	Disable the laser and press the Home button at least two (×2) times to reset. If the alarm remains active, cycle power. If the issue continues, contact LaserStar Technologies Corporation® Service Department for support.

Alerts and System Messages	Possible Cause
Back Reflection: High	Press the Home button at least two (×2) times to reset. Reposition the workpiece; it should be slightly angled. If the problem persists, be sure to contact LaserStar Technologies Corporation® Service Department for support.
Command Buffer Overflow	Press the Home button at least two (×2) times to reset. If the alarm remains active, cycle power. If the problem persists, contact LaserStar Technologies Corporation® Service Department for support.
Critical Error	Contact LaserStar Technologies Corporation® Service Department for diagnostics and troubleshooting support.
Duty Cycle: High	Press the Home button at least two (×2) times to reset. Adjust the laser's power to a mid-range setting and fire the laser. If the alarm remains active, cycle power. If the issue continues, contact LaserStar Technologies Corporation® Service Department for support.
Fiber Interlock: Active	Check to be sure the laser engine's output fiber is properly seated and affixed within the collimator. Press the Home button at least two (×2) times to reset. If the alarm remains active, cycle power. Contact LaserStar Technologies Corporation® Service Department for support.
Ground Leakage	Press the Home button at least two (×2) times to reset. If the alarm remains active, cycle power. If the problem persists, contact LaserStar Technologies Corporation® Service Department for support.
High Average Power	Press the Home button at least two (×2) times to reset. Reduce hertz (Hz) rate and re-test. If the alarm remains active, cycle power. If the problem persists, be sure to contact LaserStar Technologies Corporation® Service Department for support.
Power Supply: Failure	Verify that the key switch is "on." Press the Home button at least two (×2) times to reset. If the alarm remains active, cycle power. If the problem persists, be sure to contact LaserStar Technologies Corporation® Service Department for support.

Alerts and System Messages	Possible Cause
Power Supply: Out of Range	Verify that the key switch is “on.” Press the Home button at least two (×2) times to reset. If the alarm remains active, cycle power. If the problem persists, be sure to contact LaserStar Technologies Corporation® Service Department for support.
Pulse Energy: High	Press the Home button at least two (×2) times to reset. Reduce pulse energy and re-test. If the alarm remains active, cycle power. If the problem persists, contact LaserStar Technologies Corporation® Service Department for support.
Pulse Energy: Too Long	Press the Home button at least two (×2) times to reset. Decrease the pulse width and re-test. Check the foot pedal and verify that it’s functioning properly. For external activation, verify that the signal pulse length remains within the required specifications. If the alarm remains active, try cycling power. If the problem continues, contact LaserStar Technologies Corporation® Service Department for support.
Pulse Energy: Too Short	Press the Home button at least two (×2) times to reset. Decrease the pulse width and re-test. Check the foot pedal to ensure it’s functioning properly. For external activation, verify that the signal pulse length remains within the required specifications. If the alarm remains active, cycle power. If the issue continues, contact LaserStar Technologies Corporation® Service Department for support.
Temperature: Low	The device’s temperature is too low. Check the temperature of the space where the laser is housed and ensure it’s appropriate. Press the Home button at least two (×2) times to reset. If the alarm remains active, cycle power. If the problem persists, contact LaserStar Technologies Corporation® Service Department for support.
Workstation Overheating	The device’s temperature is too high. Check the temperature of the space where the laser is housed and ensure it’s appropriate. Press the Home button at least two (×2) times to reset. If the alarm remains active, cycle power. If the problem persists, contact LaserStar Technologies Corporation® Service Department for support.

Fault and Alarms

See below for a visual representation for the various cautionary alerts and alarms to be aware of (the causes for each are noted in the previous section - **“Diagnosing & Troubleshooting Basics” on page 91**). Alerts will appear on the touchscreen display whenever there is a critical fault or error reported. Pressing the reset button, as the notification indicates, will clear the alert.



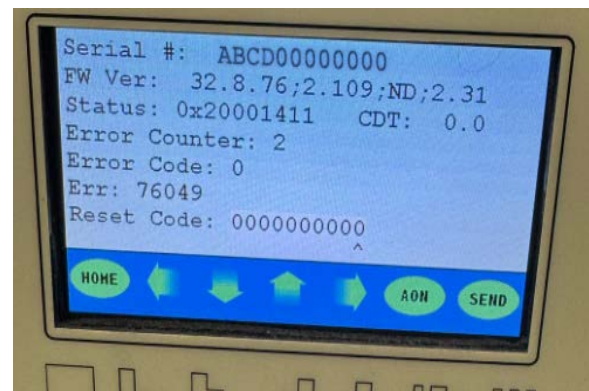
Critical Error Servicing

Press “OK” on the main laser screen quickly four times. This should turn on a visible red laser beam, include whether this beam is visible when contacting LaserStar support. For systems with mechanical safety shutters, it may be necessary to remove the system’s top cover to access the BDO/collimator (the component which the fiber laser source is plugged into) and stick a small piece of paper in the beam path to observe the aim beam.



In the event of a CRITICAL ERROR, press the ‘HELP’ button on the welder control screen to bring up the support screen, as seen below. The second screen appears when DIAG on the lower right corner is pressed.

Send the photos and information to service@laserstar.net.



Fault Diagnostic Software

For support with troubleshooting and to obtain the fault diagnostics software, please contact LaserStar Technologies® Service Department in one of the following ways with your laser’s ID Number and Service Number:

1. **Recommended:** Fill out a Service Request Form on the LaserStar Technologies Website:
<https://laserstar.net/en/about/service-center/>
2. Call Service & Support with the following number: **1-888-578-7782**
3. Email Service & Support with the following email: **service@laserstar.net**

Important Advisory:

The fault diagnostics software must only be used under guidance from support technicians affiliated with LaserStar Technologies Corporation®. If you are in need of support and require the use of the diagnostics software, please be sure to reach out to our service department for assistance.

FiberStar® Software Installation & Upgrades

For support with FiberStar® software installation or upgrades for a customer-supplied computer, please contact LaserStar Technologies Corporation® Service Department.

LaserStar Technologies: Important Contacts		
Sales & Training	Service & Support	Corporate Office
(407) 248-1142 sales@laserstar.net	1-888-578-7782 service@laserstar.net	1717 Diplomacy Row Orlando, Florida 32809, USA

VII. Parts & Accessories

LaserStar Technologies Corporation® Approved Components	
Description	Catalog Number
Operation and Maintenance Manual (hardcopy)	58-99990-764
Operation and Maintenance Manual (digital; USB flash drive)	58-99991-764
Air Filter (side panel)	24-64001
Air Filter (rear panel)	24-64002
Alignment Paper	00-10020
Beam Expander (x3)	Model Dependent
Laser Source	Model Dependent
Control Board Assembly	121-30-2008
Fiber Wipe (quantity ×1)	810-2356
Fiber Wipes (quantity ×90)	810-2354
Focus Lens Protective Disk	01-10112
Foot Switch Assembly	111-30-0003
Fuse (15A, 250V AC 3AB fast ceramic)	405-4320-115
Fuse (10A, 250 VAC, SB 5x20 mm)	405-4320-100
Protective Eyewear (diffused radiation)	444-IR-101-7-60

LaserStar Technologies Corporation® Approved Components

Description	Catalog Number
LED Lamp	405-2460-800
Spare Battery (memory)	405-3900-001
Power Cord (250V AC 14/3 AWG)	116-36-6509
Power Supply (24V DC, 6.3A)	405-4000-2463
Power Supply (48V DC, 32A)	405-4048-032
Laser View Window (100 × 60 mm)	81-10069-2
RabbitCore® Control Module	621-510
Regulator Kit (argon [inert] gas)	601-099
Remote Interlock Shorting Cap	101-36-0036
Troubleshooting Connector Kit	121-36-0006

VIII. Original Equipment Warranty FiberStar Welder Products

LaserStar Technologies Corporation® (“LaserStar”) warrants for a period of one (1) year, or two (2) years (depending on your purchase) from the date of invoice that this equipment will be free from defects in materials and workmanship as determined at the date of shipment. For details on your warranty period, please reference your purchase invoice.

(a). Limited Warranty:

After reaching out and notifying the LaserStar Technologies Corporation® Service Department about a problem with your laser system, we will, at our option, elect to:

1. Immediately send a replacement part; or
2. Request defective part(s) or alternatively, the entire laser system be returned to LaserStar Technologies Corporation® Service Department for inspection and repair or replacement; or
3. Schedule a service technician to travel to the buyer’s facility to inspect, troubleshoot, repair, or replace defective components.

(b). Warranty Exclusions:

1. This warranty does not provide coverage or protection against damage, misuse or abuse of the optical components (damage to the resonator optical output fiber, lenses, mirrors, glass, crystal, etc.) associated with the device;
2. This warranty does not provide coverage or protection against damage, misuse or abuse of the computer hardware;
3. It is required to connect an exhaust device to ensure ablated materials and/or harmful gases are removed from the system which can potentially cause damage to the laser system. Failure to connect an exhaust system can result in voiding the warranty.

4. This warranty does not provide coverage or protection for consumable parts (protective disk, air filter, coolant filter (if required), coolant (if required), cuffs, fuses, halogen lights, LED lamps, final focus lens, etc.).

This warranty is applicable for all equipment, when operated under normal conditions, and in an industrial environment. Any unauthorized use, misuse, neglect, or modification, including use of accessories that have not been previously approved or authorized by LaserStar Technologies Corporation® will void this warranty. Under no circumstance will LaserStar Technologies Corporation® accept liability for loss of use or for any indirect or consequential damage that is the result of customer negligence.

Satisfaction of this warranty, consistent with other provisions herein, is limited to replacement or repair, modification, at the sole discretion of LaserStar Technologies Corporation® and with LaserStar Technologies Corporation® to determine the availability of service personnel, and any absorption of associated service-related expenses.

The warranty terms previously outlined are valid and will remain in effect only if and when the following obligations are met:

- (a). Prompt written notification is provided to LaserStar Technologies Corporation® upon discovery of an alleged defect;
- (b). LaserStar Technologies Corporation® examines the equipment, and to its satisfaction, finds that any defect is not the result of misuse, neglect, improper installation, improper operation or improper maintenance, unauthorized repair, alteration or unusual deterioration or degradation of the equipment or parts thereof, due to the physical environment or an electrical or electromagnetic noise environment.

THIS WARRANTY IS IN LIEU OF ALL OTHER WARRANTIES WHETHER STATUTORY, EXPRESS OR IMPLIED, INCLUDING BUT NOT LIMITED TO IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE, AND THEREFORE, EXCLUDES CERTIFICATIONS OR THE LIKE FOR EQUIPMENT PERFORMANCE, USE OR DESIGN WITH RESPECT TO ANY STANDARD, REGULATION OR THE LIKE (UNLESS, AND TO THE EXTENT, THIS HAS BEEN APPROVED INDEPENDENTLY, AND IN WRITING BY LASERSTAR TECHNOLOGIES CORPORATION®) AND EXTENDS ONLY TO THE BUYER OR CUSTOMER PURCHASING DIRECTLY FROM LASERSTAR TECHNOLOGIES CORPORATION® OR FROM ANOTHER AUTHORIZED RESELLER.

Return Authorization:

Whether your equipment is under warranty and in need of repair or otherwise, you must first contact LaserStar Technologies Corporation® to communicate your issue, schedule service, and obtain prior authorization; such authorization shall be granted for each reasonable request. Unless such authority has been granted, the shipment will be refused. Any and all transportation-related expenses associated with evaluation or repair of your equipment, including any refusal of delivery, are the sole expense of the buyer. When sending equipment to our facility, an RMA or CRA number will be assigned to accompany your laser system; this number should remain clearly marked and visible on the exterior of the shipping container.

Governing Law:

The sale and purchase of this equipment, including all terms and conditions thereof, shall be governed in accordance with the Uniform Commercial Code and the **laws of the State of Florida.**

Limited Liability:

LASERSTAR TECHNOLOGIES CORPORATION® DOES NOT ASSUME RESPONSIBILITY FOR, NOR WILL IT BE HELD LIABLE FOR (A) FINES OR PENALTIES RELATING TO PENALTY CLAUSES OF ANY VARIETY, OR (B) CERTIFICATIONS NOT OTHERWISE SPECIFICALLY PROVIDED HEREIN, (C) INDEMNIFICATION FROM THE BUYER OR OTHERS (RELATED OR NOT) FOR LIABILITY, CLAIMS, ACTION, DAMAGES, LOSS, FINES, COSTS OR EXPENSES, INCLUDING, WITHOUT LIMITATION, REASONABLE ATTORNEY’S FEES, OF EVERY KIND OR NATURE ASSERTED BY ANY PARTY, AND ARISING DIRECTLY OR INDIRECTLY FROM OR IN CONNECTION WITH EQUIPMENT OR REPAIRS RELATING TO THIS PURCHASE ORDER, OR (D) FOR INDIRECT OR CONSEQUENTIAL DAMAGE UNDER ANY CIRCUMSTANCE.

This warranty does provide coverage or protection against damage or defects resulting from accidents that occur while in transit, unauthorized repairs, alteration, misuse, neglect or failure to follow proper safety and operating instructions, fire, flood, freezing temperatures or acts of God.

Authorized Equipment Repairs		
Sales & Training	Service & Support	Corporate Office
(407) 248-1142 sales@laserstar.net	1-888-578-7782 service@laserstar.net	1717 Diplomacy Row Orlando, Florida 32809, USA

IX. Service

Before service is carried out on the laser system, be sure to reference the important safety protocols outlined in **“Maintenance” on page 83** within this manual. Unplug the equipment or switch “off” the circuit breaker and wait five (5) minutes before servicing.



Service and maintenance tasks should only be performed by technicians who are affiliated with LaserStar Technologies Corporation® and who are appropriately trained; other properly trained personnel; personnel who are supervised by trained personnel (in-person or by phone); or by those who have read and understood the service-related protocols within the sections for “Operation” on page 48 and “Maintenance” on page 83.



While carrying out service-related activities with an open device, you must comply with regulations set forth by OSHA for accident prevention with regard to laser radiation or the equivalent national or international regulations (e.g. EC Directive 608 or IEC Publication 825). Be sure also to safeguard your eyes and wear appropriate laser protective eyewear.



Some service-related tasks and diagnostic procedures will require the welder to be powered “on” for a part of the process. In these instances, extreme caution must be taken to avoid accidents or serious injury. Use caution when observing internal LED indicators or purging air from the cooling system. While the device is “on,” be sure never to touch the electrical components or wiring.

Equipment Malfunction

If you experience a malfunction with your laser system that cannot be eliminated through one of the actions outlined in the previous sections for maintenance or troubleshooting, please document your results and immediately contact LaserStar Technologies® Service Department for support; either by calling [1-888-578-7782](tel:1-888-578-7782) or emailing service@laserstar.net. When reaching out, be sure to include your laser system’s model number and serial number with all correspondence. After emailing, plan to follow-up with a phone call to our service department; this will ensure that we have received all of the details necessary to assist you.

LaserStar Technologies: Important Contacts		
Sales & Training	Service & Support	Corporate Office
(407) 248-1142 sales@laserstar.net	1-888-578-7782 service@laserstar.net	1717 Diplomacy Row Orlando, Florida 32809, USA

Section A: Controls Board Memory Battery Replacement

The control board contains a battery; this battery provides power to the memory when the laser system is turned “off.” When the control board memory battery fails, the following alert displays on the touchscreen display: “Warning: Battery Dead.” When needed, a replacement battery (part number: 405-3900-001) can be purchased from LaserStar Technologies Corporation®.

(Note: If purchasing a replacement battery from another source, be sure to purchase from a reputable supplier and double check also that you’re purchasing the correct battery for your device.)

1. Make sure the device is “off;” turn the **system key switch** and **mains power switch** to the “off” or “O” position.
2. Check to be sure that the AC power is “off;” remove the **mains power cord** or shut off the wall disconnect switch.
3. Remove the right-side panel and disconnect the ground wire from the panel. **(Note: When disconnecting the ground wire, detach using the clip and be sure to refrain from tugging at the wire to remove.)**
4. The location of the battery is shown on **Figure 48 on page 104**; be sure to read all associated notes and instructions for this section, as it contains important details for the battery removal process.
5. The process for battery removal and replacement is shown in **Figure 48 on page 104**; be sure to read all associated notes and instructions for this process; there are important pieces of information that must be reviewed and understood.
6. After installing the replacement battery, be sure to reconnect the device’s ground wire. Next, replace the right-side panel.
7. Enable power to the workstation; the previous alert message, “Warning: Battery Dead.” will appear on the touchscreen display. The next time the device is powered “on,” this message will not display.

Memory Backup Battery (replace with equivalent battery)

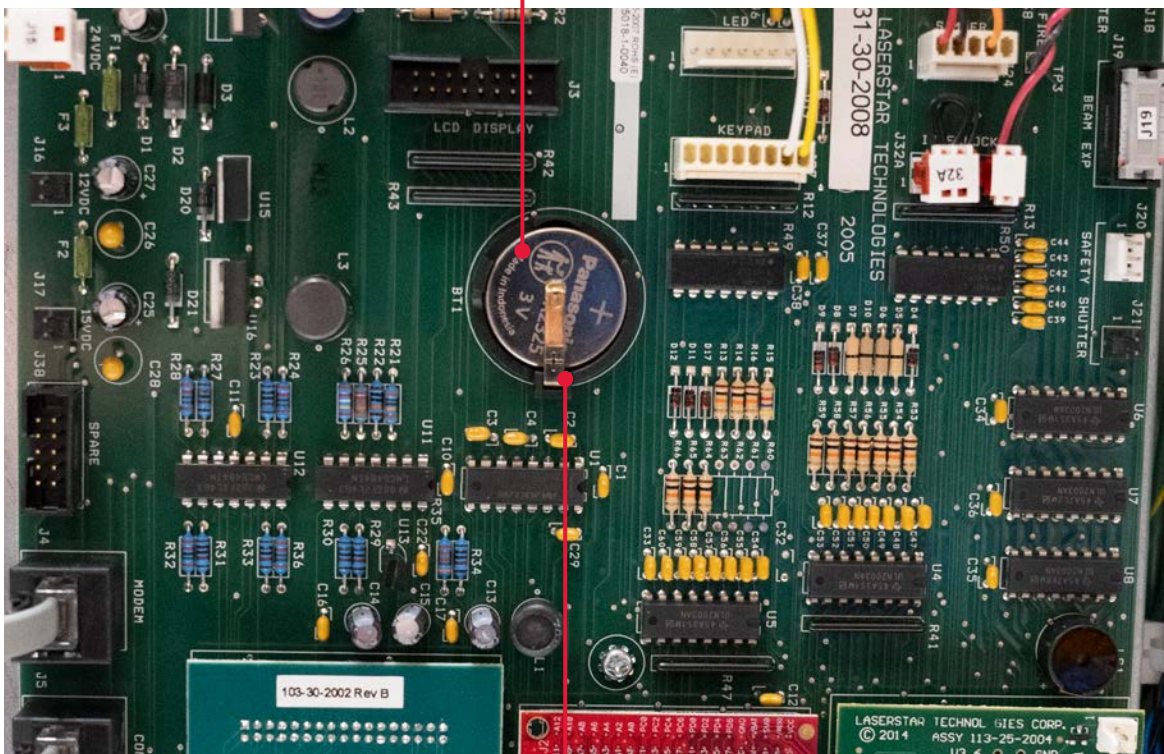


Figure 47
(Control board memory battery location)

**Battery Retaining Clip
(be careful not to bend)**

Check to be sure the retaining clip has direct contact with the battery (circuit is complete; electrical current is flowing).

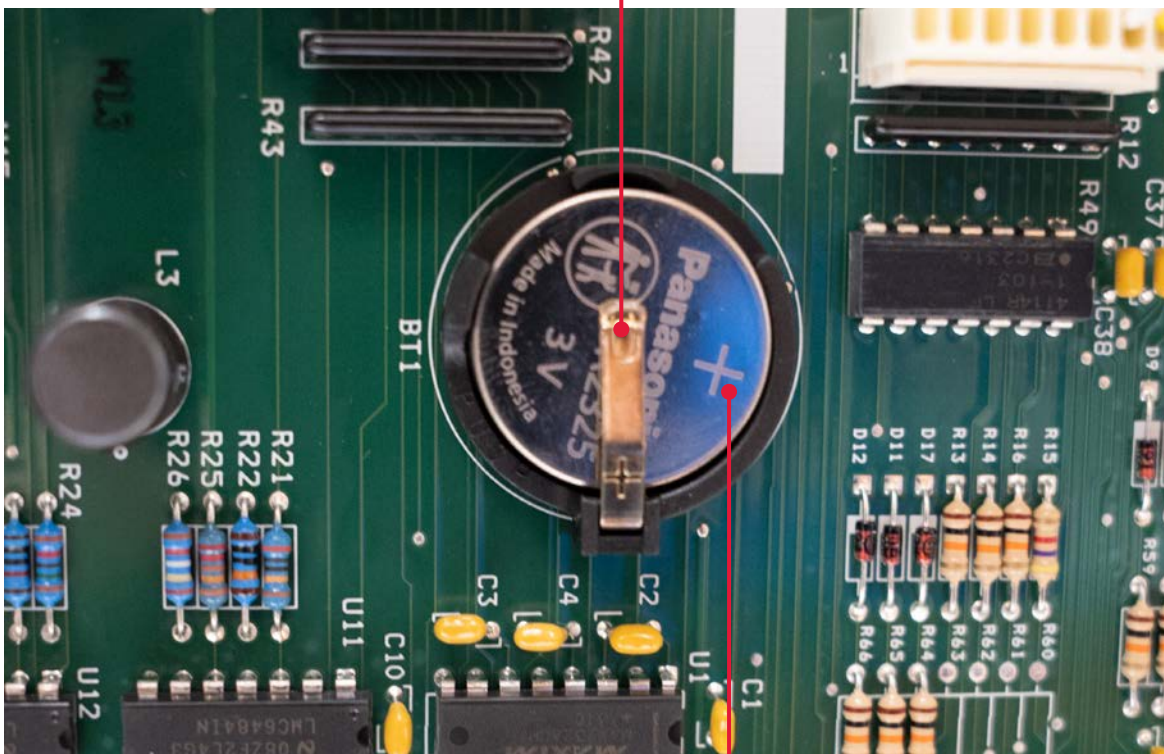


Figure 48
(Control board;
battery replacement)

Insert battery into the terminal; should remain (+) side up.

Section B: Rear System Overview, External Connections, and External Fuse Replacement

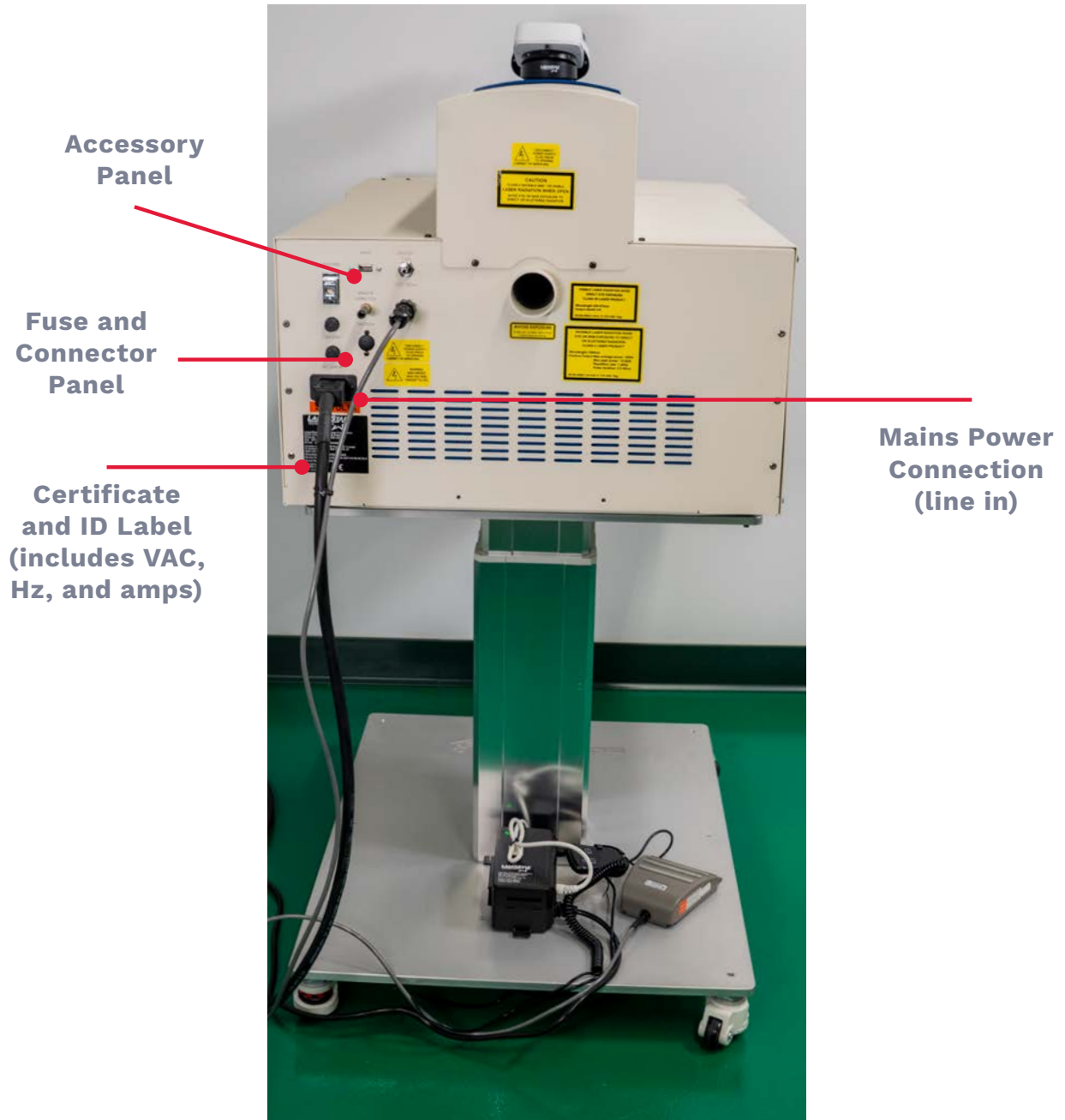


Figure 49
(Rear View)

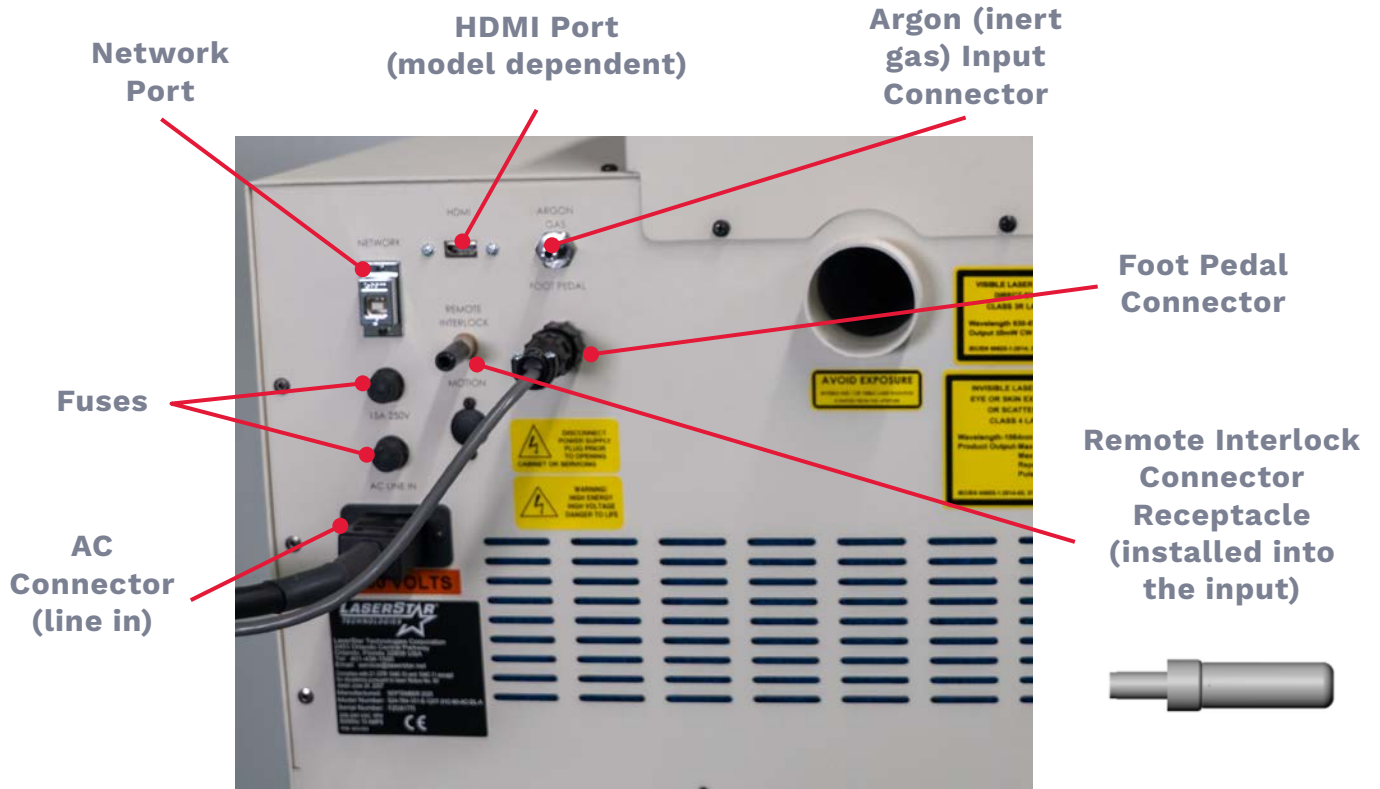


Figure 50
(External Connections)

Fuse Replacement

When completing the steps below, be sure to reference the previous pages, as well as the data table below: **“Fuses: Part Numbers and Amperage”**.

1. When checking the status of or replacing any fuse, you must first turn “off” the device, using the **system key switch** and **mains power switch**.
2. Disconnect the AC power cord from the wall and from the equipment.
3. Remove the foot pedal cable; wait **at least five (5) minutes**.
4. Verify that the AC power has been disconnected; this step is **critically important**.
5. Move the laser system to allow for access to its rear.
6. Remove all external fuses; check and replace, as needed (be sure to check these periodically and replace fuses, as needed).
7. Reconnect the AC power and foot pedal; proceed with testing the device to ensure it’s functioning properly.

(Note: If you have trouble and need support, be sure to reach out to LaserStar Technologies Corporation® Service Department for assistance.)

Fuses: Part Numbers and Amperage	
Part Number*	Amperage or Voltage Type: 120–230VAC
405-4320-115	15 A / 250 VAC / 3 AB (fast; ceramic)
405-4320-100	10 A / 250 VAC / SB 5 × 20 mm

(* Be sure to purchase only LaserStar Technologies Corporation® manufactured parts.

Attention: Check the VAC label & ID label on the rear of the laser system and compare with the power conditions at the installation site.

Section C: Major Internal System Components

Memory Backup Battery
(replace with equivalent battery)



RabbitCore® Control Module

Control Board

AC Line Filter

Circuit Board Assembly (Laser interface)

Ground Bus

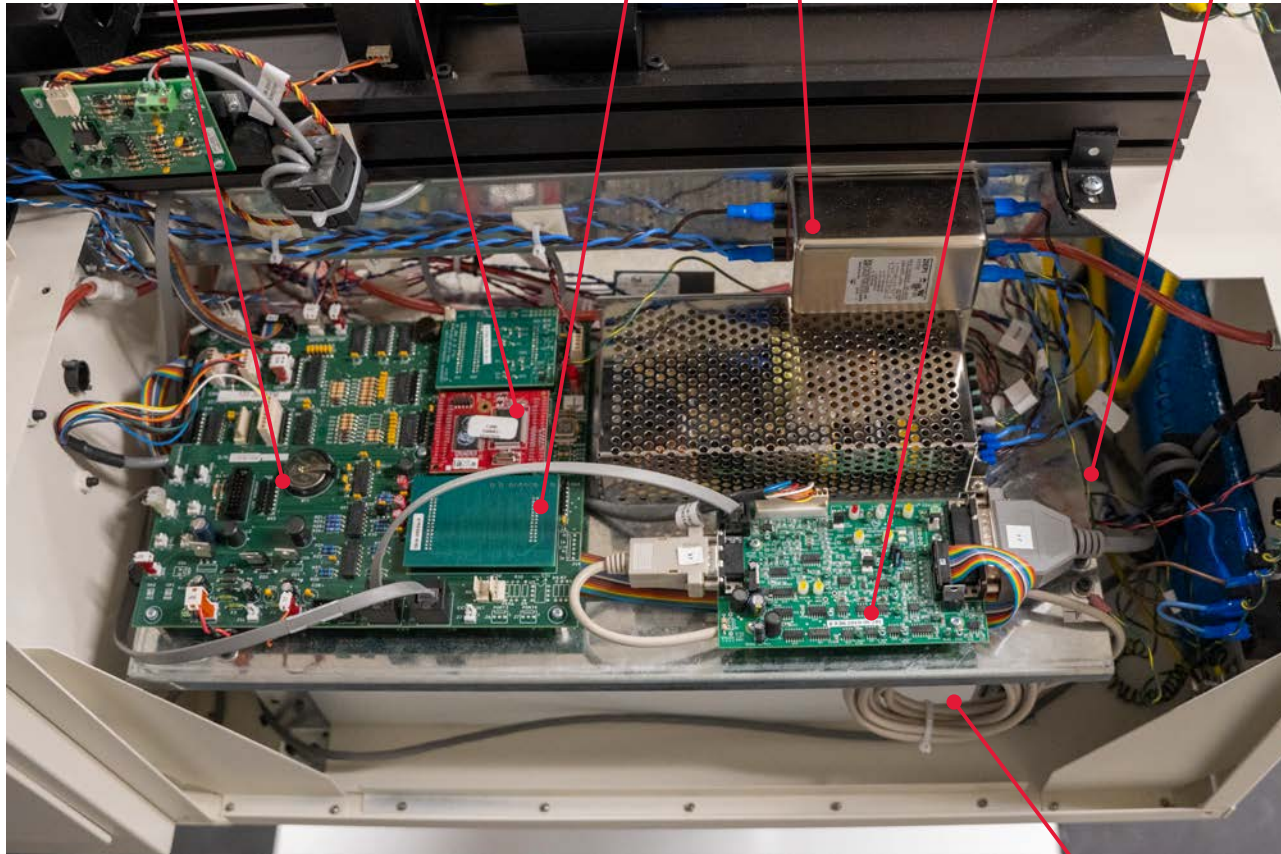


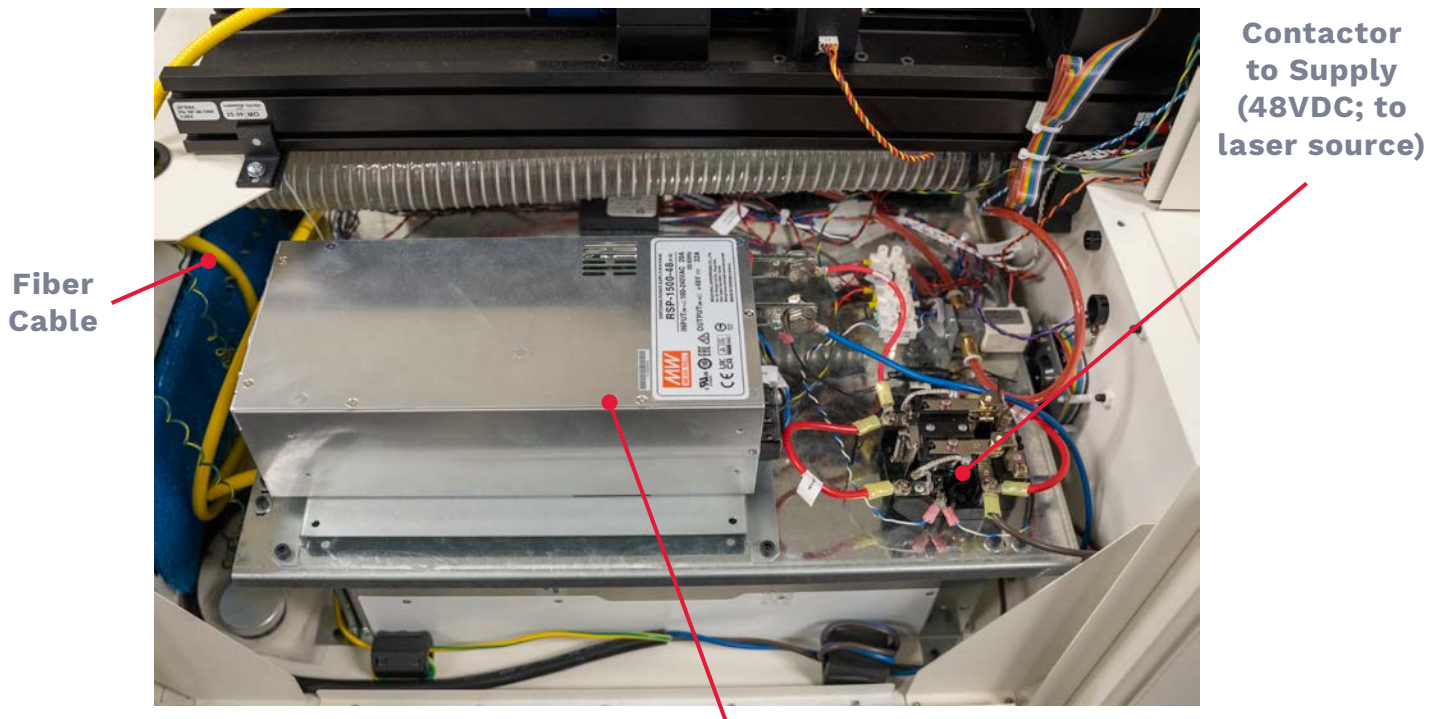
Figure 51
(Power controls; [right-side])

Laser Engine



Test Kit

Figure 52
(Laser source; [right-side, back])



Fiber Cable

Contactor to Supply (48VDC; to laser source)

Figure 53
(Laser source; [left-side])

Power Supply (48 VDC)

Section D: Chamber Door(s) Interlock Sensors

Use the figures and data table in this section to troubleshoot problems, errors, or malfunctions with the chamber door sensors. (Note: If the touchscreen display shows an alert for left door, right door or front door open, the laser will not fire. If the doors appear to be closed, to troubleshoot the cause of the failure, be sure to review the figures in this section, as well as the **data table, Chamber Door(s) Interlocks: LED Indicators and Status** at the end of this section.)



Figure 54
(Tri Doors and Hand Openings)

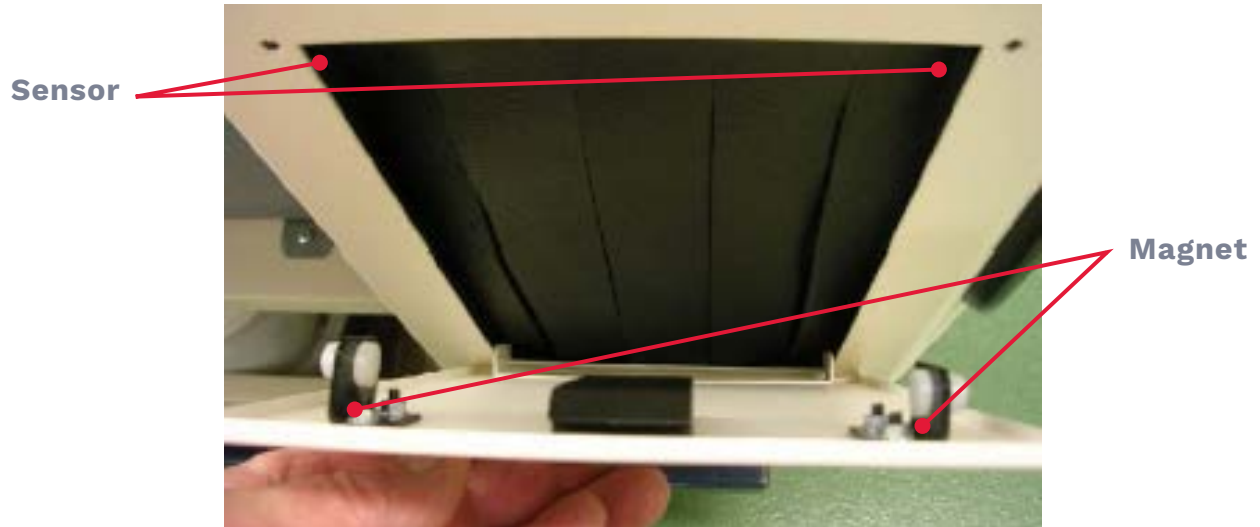


Figure 55
(Sensors; left door)

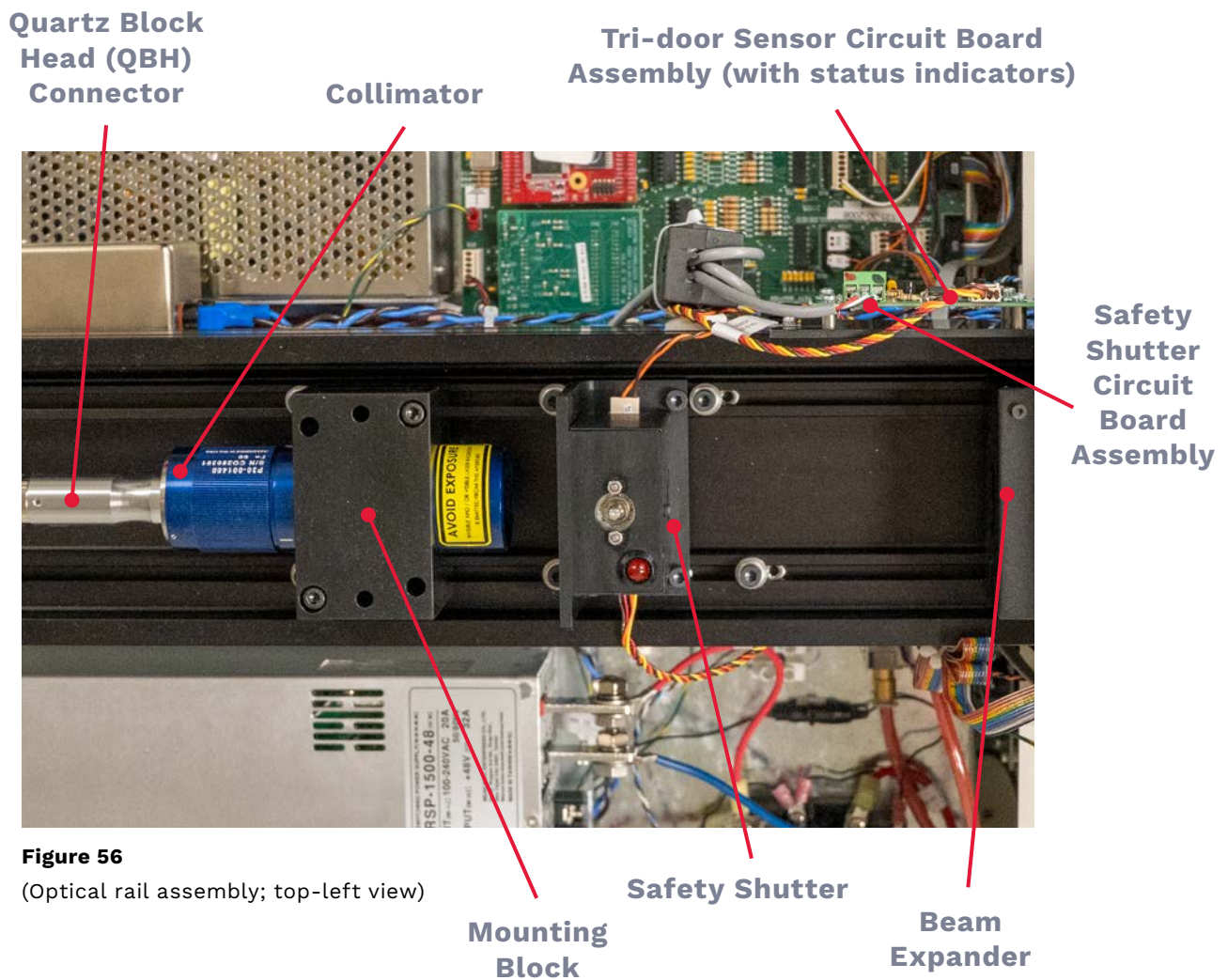


Figure 56
(Optical rail assembly; top-left view)

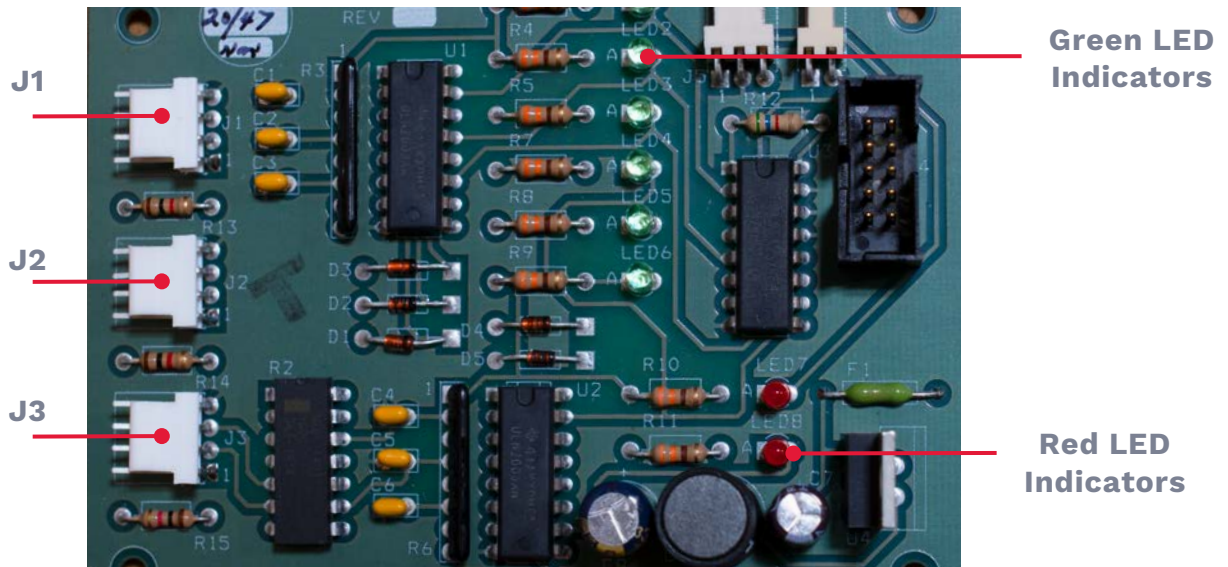


Figure 57
(Tri-door sensor circuit board assembly)

Chamber Door(s) Interlocks: LED Indicators and Status

Door	Number	LED Color	All Doors (okay)	Left-side Door (not okay)	Front Door (not okay)	Right-side Door (not okay)
Left	1	Green	On	Off	On	On
Left	2	Green	On	Off	On	On
Front	3	Green	On	On	Off	On
Front	4	Green	On	On	Off	On
Right	5	Green	On	On	On	Off
Right	6	Green	On	On	On	Off
All	7	Red	On	Off	Off	On
All	8	Red	On	On	Off	Off

X. Appendix

Section A: Restricted Access and Password (PIN) Protection

The restricted access feature is intended to prevent unintentional or unauthorized changes to the device's welding parameters; installation of this feature occurs prior to shipping.

Enabling Restricted Access and Password (PIN) Protection

1. Press the **menu button** on the main screen. **(Figure 59 on page 115)**
2. Using the **down arrow**, scroll to “restrict access”. **(Figure 59 on page 115)**
3. Press the **enter button**; the display will read “no”. **(Figure 60 on page 115)**
4. Using the **up or down arrows**, switch to “yes”. **(Figure 61 on page 116)**
5. Press “on” to enter “yes”. **(Figure 61 on page 116)**
6. Press the **exit button** twice (2) to return to main screen **(Figure 61 on page 116)**; password protection is enabled.

While password protection is enabled, the selectable options on the touchscreen display are restricted; the following buttons remain active (Figure 59 on page 115).

- ★ **Memory Location Number** (upper left-hand corner of the display)
- ★ **Up or Down Arrows** (select the desired memory location number; toggles between hertz, burst, and PS)
- ★ **Recall** (press twice [x2] to load the weld parameters for the selected memory location)
- ★ **MEM** (displays the welding parameters and memory location description; figure 5)
- ★ **Home** (returns the operator to the main screen)
- ★ **Laser Enabled/Disabled** (enables/disables the laser)
- ★ **Help** (obtain support, including field service or guided technical support; holds information for the device's model number and serial number)

(Note: The operator can choose to enable or disable the restricted access and password protection features whenever they need.)

Disabling Restricted Access and Password Protection

The default password for this device is: 438

1. Press the menu button on the password screen; the first digit “4” will begin to blink (**Figure 63 on page 117**).
2. Using the **up arrow**, press to assign the first number in the password sequence (to decrease this number, use the **down arrow**).
3. Press the **menu button** on the password screen; a (*) is inputted into the field for the first digit. Next, press the **up arrow** to assign the second number; the “3” will blink (**Figure 64 on page 117**).
4. Press the **menu button** on the password screen; a (*) is inputted into the field for the second number. Now, press the **up arrow** to assign the third digit; the last digit, “8,” will begin blinking (**Figure 65 on page 118**).
5. Press the **menu button** on the password screen to enter the password and return to the main screen (**Figure 59 on page 115**; password protection is disabled).

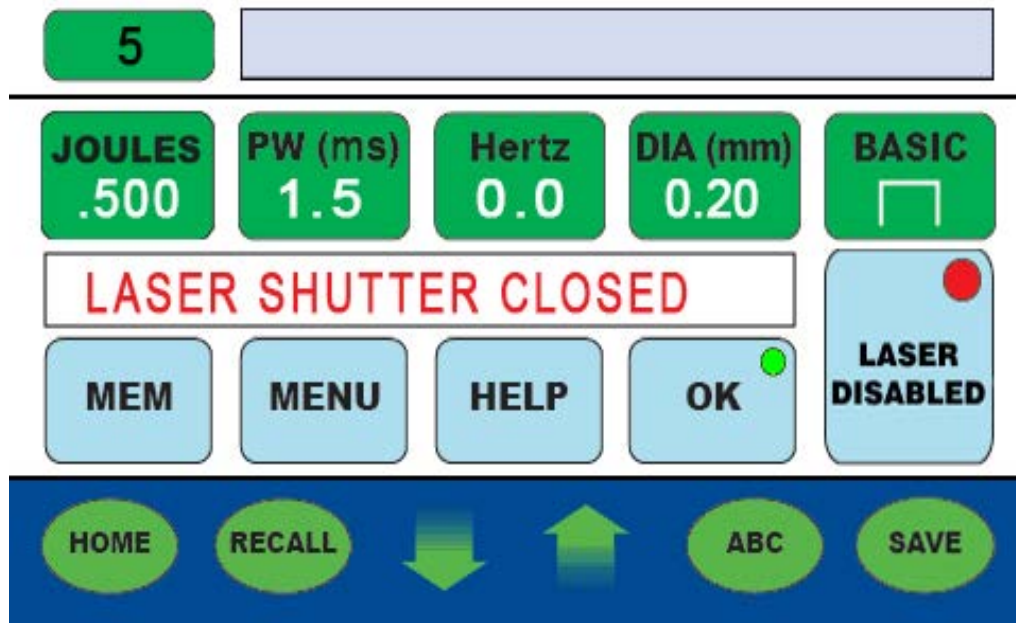


Figure 58
(Main menu)

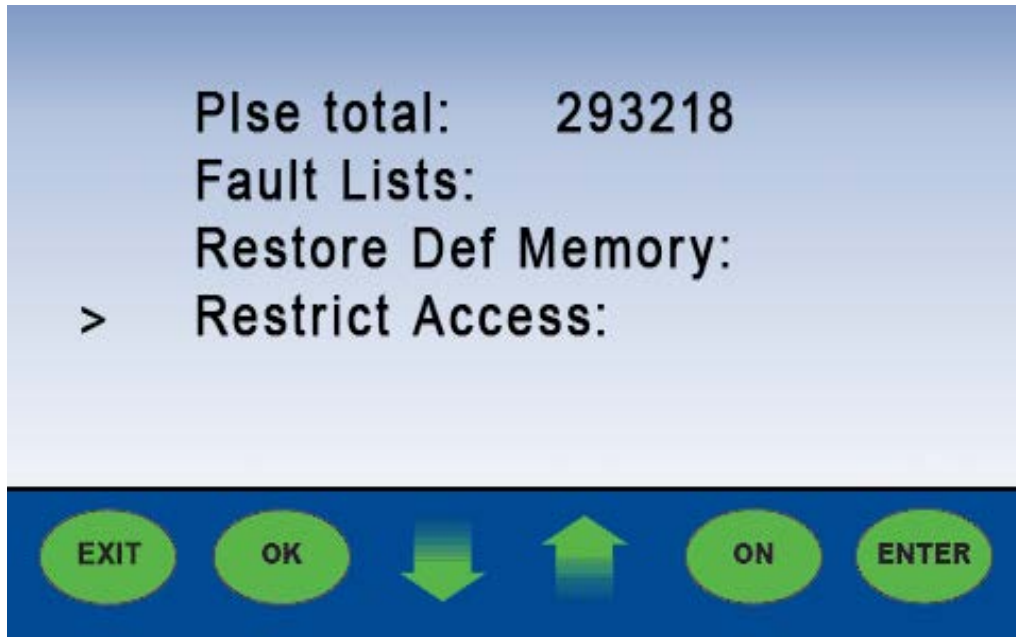


Figure 59
(Use down arrow; Restrict Access > Enter)

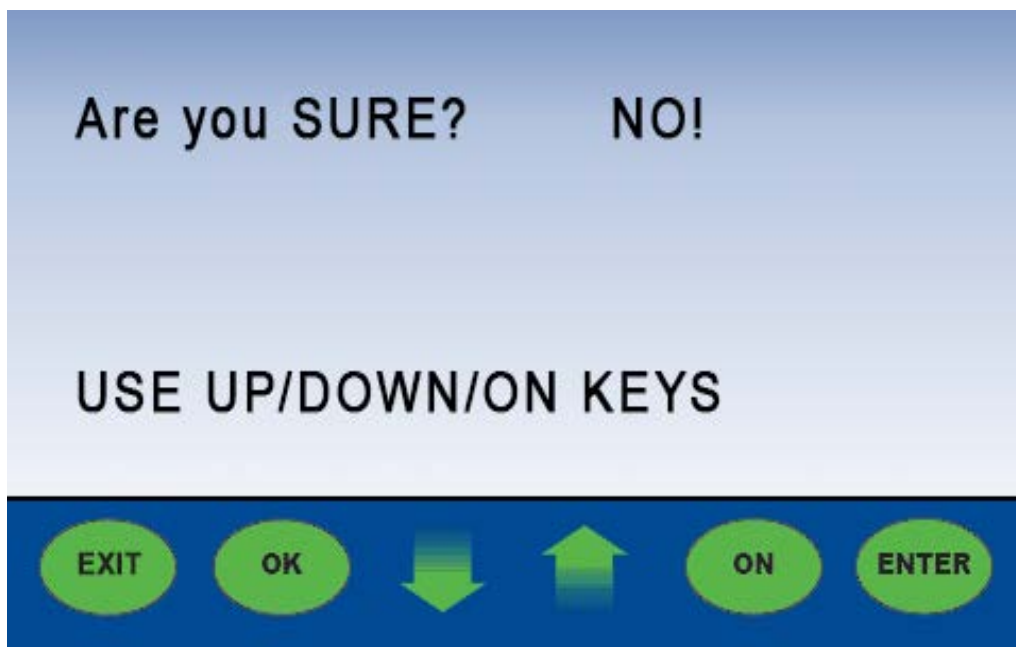


Figure 60
(Up or down arrows; used to make selections)

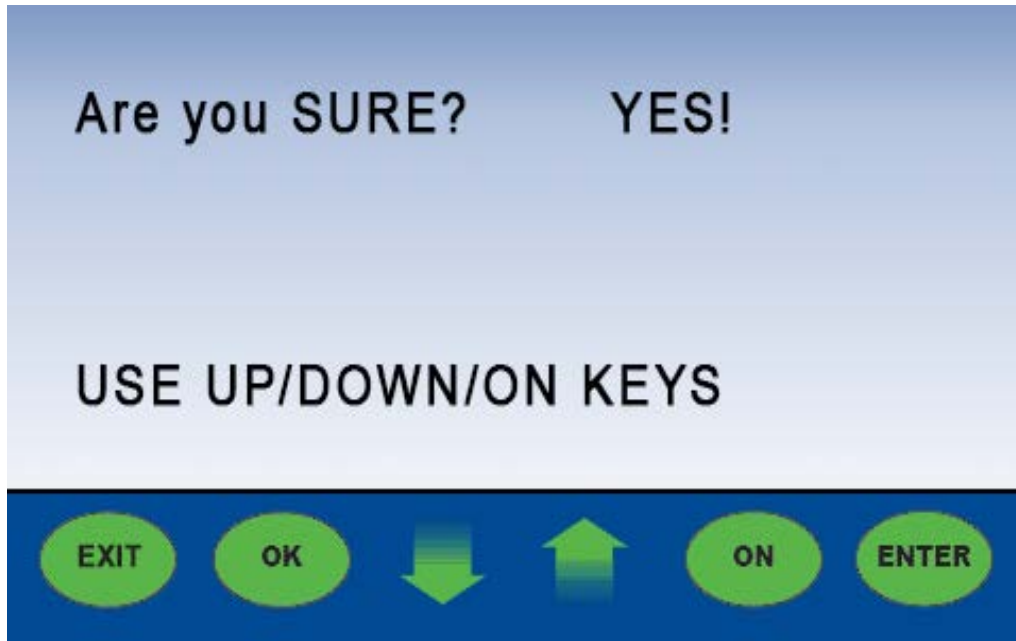


Figure 61
(YES > ON > EXIT > EXIT)

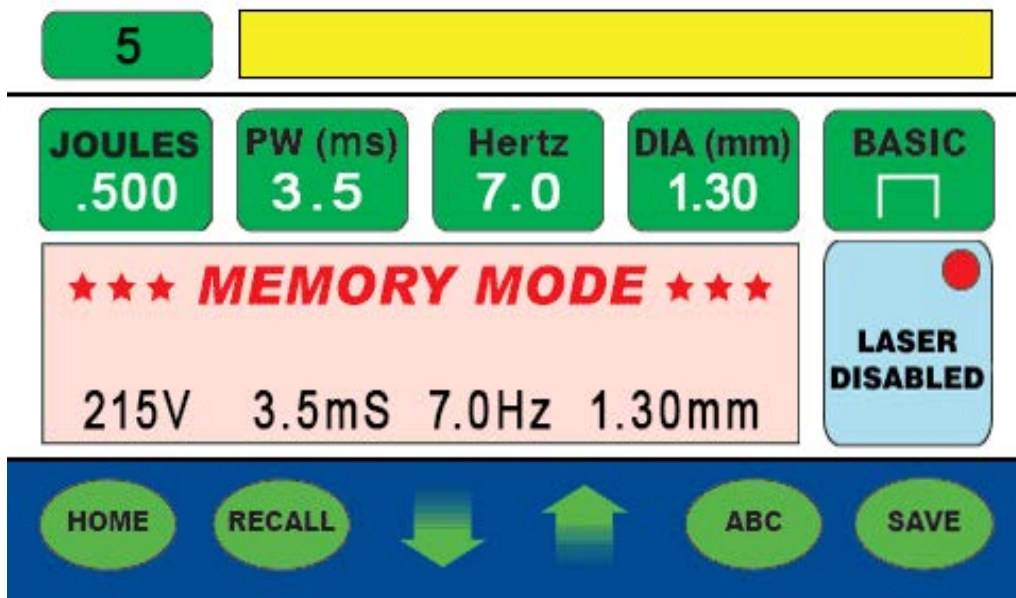


Figure 62
(Memory mode)

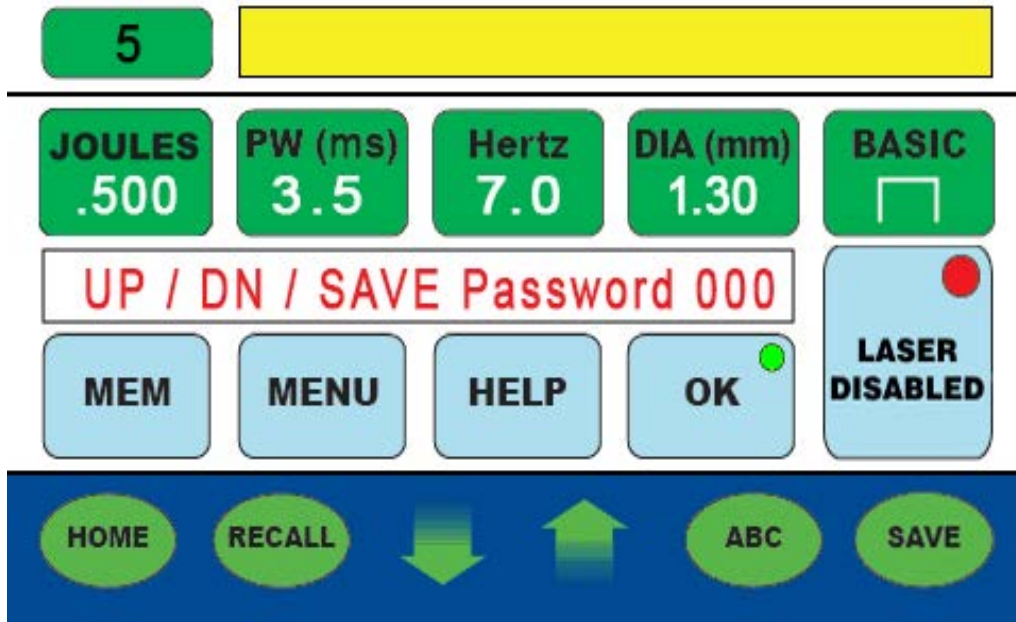


Figure 63
(Menu > up or down arrow > “4”)

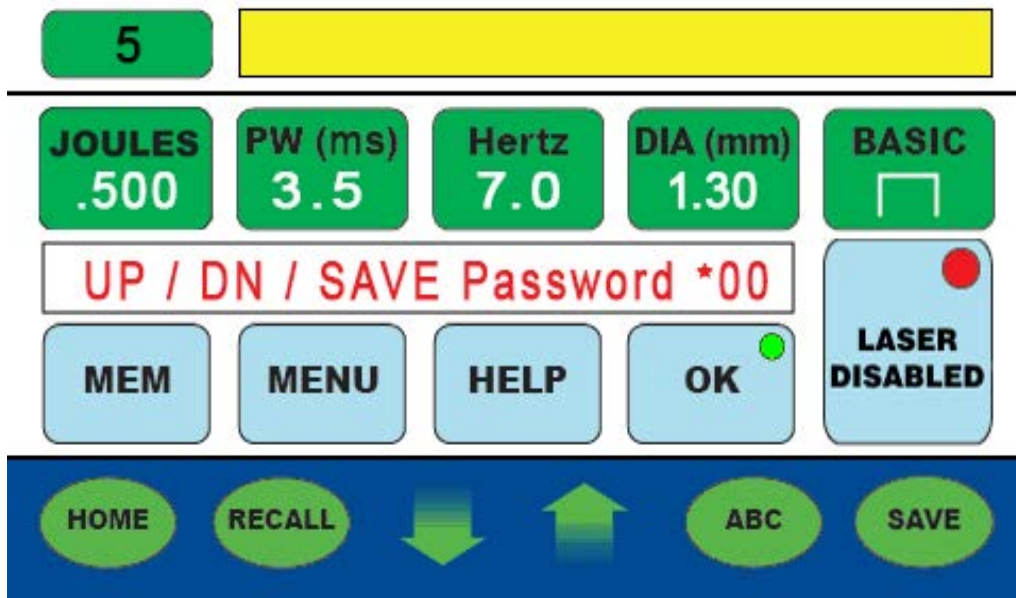


Figure 64
(Menu > up or down arrow > “3”)

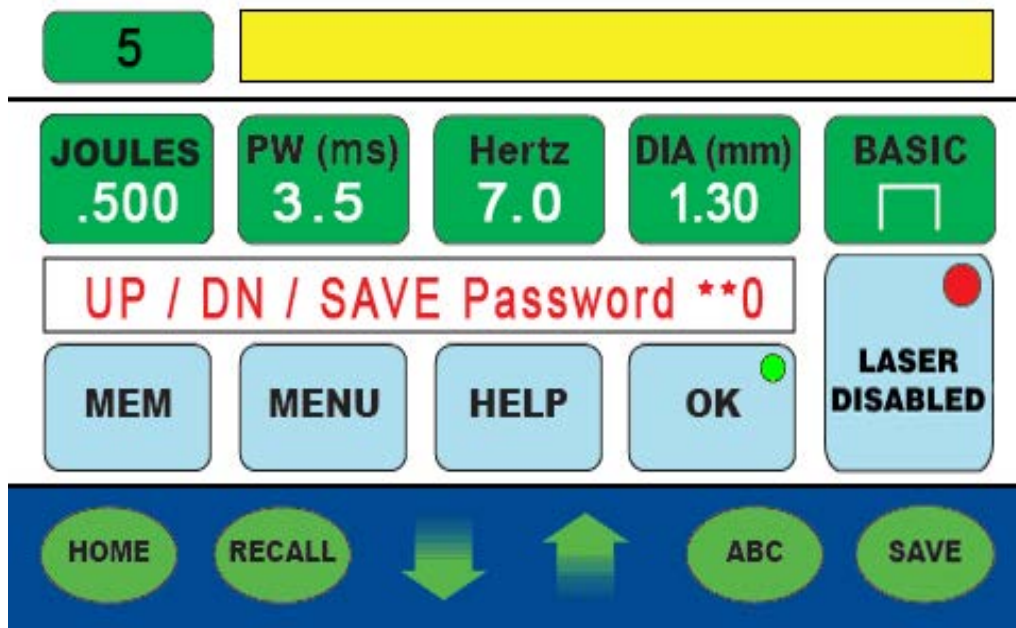


Figure 65

(Menu > up or down arrow > “8” > Menu)

When changing the password for this device, be sure to record the new password and store this information in a safe location. If you need support with password recovery, reach out the LaserStar Technologies Service Department for assistance.

Changing the Password

1. Press the **menu button** on the main screen (**Figure 66 on page 119**); scroll to **“User Password: Locked”** (the default password for this device is: **438**).
2. Using the **up arrow**, press to assign the first number in the password sequence (to decrease this number, use the **down arrow (Figure 68 on page 120)**).
3. Press the **enter button**; a (*) is inputted into the field for the first digit; the second number will begin to blink (**Figure 69 on page 121**). Next, press the **up arrow** to assign the second number.
4. Press the **enter button**; a (*) is inputted into the field for the second number. Now, the third digit, the last digit in the password sequence, will begin to blink (**Figure 70 on page 121**).
5. Press the **up arrow** to set the last digit for the password. Next, press the **enter button** to input the new password. Now, return to **“User Password: Unlocked”** on the main screen menu list (**Figure 71 on page 122**).

6. To select or confirm **“User Password: Unlocked,”** press the **enter button**.
7. To set the first number in the new password sequence, press the **up arrow** (to decrease, use the **down arrow (Figure 72 on page 122)**).
8. Press the **enter button**; a (*) is inputted into the field for the first digit; the second number will begin to blink (**Figure 73 on page 123**). Next, press the **up arrow** to assign the second number.
9. Press the **enter button**; a (*) is inputted into the field for the second number. Now, the third digit, the last digit in the password sequence, will begin to blink (**Figure 74 on page 123**).
10. Using the **up arrow**, press to assign the third number in the new password sequence.
11. Press the **enter button** to input the new password and return to **“User Password: Unlocked”** on the menu list (**Figure 75 on page 124**).
12. Press the **exit button** twice (2) to return to main screen (**Figure 59 on page 115**); returns to the main menu screen and locks the parameters on the touchscreen display.

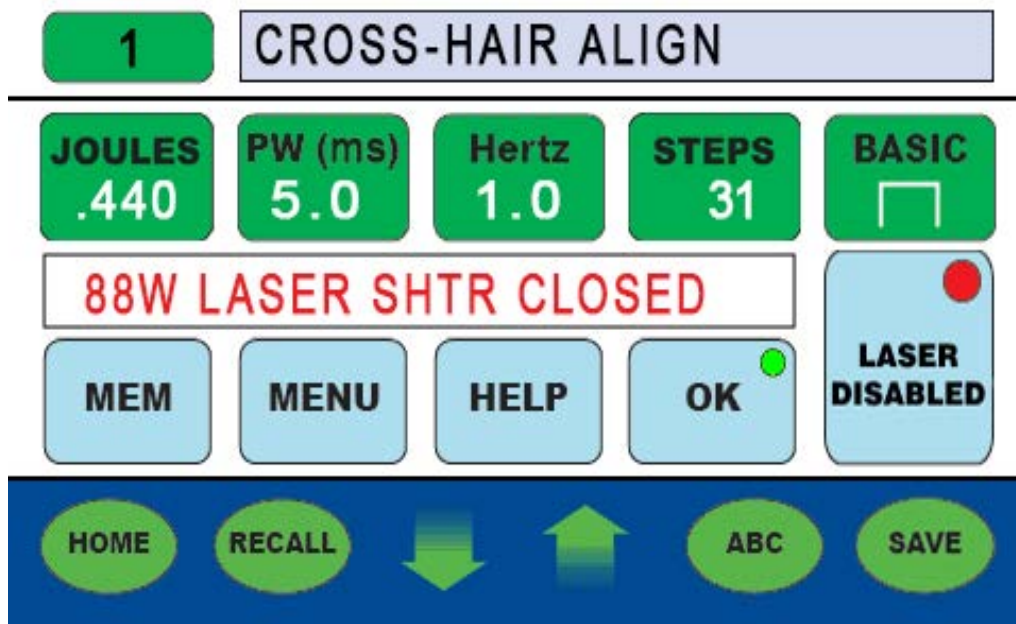


Figure 66
(Main menu)

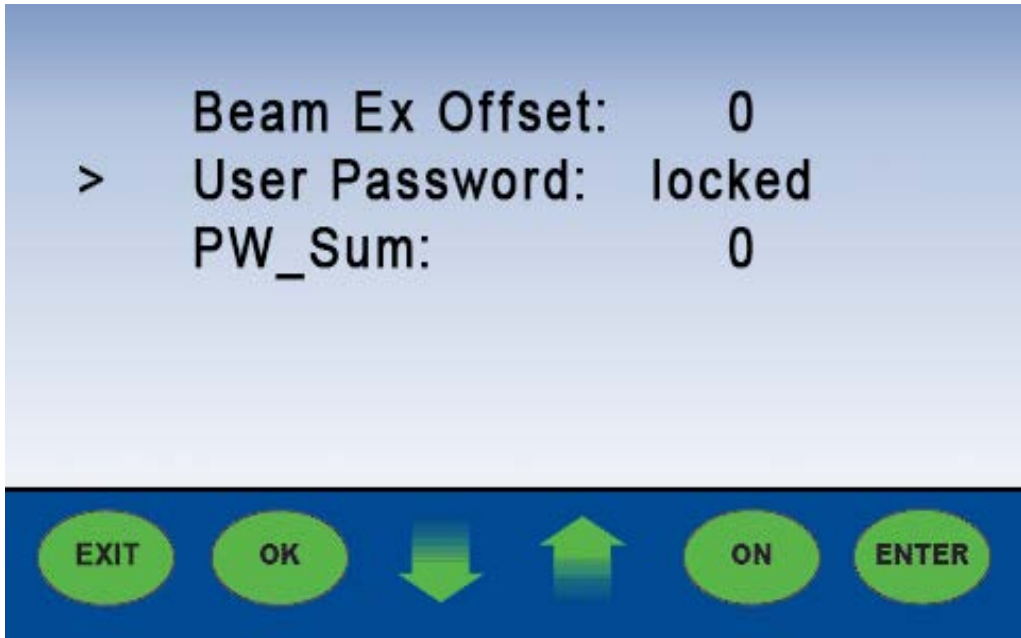


Figure 67
(User password: locked)

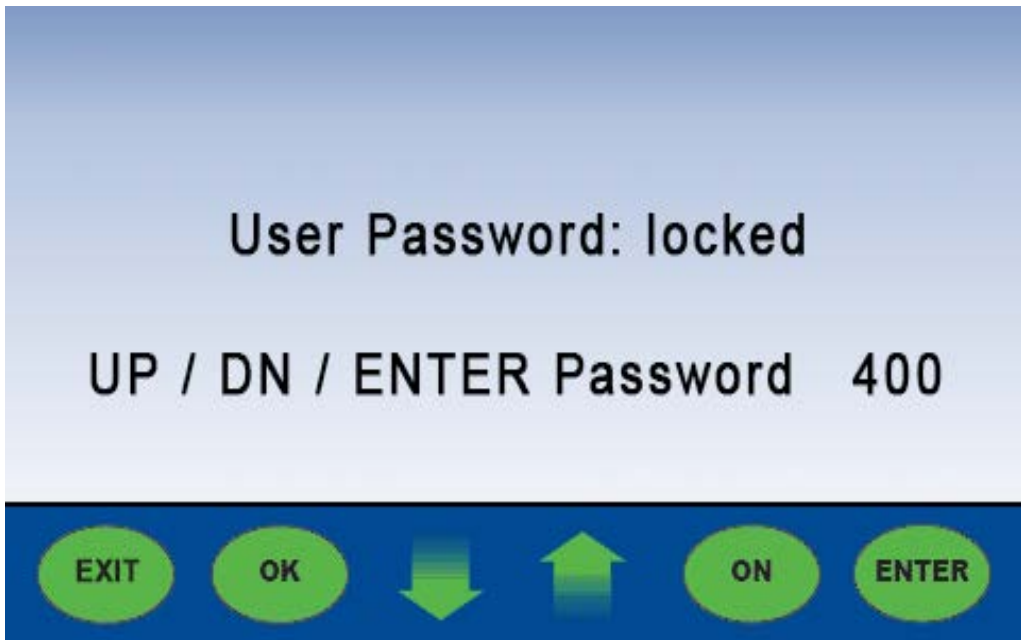


Figure 68
(Password change; 1st Digit)

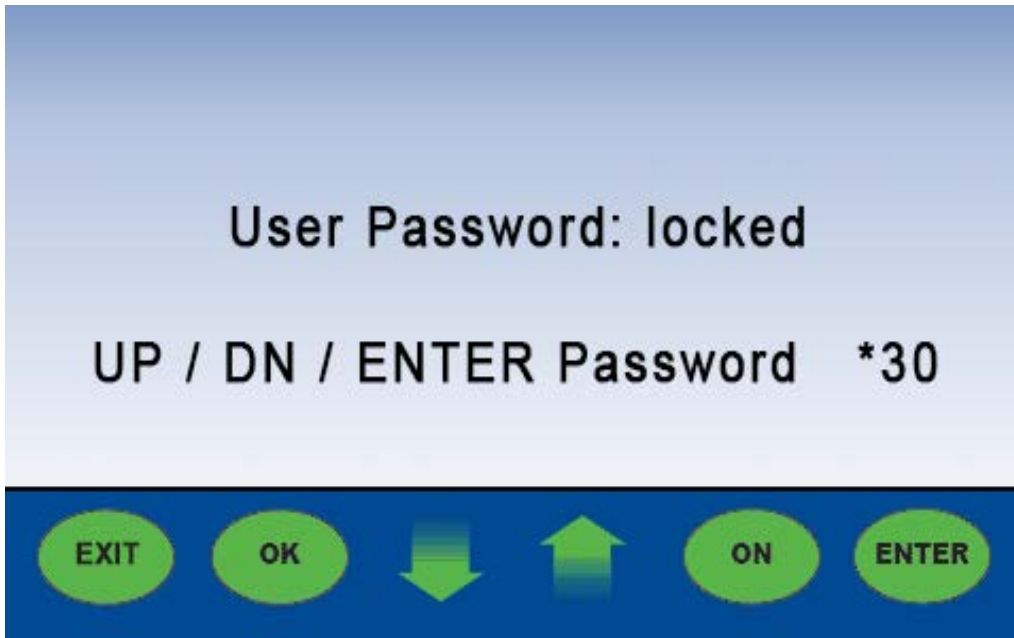


Figure 69
(Password change; 2nd Digit)

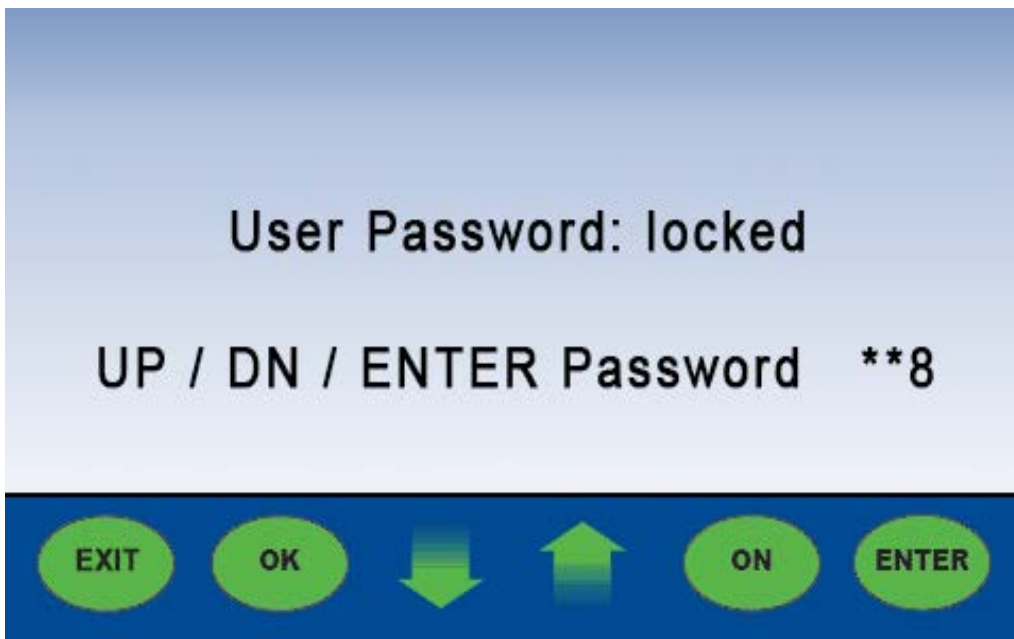


Figure 70
(Password change; 3rd Digit)

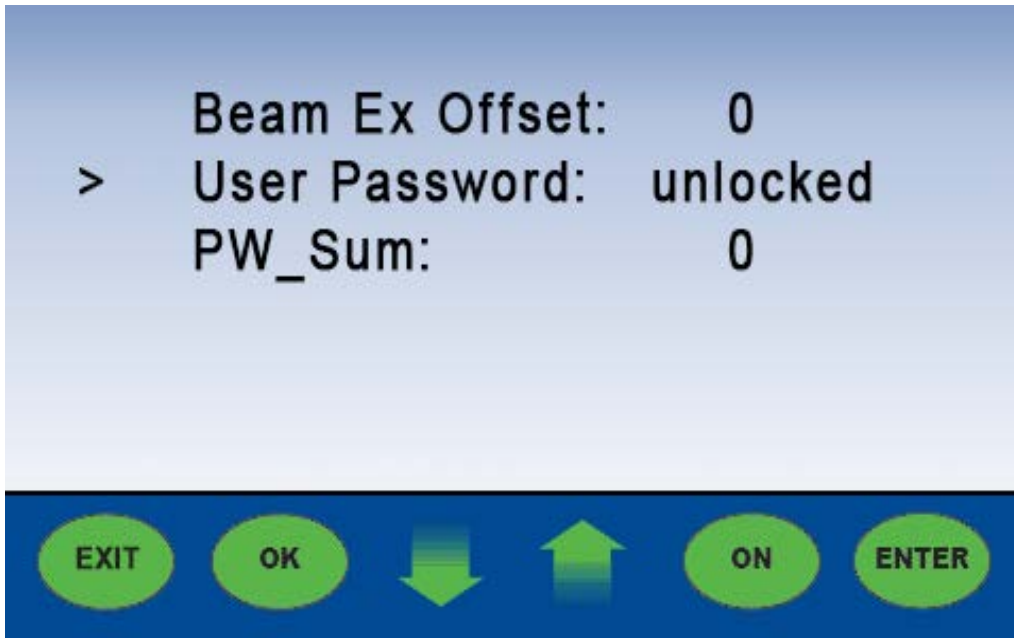


Figure 71
(User password: unlocked)

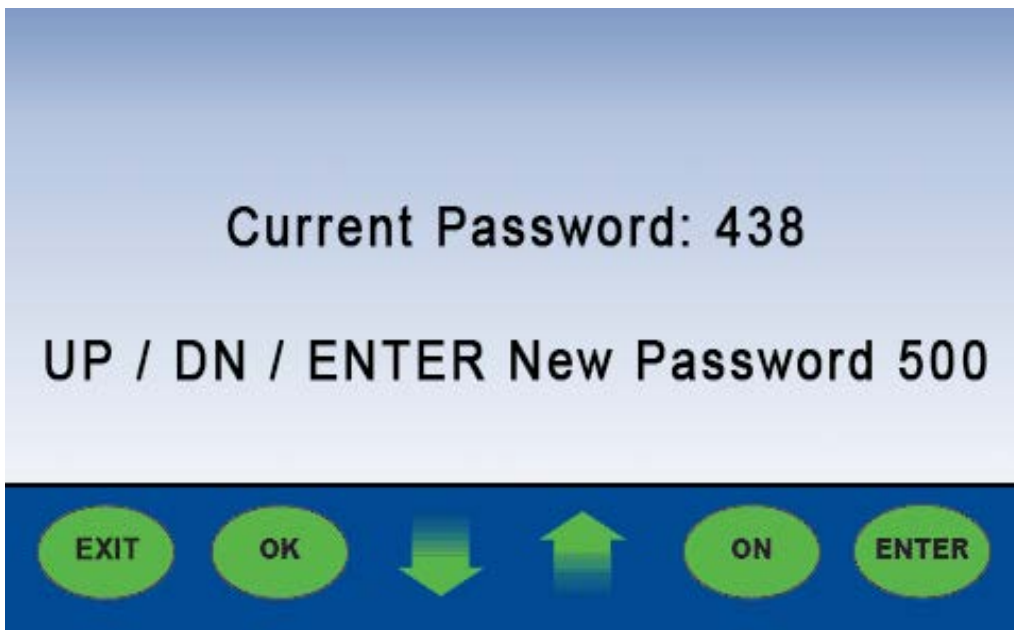


Figure 72
(New password; 1st Digit)

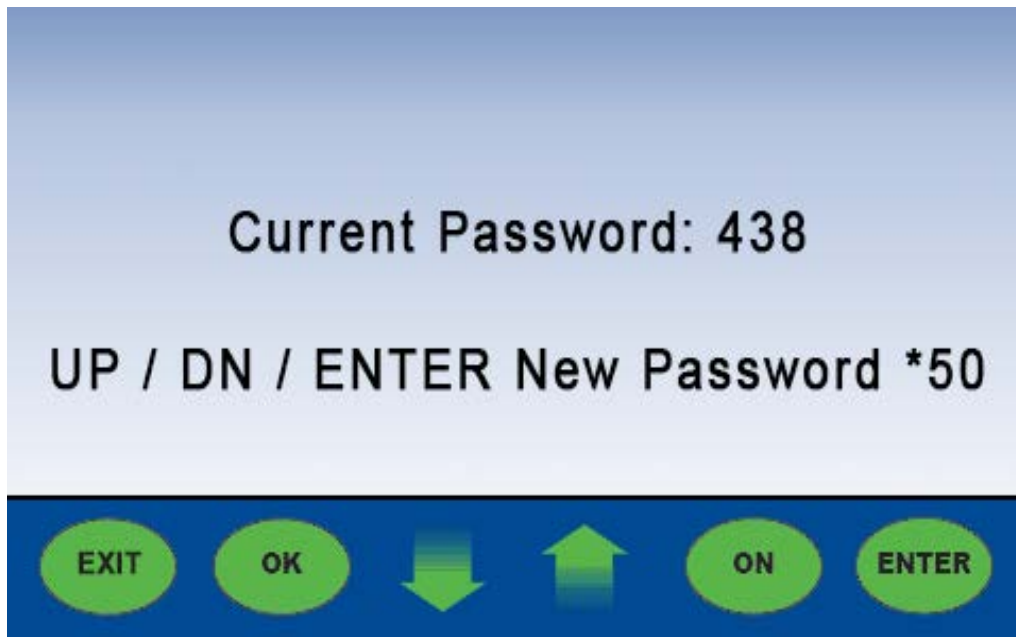


Figure 73
(New password; 2nd Digit)

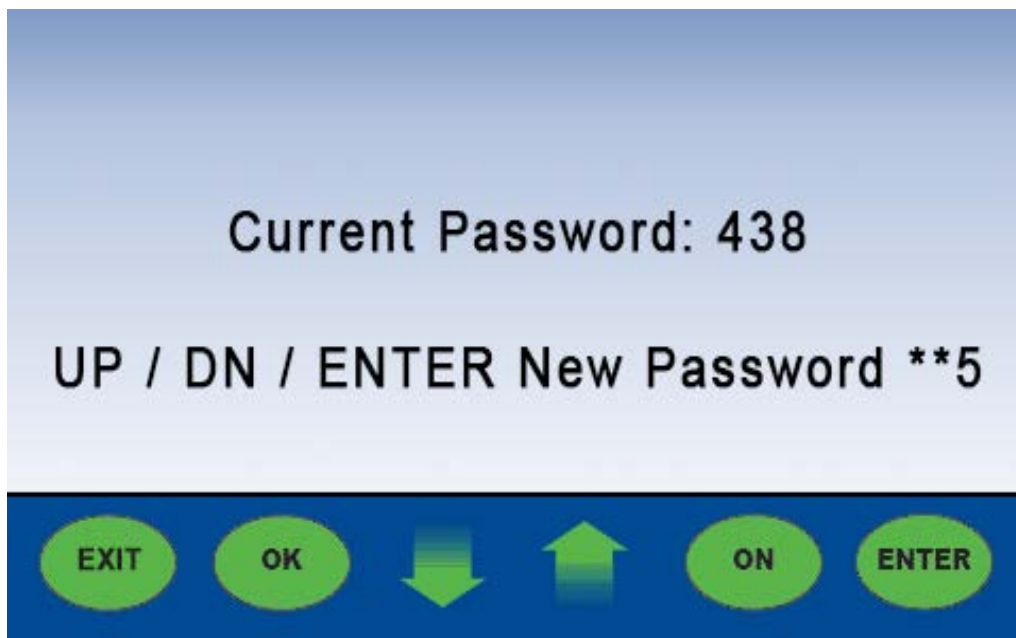


Figure 74
(New password; 3rd Digit)

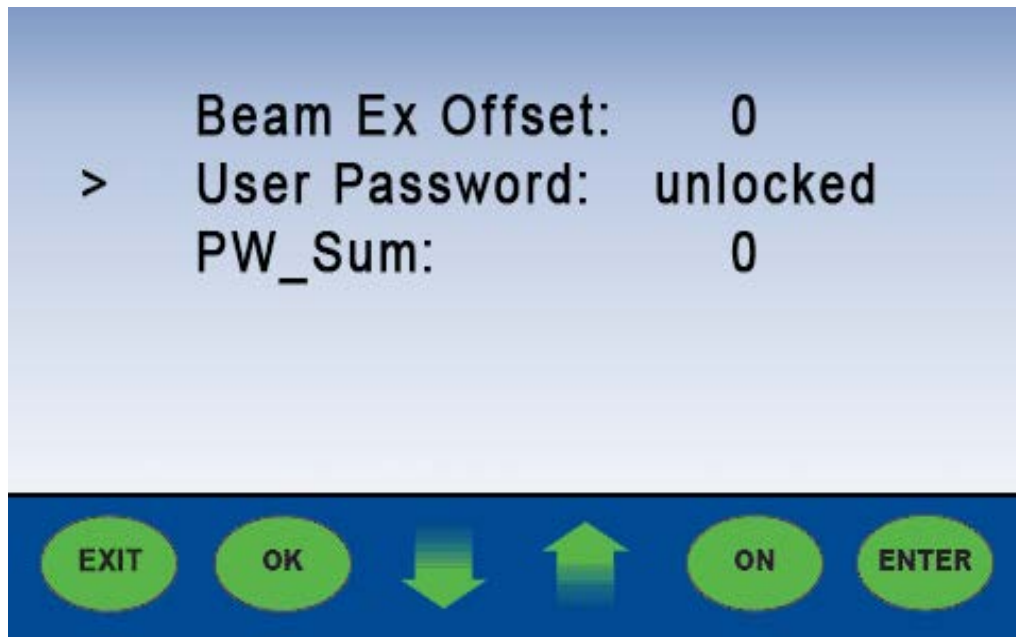


Figure 75

(User password: unlocked)

Section B: Cleaning, Service, and Maintenance Intervals

This chart can be used as a resource for tracking cleaning tasks, routine maintenance intervals, and upcoming or anticipated service needs.

Daily Tasks

- Wipe laser and chamber.
- Clean protective disc.

Monthly Tasks

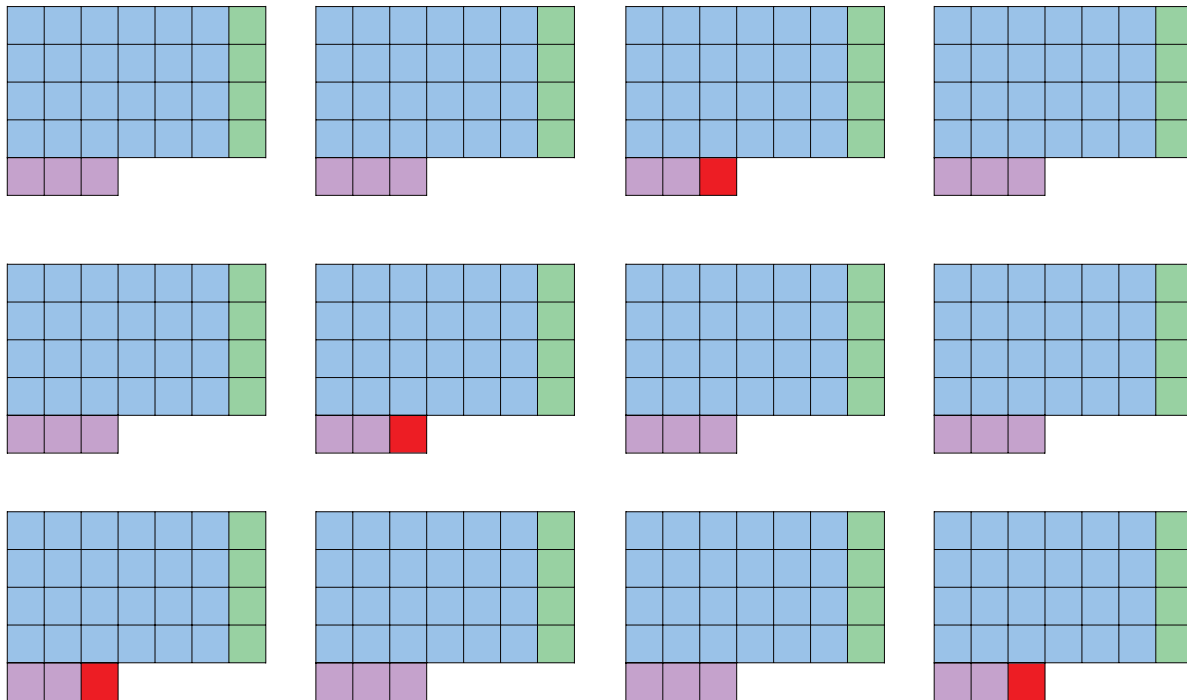
- Clean cabinet and heat exchange.
- Inspect air and exhaust filters.
- Run energy test.

Weekly Tasks

- Check cross-hair alignment.
- Clean and inspect window splash protector.

Quarterly Tasks

- Change filter as needed.



Important Advisory:

Routine maintenance is a requirement for ensuring the safe and optimal operation of the welder system. Regular maintenance intervals must be scheduled in accordance with the manufacturer’s recommendations and requirements. Use only LaserStar Technologies Corporation® approved parts and accessories. Service personnel must verify the equipment is safe to operate after maintenance is concluded.

LaserStar Technologies: Important Contacts		
Sales & Training	Service & Support	Corporate Office
(407) 248-1142 sales@laserstar.net	1-888-578-7782 service@laserstar.net	1717 Diplomacy Row Orlando, Florida 32809, USA

If you have additional questions about your device or would like to provide feedback, a testimonial or present your applications results, please reach out — we’d love to hear from you!

LaserStar Technologies: Important Contacts		
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(407) 248-1142 sales@laserstar.net	1-888-578-7782 service@laserstar.net	1717 Diplomacy Row Orlando, Florida 32809, USA



FiberStar® Workstation 7604 Series Quick Setup Guide



LaserStar Technologies Corporation

1717 Diplomacy Row Orlando, Florida 32809, USA
Phone: 407-248-1142 • Email: Service@LaserStar.net

FIBERSTAR® WORKSTATION 7604 SERIES SYSTEM QUICK SETUP GUIDE INSTRUCTIONS

ITEMS NEEDED: Phillips Head Screwdriver or Power Drill with Phillips Head Drill Bit, 6mm Allen Bit & 7/16” Socket Bit, 5mm & 6mm Allen Wrench, Scissors or Snips, Box Cutter or Knife, Step Ladder, Ramp

INSPECTION

1. Before opening the shipping container, be sure to inspect the outside of the crate for apparent damage that may have occurred in transit. If you discover damage, immediately contact LaserStar’s Service Department.
2. Identify the TIP-N-TELL indicator (located on the outside of the shipping crate). Check to see whether blue beads are present in the top portion of the arrow on the TIP-N-TELL. If you notice blue beads in this area, immediately contact LaserStar’s Service Department.



No blue beads present:
(no tipping of crate)



Blue beads present:
(crate has been tipped)

3. Identify the SHOCKWATCH warning sticker (located on the outside of the shipping crate). Check to see whether the tube in the center of the SHOCKWATCH warning is red. If you find the center of this tube is red, immediately contact LaserStar’s Service Department.



Tube is not red:
(no shock warning)



Tube is red:
(shock warning)

UNPACKING THE LASER

4. Remove the screws from the bottom of the skid. **(Note: A power drill with a cross head drill bit is required.)** With scissors, snips, or a knife, cut the tape on the outside of the shipping container. Remove the padding on top, and then remove the box from the pallette.



5. Remove the accessories from the platform before attempting to move the laser..



6. With at least three people, lift the laser off of the skid base and onto the desired surface. If with the laser stand, lift the entire ensemble and place at the desired location.



INSTALLING THE STAND (IF PURCHASED WITH STAND)

If you purchased the laser with the adjustable floor stand, all that needs to be done is to place the assembled product in the desired location and plug it in.

7. After the full assembly is where it needs to be, and before turning anything on, first make sure the cables are unwrapped, and already connected to the power bank. If they are not, pull the plastic cover off first before attempting to arrange the cables, and put the plastic cover back on once the cables have been arranged.



8. Once checked, take the black wire from the power bank (that does not connect to the control pendant) and plug it to the desired wall outlet. The light should turn green once plugged in.



9. Once plugged in, press up or down on the pendant to move the stand up or down.



POWER REQUIREMENTS 120V

10. Set a traditional voltage meter to 200VAC and check the wall outlet. An acceptable voltage range is 108VAC to 132VAC, ~50/60Hz, single-phase unless an alternate agreement was made when the system was ordered. **(Note: Make sure you are running a dedicated line.)**



POWER REQUIREMENTS 220V

11. Set a traditional voltage meter to 500VAC or 1000VAC and check the wall outlet. An acceptable voltage range is from 208VAC to 240VAC, ~50/60Hz, single-phase unless an alternate agreement was made when the machine was ordered. **(Note: Make sure you are running a dedicated line.)**



CHECK THE PLUG AND OUTLET

12. The 220V units will come with a pigtail power cord. For all other models, when selecting and purchasing your plug, be sure to choose a male plug that is the same configuration as your female wall outlet. Attach the male plug to the power cord using the appropriate screwdriver. **(Note: Make sure to connect the green grounding wire to the green terminal of the plug.)**



FINAL CONNECTIONS & POWER UP

13. Remove the keys and remote interlock from the bag in the accessory kit. Place a key in the key switch.



14. Retrieve the foot switch from the accessory kit. Plug the cable into the outlet marked “Foot Pedal” (located on the rear of the laser) and turn the threaded fastener to tighten. Place the pedal on the floor.



MOUNTING THE MICROSCOPE

15. Remove the scope from its box and take off the plastic cap that protects the flange.



17. Place the flange into the mounting ring at the top front of the laser. Select the 2mm Allen wrench (provided). Holding the scope facing forward, tighten the two (2) mounting screws (located on the mounting ring at 5 and 7 o'clock). When the scope is securely mounted, remove the rubber tube protectors.



16. Remove the oculars from the box and place one in each eye tube. **(Note: One ocular is marked with a “+”; place this ocular into the tube of the operator’s dominant eye, usually the right eye.)**



18. If the operator does not wear eyeglasses, you may insert the rubber eye cups on the ends of each ocular.



CROSS-HAIR ALIGNMENT

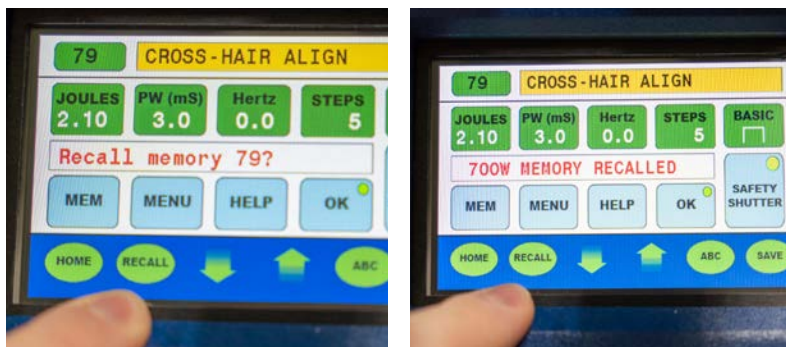
19. Touch the number on the top left (79 in these images), then touch the Safety Shutter button (see second image). The dot in the button should now be green, as shown in image 3.



20. Touch the Arrow buttons on the touch screen and select memory cell #1 TEST SETTING by using the Up or Down Arrow buttons.



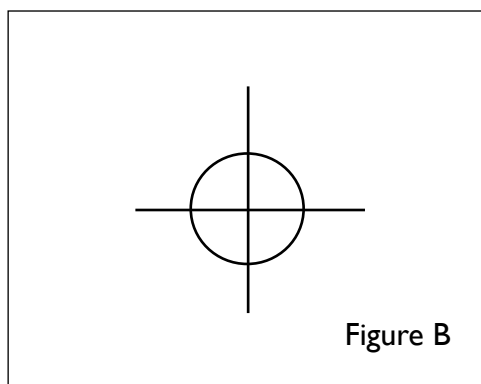
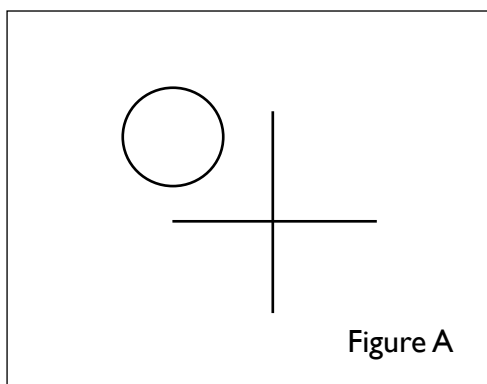
- Depress the **Set Recipe** button (yellow button; located at the top center of the touch screen). The parameter buttons will all turn green.



- Place a piece of scrap metal under the laser and then depress the foot pedal to the floor; this will release one laser pulse that will appear on the scrap metal.



- Look through the microscope to reference the pulse spot position and compare with the location of the cross-hair center target. **(Figure A)** When properly aligned, these will overlap. **(Figure B)** For alignment and movement instructions, be sure to reference the **Optical Alignment Diagram** (next page).

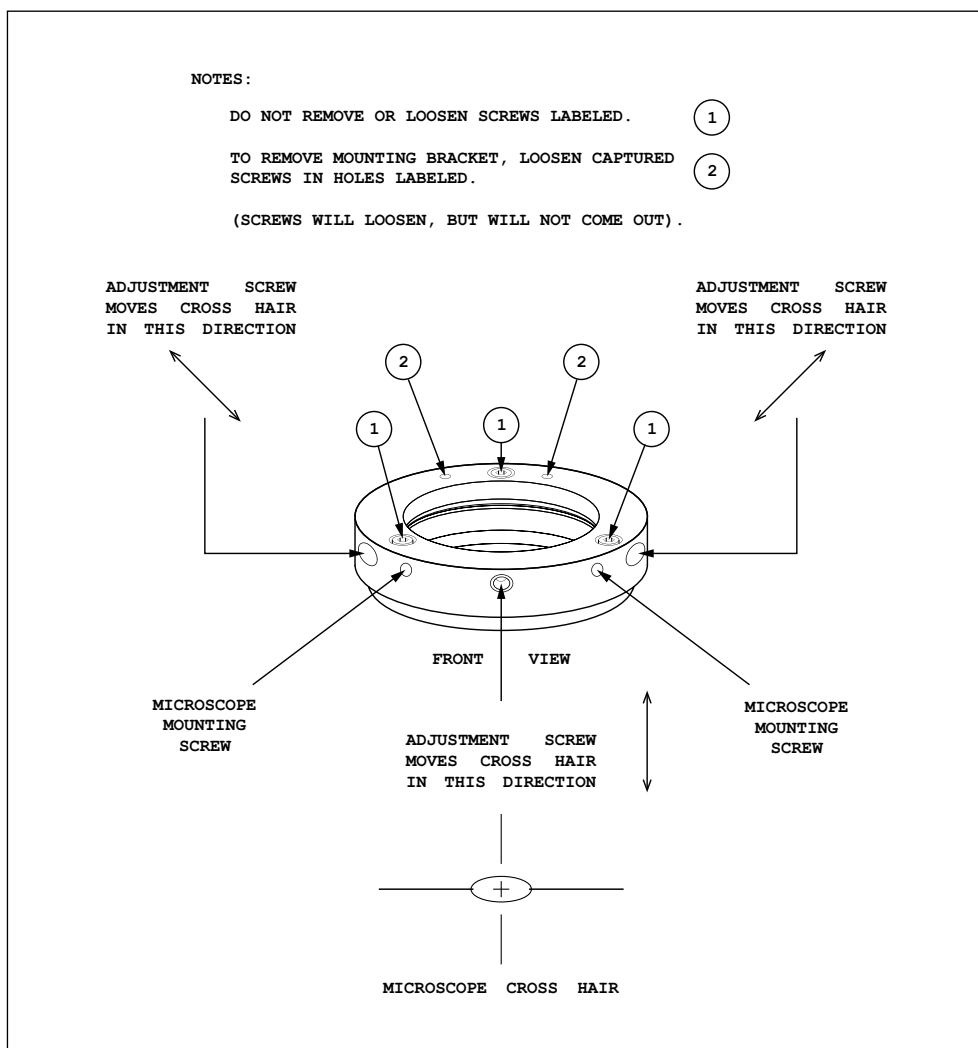


24. Referencing the optical alignment bracket diagram for the microscope, use a 2mm Allen wrench (provided) to move the cross-hair center target directly above the laser pulse position. The three (3) alignment screws on the mounting ring are located at 3, 6, and 9 o'clock.

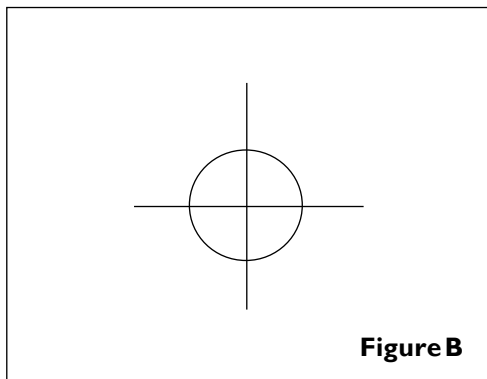
Movement directions are as follows:

- 3 o'clock screw: moves cross hair (North-East to South-West) ↗
- 6 o'clock screw: moves cross hair (North to South) ⇅
- 9 o'clock screw: moves cross hair (North-West to South-East) ↘

Optical Alignment Diagram



25. Once the cross-hair center target is correctly positioned in the center of the laser pulse, refire the laser to ensure the accuracy of all adjustments. **(Figure B)**



Congratulations you are ready to begin using your laser!

If you have additional questions about your device or would like to provide feedback, a testimonial or present your applications results, please reach out — we’d love to hear from you!

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The background features a dark blue gradient on the left and a white area with diagonal lines on the right. A horizontal band of digital data, consisting of vertical blue lines and small squares, spans across the middle. Below this band is a light blue horizontal bar.

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