



Product Manual and User Guide

For Professional Use Only - FDA Variance Required in the United States

X-Laser strongly recommends keeping this manual with your laser projector at all times as a field reference.



Review the safety and legal notices in this manual carefully before use.

If you have any questions about any of the content of this manual or the safe operation of your new laser projector, please do not hesitate to contact your dealer or X-Laser directly.



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Introduction

Thank you for purchasing an X-Laser product! You now own one of the most powerful and best crafted aerial laser display systems ever created for the entertainment industry.

Before leaving our factory, every projector is carefully checked in a comprehensive quality assurance process to ensure proper and safe operation. In many cases, the quality assurance process is repeated to ensure that the data from the first quality check remains consistent. With this level of attention to detail, you can be sure that your new X-Laser has left our factory in absolutely perfect working order. Please check your laser immediately upon receipt to ensure that it was not damaged in shipping, which can happen with sensitive optical components.

Your new X-Laser projector is capable of producing absolutely stunning aerial laser effects over audiences in nearly any performance application with the convenience and flexibility of DMX control. With the power of X-Laser fixtures also comes a responsibility for safety so we strongly encourage you to read and follow all of the notices throughout this manual.

Please note that this User Guide is NOT exhaustive. For clients in the United States, Federal law requires that you use your X-Laser equipment only in compliance with the terms of your FDA variance. We also recommend that all of our clients, especially those who may be new to high powered laser, seek advice and further training from experienced laserists and laser safety officers. Light shows of any kind are always at their best when the designer understands the strengths and weakness of the medium and the equipment. This is especially true for laser, as the value of experience and training cannot be overstated when it comes to safely crafting the best possible laser display. If you have any questions about proper use of your laser system, laser safety, troubleshooting or anything else, visit us on the web 24/7 at www.x-laser.com so that we can best assist you!

A note on Mercury equipped projectors

Our laser control system, Mercury, was designed from the ground up specifically for use with modern production grade stage lighting control. There are sometimes substantial differences in the ways these control systems present the features of the Mercury system. To help you get started, we have created a series of video tutorials to show you all the basics of the system to help you get up and running on a wide range of different platforms. Often these videos are the fastest way to learn how to work with Mercury and we encourage you to check them out.

Please check these videos out on our website at

www.x-laser.com/mercury-tutorials

Product Labeling

The following label is affixed to the top of your laser projector; if at any point the label becomes illegible, please contact X-Laser for a replacement.





Caution--use of controls or adjustments or performance of procedures other than those specified herein may result in hazardous radiation exposure.

Safety Notices

Failure to follow the above precautions and other precautions contained in this user manual, particularly with regard to human exposure to laser radiation and electrical safety, may result in serious injury, loss of vision, electric shock, skin damage, and death. Please refer to the section on safe laser projector usage later in this manual for more detailed operation guidelines. Always be mindful that Class 3B and 4 lasers shoot potentially hazardous radiation at the speed of light. They should be handled and operated with care and caution.

- 1. This equipment should only be set up and operated by qualified personnel and under the supervision of a qualified Laser Safety Officer.
- 2. Do not expose the human eye directly or indirectly to focused or scattered laser radiation as loss of vision, complete blindness, and/or other serious injuries may result. Lasers are capable of starting fires at great distances. Do not use around flammable materials.
- 3. This fixture is NOT intended for audience scanning effects. Operators must ensure that the primary laser beam and any reflected beams remain in designated safe areas only. Please refer to the terms of your specific FDA variance for vertical and lateral separation requirements. In most cases, to prevent human access to the laser beam all beams are required to pass no closer than 3m (10ft.) above any surface upon which someone can stand.
- 4. Always ensure that the fixture is mounted securely to prevent accidental beam shifts.
- 5. Always ensure that the main power supply is properly grounded before use. Do not use an ungrounded power cable with this fixture.
- 6. Always provide both a primary and backup means of instantly terminating laser emissions.
- 7. Always test your means of termination before every performance.
- 8. DO NOT USE this fixture if you suspect that it contains a defect of any kind due to manufacturing, damage, general wear or if the fixture has a broken manufacturer's seal. Return the fixture to the factory for service and/or maintenance immediately.
- 9. DO NOT EVER allow lasers to enter airspace or hit aircraft.
- 10. This unit should never be left unattended while operational and should always be disconnected from both signal and power while being transported, rigged, de-rigged, cleaned, or when a qualified operator is not present. We also recommend removing the key from your etherStop pendant to prevent unwanted activation by untrained users.
- 11. Do not stand in front of the laser while active. All persons should wear protective eyewear while rigging, maintaining, or otherwise working with the laser.
- 12. There are NO user serviceable parts inside of the fixture. Opening the outer casing may result in radiation exposure. Any modifications to the fixture are prohibited, may be dangerous, and require recertification by the manufacturer to maintain compliance with US Federal regulations.
- 13. Service operations other than those described in this manual must be carried out only by a qualified technician in accordance with manufacturer's specified procedures.

Legal Notice

- 1. Before using this product, it is the responsibility of the user to be familiar with all Federal and State reporting and usage requirements for high powered laser demonstration equipment. Laws vary by state. Refer to the included user USB drive for more information.
- 2. In the United States, federal law requires that this product be operated by an FDA variance holder or an authorized and adequately trained employee under the supervision of an FDA variance holder. In all cases, this product should only be operated by qualified personnel and should be kept inaccessible to unauthorized persons before, during, and after use. Keep away from minors.
- 3. The labels and emission indicator on this product are required for compliance with US Federal law and international standards and must be kept on the unit, visible, and in legible condition at all times. Do remove any labels and do not cover the emission indicator or laser aperture label under any circumstances. If any labels become damaged, contact X-Laser for replacement.
- 4. This product must be certified by the manufacturer to comply with US Federal requirements for laser demonstration equipment after manufacturing, modification, or alteration. The use of laser demonstration equipment that has not been recertified by the manufacture after any alteration or modification is a violation of US Federal Regulations.
- 5. To maintain compliance with US Federal requirements, this product must only be operated and serviced in accordance with the manufacturer's specified procedures, including the procedures described in this manual.

Failure to comply with federal, state, or other applicable laws, codes, and/or standards of practice when using this product may cause serious and permanent injury and may result in civil or criminal penalties including fines and jailtime. Such failures to comply may be grounds for cancellation of liability or other insurance policies and increase the liability exposure of the user.

Unpacking Your Laser Projector

Your new X-Laser Mobile Beat laser projector box should contain the following items:

- 1. X-Laser Mobile Beat Mercury laser projector
- 2. A grounded powercon True1 cable
- 3. Laser projector key
- 4. etherStop terminator
- 5. "Black wrap" beam blocking foil
- 6. A USB key containing this manual, letters, forms, and a wealth of other information about this product and laser safety in general

Projector Layout and Functions



- 1. PowerCON True One inlet
- 2. PowerCON True One outlet
- 3. Power Switch
- 4. Fuse holder
- 5. Key Switch
- 6. 5 pin DMX Through
- 7. 5 pin DMX Input
- 8. etherStop port (Artnet and e-stop/reset)
- 9. E-stop port (e-stop and reset only, upgradable to etherStop)
- 10. ILDA input/through
- 11. Mercury interface

Mercury Interface layout and functions

- 1. LCD Screen
- 2. USB Port for firmware and content updates
- 3. Signal status indicators
- 4. Laser emission indicator
- 5. Keypad





Directional buttons





Back button

Enter button





Menu button

Laser button

Power Variations

Laser systems often exhibit minor variations in power level between units, especially between systems of different ages. X-Laser systems are built to match from unit to unit within a small tolerance that is usually not noticeable. Variations within that tolerance are not considered a defect, even if they may be noticeable in certain applications. Contact X-Laser before purchasing if you require more closely matched systems.

General Guidelines for Safe Laser Use

This product is a powerful laser device intended to be operated by professionals. The major concern with professional laser systems is to avoid human contact with the laser beam and to create a safe area where patrons and staff can enjoy your light show. Please observe the following guidelines when using your X-Laser product:

Safe Zoning

Laser effects should only be projected in areas away from people and flammable materials and free of surfaces that may reflect laser beams towards people. People should be prevented from entering those projection zones at all times. If at any point a person enters the projection zone or for any reason any laser leaves the projection zone the laser display should be immediate terminated.

Prevent Mishaps

As a laser light show operator you have a responsibility to reasonably foresee circumstances where conditions could present a safety risk to people. This means that you must make sure all laser units are properly aimed via your show programming and securely mounted to prevent shifting during operation, physically blocked to prevent radiation spill or reflection into safe areas, and securely mounted. To ensure that these conditions are met properly, trained employees should be the only ones rigging or operating X-Laser products.

Means of Termination

Always provide primary and backup means of terminating the laser output in case of emergency. For example, DMX control as well as a remote etherStop pendant for the Mobile Beat series. Always test both primary and backup means of termination before every performance.

Warning: DMX distribution or network control equipment that implements a "last look hold" feature is not a reliable means of termination. Such equipment may continue to provide a control signal that causes laser emission after a termination command from or even the total failure of the main control system.

Service and Maintenance

Because there are no user serviceable parts inside of this product, the outer case should never be opened by the user. To ensure proper safe operation in demonstrations and performances, immediately discontinue use of this product if you notice or suspect that any part of the laser is not functioning properly. After any repair, service, or modification, this product must be certified by the manufacturer to comply with US Federal requirements for laser demonstration equipment. In case of any malfunction, contact X-Laser or your dealer for an RMA number and we will repair the unit to bring it back into working operation and US Federal compliance.

Training and Qualification

In the United States, Class 3B and 4 laser products may only be used by a person or employees of an organization which holds a Laser Light Show Variance. All such persons must have adequate and appropriate laser operation and safety training, keep a copy of their variance with them at all performances, and keep appropriate safety logs and checklists. The variance holder must also file annual reports as required by the CDRH (FDA) and ensure that their variance is renewed prior to expiration. Copies of these forms, introductory training materials, and more may be found on the USB DRIVE enclosed with this product.

We strongly recommend that each user of an X-Laser product read "Safe Laser Display" literature published as ANSI Z136.1 and Z136.10. These and a wealth of laser safety information are available from www.rli.com and the Laser Institute of America. We also strongly recommend that proper safety equipment such as wavelength specific laser safety glasses be used during any times in which a technician or others could be exposed to laser radiation.

Excellent laser training is available from a number of private institutions such as RLI and we recommend that all of our users undertake it. Basic safety training is provided with this product but is NOT meant to be comprehensive. Please follow the enclosed instructions on the user USB drive.

Special Considerations for Outdoor Use

Do not ever, under any circumstances, allow laser beams to enter airspace except under conditions specifically approved by the FAA and any other applicable authorities. FAA approval is only ever granted for a specific case and under specific conditions for the specific timeframe outlined in an application filed by the operator. Contact X-Laser or a qualified Laser Safety Officer for guidance on performing unterminated outdoor laser shows safely and legally. **Striking an aircraft with a laser beam, even if accidental, is dangerous and is a felony punishable by fines and jail time.**

We want you to have a wonderful experience with our products so that you can bring the thrill of professional laser light shows to your audiences. The safety procedures outlined in this manual should be easy to successfully implement in your shows and provide you with years of safe and profitable laser displays. Please contact us if you have any questions about how to safely and effectively use X-Laser products.

General Guidelines for Proper Usage

- 1. Always treat your laser with great care as some components are very fragile. While this product is designed to withstand the normal rigors of production use, drops or other severe impacts may cause internal misalignments requiring factory service or other serious internal damage. Care for it as you would a video projector.
- 2. Mercury-equipped X-Laser systems including the Mobile Beat Mercury are designed to work well with professional production lighting control systems. More basic control systems may not be able to present the capabilities of the Mercury control system in an intuitive or easy to use manner leading to a frustrating experience. If you need a control solution, we highly recommend Avolites Titan software.
- 3. Always keep all factory supplied labels on the unit and visible. Never cover or disable the emission indicator on the front of the unit. The labels and indicators are all required for legal compliance.
- 4. The unit is supplied with black wrap foil to be used as beam blocks to prevent the laser from accidentally scanning into the audience area. This is provided separate from the fixture so that it can be applied, adjusted, and removed easily for mobile entertainment applications.
- 5. If this unit is to be permanently installed, you may permanently apply the foil to the outside of the unit. To apply, simply use thin strips of gaffer's tape or a heat safe glue for permanent installation. Using this foil is required for maximum safety and we recommend replacing the foil and/or tape at the first signs of wear. Replacement foil strips can be obtained very inexpensively through your X-Laser dealer.
- 6. Always maintain open space around all sides of the laser to facilitate airflow.
- 7. Always operate the laser in an ambient temperature of 50-90°F. Operation outside of this temperature range may result in failure or diminished operating life. Such failures are NOT covered under our manufacturer's warranty.
- 8. This unit is primarily intended for indoor use, but occasional outdoor use is acceptable. Treat this fixture like you would a video projector when using outdoors. Do not expose this fixture to rain or temperatures outside of a normal working range of 50-90°F/10-32°C, or direct sunlight. Do not store this product outdoors. While the Mobile Beat series is not fully weatherproof, the fixture is weather resistant, so outdoor use is acceptable. If the fixture will be used outdoors, we recommend that the fixture be covered, specifically over the back panel and top panel to protect the wired connections

Installation

You may hang or otherwise mount your new X-Laser product in any suitable orientation provided the requirements of this guide and all other applicable rules and regulations are observed. Before every show, verify that the programming and hard beam blocks are suitable for the application, especially if you have changed the orientation of the laser or if you are operating it in a new environment.

Safe Beam and Projection Height

Most US FDA variances require that all beams be kept at least 3 meters (10 feet) above any surface upon which your audience can stand. Refer to your variance for required vertical and lateral safety distances. Performers and trained personal MAY be exempt from these safety distances at the discretion of a qualified Laser Safety Officer who may be able to implement an alternative radiation safety plan.



Example of a safe projection, 3 meters above the dance floor

Physical beam blocks

After your projection area has been set up in your laser controller, make sure to block off the laser aperture to make sure the projection area remains safe, even in the event of a laser or controller malfunction. You can do this using the physical block attached of the front of the laser (if equipped) as well as with "black wrap" cinefoil or black aluminum foil tape.



Operation

Before Powering up Your Projector

Laser beams may shoot in unexpected places during setup, so be sure that all areas which may be within the projection field of the laser are clear of people and flammable materials. Be prepared to immediately terminate the laser output if any laser is emitted in an unsafe direction.

Be sure the laser projector is safely and securely rigged, and not likely to be moved or dislodged by vibration or collision with any moving scenery, equipment, people, animals, etc.

Be sure you have at least one, but preferably two, reliable means of attenuating the laser beam such as an etherStop pendant, functioning DMX/Art-Net control, or the ability to quickly cut power to the projector. Mains power termination should only be considered a secondary safety system, not the primary means of attenuation.

Duty Cycle

The laser may be left powered on without projecting any laser content indefinitely, however over time this will result in the cooling fans, filters, and external heatsinks needing more frequent cleaning. For optimal maintenance intervals, power off the system when it will not be used for more than an hour or two. When operated within the specified temperature range, the laser may be operated continuously for up to four hours with no ill effect.

Laser Startup

To provide safe and reliable operation and meet the requirements of US Federal regulations and international standards, X-Laser projectors generally require a multi-step startup procedure:

- 1. After power on, the laser starts in the "Startup" state.
- If any key switches are not in the enabled position or any remote interlocks are open, the laser will enter the "Not Ready" state. The laser's display will indicate the required action, for example "Turn Key" or "Interlock Open"
- 3. All key switches must be switched to the enabled position, all remote interlocks must be closed, and if the if the reset input is initially asserted, it must be released.
- 4. When these conditions are met, the laser will enter the "Ready" state and the emission indicator will flash briefly once every three seconds.
- 5. The reset input must be asserted, either by pressing the reset button on a remote pendant or by pressing the laser button ⁽²⁾ on the projector.
- 6. The laser will test its local emission indicator and then enter the "Emission Delay" state. The emission indicator will flash once per second during this time.
- 7. If all key switches and remote interlocks are kept in the closed state, the laser will enter the "Enabled" state after the emission delay time has expired. The emission indicator will be on continuously, and the laser will be ready to emit if a suitable control signal is applied.
- 8. If at any point a key switch or remote interlock is opened, the laser will immediately return to the "Not Ready" state.

The etherStop system

X-Laser's etherStop control interface combines network-based control (such as Art-net) and a remote Estop interface into a single cable. The interface includes 10/100Mb Ethernet, a remote interlock loop, an emission signal, and a reset signal, all in a single CAT5 or CAT6 network cable. We recommend etherCON connectors and rugged CAT5 or better cables for best durability, but standard networking cables can be used for less demanding setups.

etherStop terminator

Every etherStop compatible laser projector ships with an etherStop terminator that may be used as a service plug. This terminator closes the etherStop interlock loop, but does not provide a reset signal.

The service plug is intended to be used during testing only and does not meet US federal requirements for a means of remote termination of laser output per 21CFR1040.10. When using the



terminator as a service plug, physical access to the laser is required to reset the laser to initiate laser emission.

In almost all cases, the we recommend that etherStop-equipped projectors be used with an etherStop pendant or a Nexus etherStop switch system (sold separately).

To use the terminator as a service plug for bench testing, connect the terminator to one of the two etherStop ports on the back of the laser. This will close the interlock loop. With the terminator installed, and the key switch in the enabled position, press the laser button rest to the LCD to reset the projector and enable laser emission.

Do NOT install the terminator in the laser when using an etherStop pendant or other remote stop system.

etherStop Pendant

etherStop connections

The etherStop pendant has 3 etherCon connectors. These provide connections for:

- 1. Network this connector is for data input (Art-Net or SACN) from your control source
- 2. Laser etherStop LASER control out (green connector). This connector carries the combined emergency stop signal, reset signal from the pendant itself and the Remote connector and the data injected from the Network connector. If the laser is being



controlled through DMX or ILDA only and not using network data for laser control this will only carry the emergency stop and reset signals

3. Remote – this connector provides expansion to a secondary control location for additional safety if the show requires it. If no secondary control location is required, insert the etherStop terminator into this port. Otherwise, connect this port to the Laser port of the secondary control, and insert the terminator in the Remote port of the secondary control. A total of up to five pendants, including the primary pendant may be daisy chained in this manner.

Do NOT connect more than one pendant directly to a laser projector. When using more than one pendant, ALWAYS connect the second pendant to the Remote port of the first pendant.

etherStop interface



The front of the etherStop interface contains:

1. BIG RED BUTTON – Depress this button to emergency stop your laser. The button will latch in the down position when pressed, twist it clockwise to reset the switch.

2. Reset button/Emission indicator – The laser requires a reset signal to begin laser emission after startup or after an interlock has been opened. The emission indicator will illuminate or flash to indicate the state of the laser system. Refer to the "Laser Startup" section above for details on the startup sequence.

3. Key switch - This key switch is part of the remote interlock loop and must be actuated to permit emission from your laser.

Remove this key to prevent unauthorized operation if the control station must be left unattended.

The etherStop interface is only part of the laser projector's interlock and safety system. In order to close the remote interlock loop and permit laser output, the following conditions **must** be met:

- 1. The key switch must be turned to the enabled position, if you cannot pull the key out of the switch it is in the enabled position.
- 2. The BIG RED BUTTON must be in the "up" position on all connected pendants.
- 3. The Laser port (green) on the etherStop pendant must be connected to the laser via either etherStop port on the laser.
- 4. The last pendant in the daisy chain must have an etherStop terminator installed in the Remote port
- 5. Once these conditions are met, the emission indicator will flash once every three seconds. Pressing the reset button will then cause the system to enter the Emission Delay state, and the emission indicator will flash once per second.
- 6. At the end of the Emission Delay period, if all interlocks remain satisfied, the emission indicator will illuminate solidly, and the system will be ready to emit when an appropriate control signal is provided.

The etherStop system can control up to 10 lasers "daisy chained" together. For larger systems or systems where chaining is not desirable, please contact us for more information on our Nexus line of etherStop hubs.

etherStop system examples



Other e-stop systems

Some users may already have other laser systems and prefer to wire their e-stop system to be compatible across all their projectors. Additionally separate remote relays and switches can be used in place of the terminator to integrate remote stop busses, door switches and more. For users who require such arrangements, example wiring is shown below.



While the etherStop interface has been designed with reasonable protections against miswiring, damage to the laser through improper use of the etherStop interface may be possible and is not covered under the warranty. X-Laser is unable to provide support for external E-stop systems implemented by others.

The Mercury Menu system

Lasers equipped with our Mercury laser control system have a large, full color LCD menu system to navigate all the available settings and options. This menu system is navigated using the 8 keypad buttons.



Directional buttons





Back button

Enter button



Menu button



Laser button

System Status Display

The System Status display is the default display and provides an "at a glance" view of the most critical information such as:

Ctrl: This is an indicator of the currently set control mode. This can be DMX, Art-Net or Manual

Status: This indicates the status of the control source. This may indicate:

Timeoutl – A control packet has not been received within the timeout period

Too Slow - control packets are being received, but not frequently enough to meet the packet

threshold

Ready - control packets are being received regularly

Universe: This indicates the Art-Net universe the laser has been set to, if in DMX mode this will read DMX, if in manual mode this will read MANUAL

Address: This indicates the address the laser projector has been set to if in DMX or Art-Net modes. If the projector is in Manual mode this will read MANUAL



Laser Status: This indicates the status of the laser's internal safety systems. Statuses include:

Enabled - The projector is capable of emitting laser when an appropriate control signal is sent

Turn Key – The key switch is in the disarmed position

Interlock Open – The system detects that the etherStop interface remote interlock loop is open (no etherStop pendant or compatible terminator connected, key switch not in the enabled position, or BIG RED BUTTON pressed)

Indicator Faill - The emission indicator on the laser has failed. Per IEC60825 the emission indicator is failsafe, so emission is prohibited

Not Ready – The system is not ready to emit laser for some internal reason

Suspended – Emission has been suspended due to an internal laser fault or diagnostic state

Release Reset - the reset signal must be released before the laser will respond to the reset button being pressed

Press Reset – The projector is ready to emit, but has not had the etherStop reset triggered

Wait – The projector is in the Emission Delay state and will be ready to emit at the end of the Emission Delay period (ten seconds on most systems)

Additional status screens showing the status of the available control interfaces are available using the left \bigcirc and right \bigcirc arrow keys.

To access the Main Menu from the System Status screen, press the Menu 🖲 button. From the main menu, pressing the back 🛇 key will return to the status screen.

System Menu

The system menu includes frequently changed settings such as:

Personality The DMX personality of the system. Available options are:

- 1. Master only
- 2. 1X Basic Builder
- 3. 2X Basic Builder
- 4. 3X Basic Builder
- 5. 4X Basic Builder

These personalities are explained in depth in the Fixture Profile section of this manual.

| Control Source | Sets the control source to Manual, DMX or Art-Net |
|-----------------------|--|
| DMX Timeout (ms) | The DMX timeout setting in milliseconds. Default is 100 |
| Art-Net timeout (ms) | The Art-Net timeout setting in milliseconds. Default is 2000 |
| Load Defaults | Resets the system to the factory defined default settings |
| About | Important information about your system such as the model of laser, serial number of the Mercury interface and MAC address of the system |

The DMX and Art-Net timeouts should be set to the minimum value that provides reliable operation. The system requires a continuous control signal to maintain output, and the loss of that control signal should result in termination of output as soon as possible, with the understanding that there is a minimum time required for reception of new control packets.

DMX Menu

The DMX menu allows you to set the projector's DMX receiving characteristics, such as:

Address The starting DMX address of the projector

Packet Threshold The packet threshold for receiving DMX, default is 30

Network Menu

This menu is where you access the network settings of this projector.

| IP Mode | Set the IP mode, at this time the only option is Static IP but this will likely |
|---------|---|
| | change in a future release |

- Static IP Sets the static IP, the default is 10.0.0.1
- Subnet Sets the subnet, the default is 255.0.0.0

Art-Net Menu

This is where the Art-Net specific settings of the projector are accessed.

Mode Sets the Art-Net mode as enabled or disabled

Universe Sets the Art-Net Universe the projector responds to

Poll Reply Mode Sets the poll reply mode, available options are:

- 1. Limited broadcast (default)
- 2. Unicast
- 3. As Polled
- 4. Broadcast

Packet Threshold Sets the packet threshold, the default is 4

X/Y Menu

Zoning your laser is one of the most important setup steps and this menu is essential to accurate and safe zoning. While many may choose to do all their zoning from the Master fixture via DMX or Art-Net, it's still essential to learn this menu.

| X Invert | s the projection along the X Axis, left to right | | | | | | | |
|------------------|--|--|--|--|--|--|--|--|
| Y Invert | Flips the projection along the Y Axis, top to bottom | | | | | | | |
| X/Y Swap | ritches the X and Y axis, this way a projector mounted at 90 degrees n maintain the same orientation as a projector mounted iditionally | | | | | | | |
| X/Y Ext. Control | nis setting controls the X/Y size and position controls from the DMX r Art-Net Input. Available options are: | | | | | | | |
| | Full – DMX/Art-Net control is enabled, and is not limited by the minimum and maximum values set in the X/Y Limits submenu | | | | | | | |
| | Scale – DMX/Art-Net control is enabled, but the DMX values are scaled to the range between the minimum and maximum values set in the X/Y Limits submenu | | | | | | | |
| | Limit – DMX/Art-Net control of scale and positions is enabled, but the DMX values are not permitted to go beyond the limits set in the X/Y Limits submenu | | | | | | | |
| | Disable - DMX/Art-Net control of scale and position is disabled, and the size and position values from the X/Y submenu are used | | | | | | | |
| X Scale | ets the X Scale from 1-256, with 1 being the minimum and 256 being he maximum. This scale setting is ignored when DMX/Art-Net control s enabled and X/Y Ext. Control is set to Full. The default is 128 ets the Y Scale from 1-256, with 1 being the minimum and 256 being he maximum. This scale setting is ignored when DMX/Art-Net control s enabled and X/Y Ext. Control is set to Full. The default is 128 | | | | | | | |
| Y Scale | | | | | | | | |
| Y Offset | Sets the Y Offset from -100 to 100. This scale setting is ignored when DMX/Art-Net control is enabled and X/Y Ext. Control is set to Full. The default is 0 | | | | | | | |
| X Offset | Sets the X Offset from -100 to 100. This scale setting is ignored when DMX/Art-Net control is enabled and X/Y Ext. Control is set to Full. The default is 0 | | | | | | | |
| X/Y Limits | Sets the limits for Scale and Offset when X/Y Ext. Control is set to Scale or Limit | | | | | | | |

Colors Menu

The colors menu allows you to do basic color balancing across your projectors.

| Red Min | The minimum level of the Red laser source when there is any red laser commanded to be on |
|-------------|---|
| Red Max | The maximum level of the Red laser source when there is any red laser commanded to be on |
| Green Min | The minimum level of the Green laser source when there is any Green laser commanded to be on |
| Green Max | The maximum level of the Green laser source when there is any Green laser commanded to be on |
| Blue Min | The minimum level of the Blue laser source when there is any Blue laser commanded to be on |
| Blue Max | The maximum level of the Blue laser source when there is any Blue laser commanded to be on |
| Color 4 Min | The minimum level of the Color 4 laser source when there is any Color 4 laser commanded to be on, if the projector is so equipped |
| Color 4 Max | The maximum level of the Color 4 laser source when there is any Color 4 laser commanded to be on, if the projector is so equipped |
| Color 5 Min | The minimum level of the Color 5 laser source when there is any Color 5 laser commanded to be on, if the projector is so equipped |
| Color 5 Max | The maximum level of the Color 5 laser source when there is any Color 5 laser commanded to be on, if the projector is so equipped |
| Color 6 Min | The minimum level of the Color 6 laser source when there is any Color 6 laser commanded to be on, if the projector is so equipped |
| Color 6 Max | The maximum level of the Color 6 laser source when there is any Color 6 laser commanded to be on, if the projector is so equipped |

Display Menu

The display menu allows you to adjust the settings for the LCD display on your laser.

| Brightness | Sets the brightness from 1-10, 1 being the minimum and 10 the maximum |
|------------|---|
| Timeout | Sets the timeout for the LCD screen from 5 seconds to 10 minutes or to never turn off |

Manual Operation Menu

The manual operation menu allows you to select the manual operation mode of the laser, typically used to enable ILDA input without the use of DMX or Art-Net. Available modes are:

| Fixture Disabled | Disables the laser projector from accepting any control inputs |
|------------------|--|
| Builders Enabled | Not yet enabled |
| Preset Mode | Not yet enabled |
| External Input | Allows signal input from an external source, such as ILDA or FB4 (if equipped) |

Mercury Menu

This menu grants access to some of the control parameters of the Mercury laser engine. Do not adjust these settings unless directed to by an X-Laser technician.

Content Menu

This menu allows you to see what content packs you have installed, if any, and to install new content packs as needed. The projector can store 2 separate content packs.

To install a new content pack, insert a USB drive into the USB port on the laser that has an X-Laser content file (*.XLC) on it, select content pack 1 or 2, then select Install and follow the on screen prompts.

Restoring settings

In rare cases, improper or corrupted settings may prevent the system from starting correctly or may cause other undesired operation. In this case, the default settings may be restored by holding the back key down while the laser powers on. Keep the back key pressed until the two status LEDs next to the LCD turn green and the system status screen is displayed, then release it.

System Update Menu

The system update menu is hidden from regular access. Be careful in the system update menu as it is possible to erase your content packs and settings.

The system update menu is accessed by holding the Menu 🖲 button down while the laser powers on. Keep the Menu 🖲 button pressed until the system update menu is displayed, then release it.

The system provides two software update storage slots. The primary slot is used to store the last installed update, and the backup slot may be used to hold an alternative software version in case the installed version must be reverted for any reason. Updates from USB are always installed via the primary update slot.

| Exit | Return to main menu | | | | |
|-------------------------|---|--|--|--|--|
| System Info | Important information about your system such as the model of laser, serial number of the Mercury interface and MAC address of the system | | | | |
| Install update from USB | This allows you to update the firmware on your laser projector. Inse a USB drive into the USB port with the X-Laser firmware (*.XLB file) it. Select this setting and follow the on screen prompts. Detailed instructions are included with all software update files. | | | | |
| Reinstall last update | Reinstalls the last update that was installed from USB | | | | |
| Install backup software | Reinstalls software stored in backup slot | | | | |
| Update backup | Loads software into backup slot, but does not install it | | | | |
| Clear Pending Tasks | This clears any requested actions and is useful in case of certain error conditions that may rarely occur in case of a corrupted update | | | | |
| Erase last update | Clears the update storage slot | | | | |
| Erase Backup | Erases the update stored in the backup slot | | | | |
| Erase Application | Erases the currently installed application. The bootloader and in most cases the settings are preserved, so the laser is not bricked, but will need to have application software installed before it becomes useful again. Unless you're a certified X-Laser technician, please don't do this | | | | |

A video showing the update process and the latest firmware can be found at

http://www.x-laser.com/mercurydownloads

Controlling your laser projector

Builders

Builders are used to "build" up laser effects from a basic shape and several layers of available modifiers, including intensity, size, position, color effects, gobos, prisms, wave effects and motion effects. We have two different types of builders exposing different levels of complexity.

The Basic Builder is 28 channels and is what the Mobile Beat Mercury is equipped with. The basic builder provides control over:

- 1. Intensity
- 2. Gobos
- 3. Preset color macros
- 4. RGB1 and RGB2 for the color macros
- 5. Prisms with X/Y spacing and rotation
- 6. Geometric Post Group (see Geo Pre/Post for further explanation) which is similar to zoom, Pan/tilt and gobo rotation on a mover
- 7. Motion macros with speed and size, similar to an animation wheel

Multiple builders can be layered over top of each other for more complex effects or for fast crossfades/bumps. Up to four builders can be used simultaneously depending on the personality selected on the fixture.

DMX/Art-Net Control

To enable control by DMX, in the System Menu on the laser, set your control source to "DMX". To enable control by Art-Net, set your control source to Art-Net and select the desired Art-Net universe in the Art-Net menu. In the DMX or Art-Net settings menu, set the starting address you wish to use.

Personalities

Your Mobile Beat Mercury has 5 different operating personalities. These personalities are crucial to the proper operation of the system and must be understood. The Mobile Beat Mercury is designed to be patched into your DMX/Art-Net control system as 1-4 basic builders. The Mobile Beat Mercury uses a different number of channels based on the personality you have selected in the Settings Menu on the laser.

| Personality | Channels used | | | | |
|------------------|---------------|--|--|--|--|
| Master | 6 Channels | | | | |
| 1X Basic Builder | 28 Channels | | | | |
| 2X Basic Builder | 56 Channels | | | | |
| 3X Basic Builder | 84 Channels | | | | |
| 4X Basic Builder | 112 Channels | | | | |

Control Groups

The Mercury laser control system in your Mobile Beat Mercury laser is simplified by breaking the control up into groups relevant to different features of the system. These control groups are:

- 1. Master Group
- 2. Builder Main Group
- 3. Color Group
- 4. Intensity Effect Group
- 5. Prism Control Group
- 6. Geometric Post group
- 7. Motion Macro Group

The *Master Group* is the entirety of the Master Fixture and consists of the Enable function, Master Maximum Intensity, Master X/Y scale and offset.

The *Builder Main Group* is where the gobo wheels and overall intensity controls are located in the basic and advanced builders. There are also a few reserved channels for future expansion. It's important to note the maximum intensity in this group will never exceed the Intensity set in the Master fixture.

The *Color Group* contains RGB1 and RGB2 color pickers in both builder modes, preset color macros in the basic builder and a wide range of color tools in the advanced builder. For more information on the different color effects possible with advanced builders, please visit <u>www.x-laser.com/mercurycolorgroup</u>

The Intensity Effect group is not yet active but will be pretty damn cool when it is.

The *Prism Control group* is where the digital prism and its parameters are accessed. At the time of this writing there are 11 different digital prisms built into the system. Additional channels control the X and Y spacing of the prisms and the rotation across the facets. The rotation parameter is an incremental rotation applied to each successive prism element. For example, if the prism inner rotation is set to 5°, the first element will be rotated 0°, the second 5°, the third 10°, and so on. To rotate the entire prism, select rotation or spin from the geometric post group. To rotate the individual facets of the prism, select rotation or spin from the geometric pre group.

The *geometric post group* is the largest departure from more traditional intelligent lighting fixtures. The basic builder has access to the Geometric Post group, this provides access to X and Y scale (zoom), X and Y position (pan and tilt), Z rotation (gobo indexing) and Z Spin (gobo rotation). The "Post" refers to these parameters happening after the prism modifier. For example, with a 1x3 linear prism on a circle gobo, a Z spin would spin the entire array of circles.

The *Motion Macro group* provide access to a number of pre built motion effects in Basic Builder modes. The Macro Speed channel can be used to override the recorded speed of the macro to make the effect faster or slower, and the Macro Size channel can likewise be used to override the recorded magnitude of the motion effect. When these channels are at 0, the default recorded speed and size of the macro are used.

Correlation with moving lights

The Mercury laser control system was designed to be easily mapped to mimic a moving head light in some ways to allow use of the effects and shape engines in your console. These best analogues for mapping your laser projector to existing moving head effects are as follows:

| Dimmer | Builder Intensity | | |
|-----------------------|-------------------------------------|--|--|
| Pan | Geometric Post X Position | | |
| Tilt | Geometric Post Y Position | | |
| Gobo 1 | Pattern | | |
| Gobo 2 | Pattern Page | | |
| Prism | Prism | | |
| Prism Rotation | Geometric Post Z Spin | | |
| Color | First RGB set in color effect group | | |
| Zoom | Geometric Post X Scale + Y Scale | | |

DMX Parameters

The Master channel block controls overall fixture function and final size and position of the projection area.

In Fixture Disabled mode, the fixture is active but will not project any content. This mode can be used to immediately stop all output directly from the console.

External Input mode applies to fixtures equipped with an ILDA input, and in this mode the signal presented at that input is directly displayed by the fixture. In this mode the external input signal is subject to the Master size, position, and intensity controls.

An * underneath the channel number indicates that this value must be NON ZERO to get laser output

| Channel | 8/16 Bit | Function | Values | | | | | | | | |
|---------|----------|-----------|------------------|-----------------|-------------------|------------------|----------|--|--|--|--|
| 1 | 8 bit | Enable | 0-3 | 4-7 | 8-11 | 12-15 | 16-255 | | | | |
| * | | | Fixture Disabled | External input | Reserved | Builders Enabled | Reserved | | | | |
| 2 | 8 bit | Intensity | 0-255 | | | | | | | | |
| * | | | 0-100% | | | | | | | | |
| 3 | 8 bit | X Scale | 0-127 | 128 | 129-255 | | | | | | |
| | | | 100% - 0% | 0 | 0 - 100% Inverted | | | | | | |
| 4 | 8 bit | Y Scale | 0-127 | 128 | 129-255 | | | | | | |
| | | | 100% - 0% | 0 | 0 - 100% Inverted | | | | | | |
| 5 | 8 bit | X Offset | 0 | 1-127 | 128 | 129-255 | | | | | |
| | | | Center | Left Offset | Center | Right offset | | | | | |
| 6 | 8 bit | Y Offset | 0 | 1-127 | 128 | 129-255 | | | | | |
| | | | Center | Downward Offset | Center | Upwards offset | | | | | |

Master - 6 channels

Basic Builder - 28 channels used

| | Builder Main Group | | | | | | | | | | | | | |
|---------|--------------------|--------------|---------------|------------------|----------------------------|------------------------------------|-------------------|------------------|--|--|--|--|--|--|
| Channel | 8/16 Bit | Function | | Values | | | | | | | | | | |
| 1 | 8 bit | Reserved | 0-255 | | | | | | | | | | | |
| | | | Reserved | | | | | | | | | | | |
| 2 | 8 bit | Gobo Page | 0-14 | 15-253 | 254 | 255 | | | | | | | | |
| | | | Gobo pages | Reserved | Optimized test patterns | Non- optimized test patterns | | | | | | | | |
| 3 | 8 bit | Gobo | 0-255 | Please note, the | re are 410 gobos at t | he time of this w | riting so pages a | re not full yet. | | | | | | |
| | | Selection | Gobo Patterns | Future gobos are | e being released with | firmware updat | es | | | | | | | |
| 4 | 8 bit | Intensity | 0-255 | | | | | | | | | | | |
| * | | | 0-100% | | | | | | | | | | | |
| 5 | 8 bit | Reserved | 0-255 | | | | | | | | | | | |
| | | | Reserved | | | | | | | | | | | |

| | Color Group | | | | | | | | | | | | |
|---------|-------------|----------|----------------|--|--|--|--|--------|--|--|--|--|--|
| Channel | 8/16 Bit | Function | | | | | | Values | | | | | |
| 6 | 8 bit | Color | 0-255 | | | | | | | | | | |
| | | Macro | Various Macros | | | | | | | | | | |
| 7 | 8 bit | Red 1 | 0-255 | | | | | | | | | | |
| | | | 0-100% | | | | | | | | | | |
| 8 | 8 bit | Green 1 | 0-255 | | | | | | | | | | |
| | | | 0-100% | | | | | | | | | | |
| 9 | 8 bit | Blue 1 | 0-255 | | | | | | | | | | |
| | | | 0-100% | | | | | | | | | | |
| 10 | 8 bit | Red 2 | 0-255 | | | | | | | | | | |
| | | | 0-100% | | | | | | | | | | |
| | | | | | | | | | | | | | |

| 11 | 8 bit | Green 2 | 0-255 | | | | | |
|----|-------|---------|--------|--|--|--|--|--|
| | | | 0-100% | | | | | |
| 12 | 8 bit | Blue 2 | 0-255 | | | | | |
| | | | 0-100% | | | | | |

| | Intensity Effect Group (not yet active) | | | | | | | | | | | | |
|---------|---|----------|----------|--|--|--|--|--------|--|--|--|--|--|
| Channel | 8/16 | Function | | | | | | Values | | | | | |
| | Bit | | | | | | | | | | | | |
| 13 | 8 bit | Reserved | 0-255 | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | Reserved | | | | | | | | | | |

| | Prism control group | | | | | | | | | | | | |
|---------|---------------------|-----------|-----------------|----------|-------------------|--|--|--|--|--|--|--|--|
| Channel | 8/16 Bit | Function | | Values | | | | | | | | | |
| 14 | 8 bit | Prism | 0-51 | 52-255 | | | | | | | | | |
| | | selection | Prism Selection | Reserved | | | | | | | | | |
| 15 | 8 bit | X | 0-127 | 128 | 129-255 | | | | | | | | |
| | | Spacing | 100% - 0% | 0 | 0 - 100% Inverted | | | | | | | | |
| 16 | 8 bit | Y | 0-127 | 128 | 129-255 | | | | | | | | |
| | | Spacing | 100% - 0% | 0 | 0 - 100% Inverted | | | | | | | | |
| 17 | 8 bit | Facet | 0-255 | D-255 | | | | | | | | | |
| | | Rotation | 0-360 degrees | | | | | | | | | | |

| | | | | | G | eometric Post g | roup (applied af | ter prism) | | | |
|---------|-------------|---------------|---------------|---------------|-------------------|------------------|------------------|------------|--|--|--|
| Channel | 8/16 Bit | Function | | | | | | Values | | | |
| 18 | 8 bit | X Scale | 0-127 | 128 | 129-255 | | | | | | |
| | | | 100% - 0% | 0 | 0 - 100% Inverted | | | | | | |
| 19 | 8 bit | Y Scale | 0-127 | 128 | 129-255 | | | | | | |
| | | | 100% - 0% | 0 | 0 - 100% Inverted | | | | | | |
| 20/21 | 16 bit | X Position | 0-127 | 128 | 129-255 | | | | | | |
| * | | | Left | Center | Right | | | | | | |
| 22/23 | 16 bit | Y Position | 0-127 | 128 | 129-255 | | | | | | |
| * | | | Left | Center | Right | | | | | | |
| 24 | 8 bit | Z Rotation | 0-255 | | | | | | | | |
| | | | 0-360 degrees | | | | | | | | |
| 25 | 8 bit | Z Spin | 0 | 1-127 | 128 | 128-255 | | | | | |
| | | | No spin zone | Forward speed | No spin zone | Reverse speed | | | | | |

| | Motion Macro group | | | | | | | | | | | | | |
|---------|--------------------|----------|----------------|--------------------|--|--|--|--|--|--|--|--|--|--|
| Channel | 8/16 Bit | Function | | Values | | | | | | | | | | |
| 26 | 8 bit | Motion | 0-255 | | | | | | | | | | | |
| | | macro | Various macros | i macros | | | | | | | | | | |
| 27 | 8 bit | Speed | 0 | 1-255 | | | | | | | | | | |
| | | | Default | Min to Max | | | | | | | | | | |
| 28 | 8 bit | Size | 0 | 1-255 | | | | | | | | | | |
| | | | Default | Default Min to Max | | | | | | | | | | |

Gobo Guide

Your laser projector has over 400 digital gobos already loaded, with more to come in future firmware updates. Here's a quick guide to how they are organized:

| | Page 1 – Circles | Page 2 - Lines | | | 3 – Dangerous Curves |
|------|---------------------------|----------------|-----------------------|------|-----------------------|
| Gobo | Gobo Name | Gobo | Gobo Name | Gobo | Gobo Name |
| 1 | circle | 1 | line | 1 | 1 coil spiral |
| 2 | RGB circle | 2 | Big line | 2 | 2 coil spiral |
| 3 | 3 spine circle | 3 | big line with accents | 3 | 3 coil spiral |
| 4 | 4 spine circle | 4 | 2 spine line | 4 | 4 coil spiral |
| 5 | 6 spine circle | 5 | 3 spine line | 5 | 5 coil spiral |
| 6 | 1 point in circle | 6 | 5 spine line | 6 | 3 broken arcs |
| 7 | color 1 point in circle | 7 | a big fan | 7 | 6 broken arcs |
| 8 | color 3 points in circle | 8 | V | 8 | simple arc |
| 9 | color 6 points in circle | 9 | color V | 9 | parentheses |
| 10 | fading circle | 10 | spine V | 10 | sliced circle |
| 11 | fading quadrant circle | 11 | dense spine v | 11 | 2 arcs |
| 12 | segmented circle | 12 | broken V | 12 | concave square |
| 13 | segmented circle with | 13 | Ν | 13 | the downward spiral |
| | spines | 14 | Broken N | 14 | color downward spiral |
| 14 | 2 cocentric circles | 15 | 3 lines | 15 | now in stereo |
| 15 | color 2 circles | 16 | 3 spine lines | 16 | color now in stereo |
| 16 | 3 cocentric circles | 17 | 120 degree lines | 17 | squiggles |
| 17 | RGB 3 cocentric circles 1 | 18 | RGB 120 degree lines | 18 | color squiggles |
| 18 | RGB 3 cocentric circles 2 | 19 | power 3 | 19 | feeling a little wavy |
| 19 | RGB 3 cocentric circles 3 | 20 | big + | 20 | feelin pretty wavy |
| 20 | 3 circles | 21 | color big + | 21 | feeling really wavy |
| 21 | RGB 3 circles | 22 | Х | 22 | sproing |
| 22 | traffic light | 23 | color X | 23 | color sproing |
| 23 | 4 circles | 24 | color X 2 | 24 | light mess |
| 24 | color 4 circles | 25 | RGB X | 25 | medium mess |
| 25 | Eclipse | 26 | spine X | 26 | dense mess |
| 26 | shrinking circles | 27 | XXX | 27 | DNA |
| 27 | olympic rings | 28 | 5 lines | 28 | fat swirl |
| | | 29 | 5 color lines | 29 | dangerous curves sign |
| | | 30 | lattice | | |
| | | 31 | RGB lattice | | |
| | | 32 | pick up sticks | | |
| | | 33 | tic tac toe grid | | |
| | | 34 | square wave | | |
| | | 35 | ramp wave | | |
| | | 36 | offset cross | | |
| | | 37 | brackets | | |
| | | | | | |

| | Page 4 – Triangles Gobo Gobo Name | | Page 5 - Squares | Pag | e 6 – Other Polygons |
|------|--------------------------------------|------|-------------------------|------|----------------------|
| Gobo | Gobo Name | Gobo | Gobo Name | Gobo | Gobo Name |
| 1 | triangle | 1 | square | 1 | 4 point star |
| 2 | big triangle | 2 | 4 spine square | 2 | 8 spine star |
| 3 | 1 point in triangle | 3 | 8 spine square | 3 | 5 point star |
| 4 | concave triangle | 4 | fading quadrant square | 4 | 10 spine star |
| 5 | 3 spine triangle | 5 | 2 cocentric boxes | 5 | 6 point star |
| 6 | 6 spine triangle | 6 | color 2 cocentric boxes | 6 | 12 spine star |
| 7 | 2 cocentric triangles | 7 | double diamond | 7 | 7 point star |
| 8 | color 2 cocentric | 8 | color double diamond | 8 | 14 spine star |
| | triangles | 9 | squarepocalypse | 9 | 8 point star |
| 9 | inverted 2 cocentric | 10 | squareception | 10 | 16 spine star |
| | triangles | 11 | square cascade | 11 | 9 point star |
| 10 | color inverted 2 | 12 | 3 squares | 12 | 18 spine star |
| | cocentric triangles | 13 | 2 not squares | 13 | 10 point star |
| 11 | power triangle | 14 | segmented square | 14 | 20 spine star |
| 12 | hourglass | 15 | breakup square | 15 | pentagon |
| 13 | triforce | 16 | looking into the box | 16 | 5 spine pentagon |
| 14 | RGB triforce | | | 17 | hexagon |
| | | | | 18 | 6 spine hexagon |
| | | | | 19 | septagon |
| | | | | 20 | 7 spine septagon |
| | | | | 21 | octagon |
| | | | | 22 | 8 spine octagon |
| | | | | 23 | nonagon |
| | | | | 24 | 9 spine nonagon |
| | | | | 25 | decagon |
| | | | | 26 | 10 spine decagon |
| | | | | 27 | nested hexagons |
| | | | | 28 | nested hexagons 2 |
| | | | | 29 | hexagonal hallway |
| | 1 | | 1 | | |

| | Page 7 - Points | Page | e 8 – Abstract Building Blocks | Page 9 - Mixed | | | |
|------|-----------------|------|-----------------------------------|----------------|------------------------|--|--|
| Gobo | Gobo Name | Gobo | Gobo Name | Gobo | Gobo Name | | |
| 1 | 1 point | 1 | Shredder | 1 | 10 | | |
| 2 | 3 point line | 2 | Hex C | 2 | Power | | |
| 3 | 4 point line | 3 | broken spiral | 3 | 101 | | |
| 4 | 5 point line | 4 | color warp | 4 | deathly hallows | | |
| 5 | 6 point line | 5 | sickle circle | 5 | circle and square 1 | | |
| 6 | 7 point line | 6 | shards | 6 | circle and square 2 | | |
| 7 | 8 point line | 7 | shards 2 | 7 | circle and square 3 | | |
| 8 | 9 point line | 8 | shards 3 | 8 | circle and square 4 | | |
| 9 | 10 point line | 9 | shards 4 | 9 | circle and square 5 | | |
| 10 | 16 point line | 10 | spaghetti | 10 | circle and triangles 1 | | |
| 11 | point pentagon | 11 | gradient spaghetti | 11 | circle and triangles 2 | | |

| | (Page 7 – Points | | (Page 8 – Abstract | | (Page 9 – Mixed |
|----|--------------------------|----|----------------------|----|-------------------------|
| | continued) | | building blocks | | continued) |
| 12 | point hexagon | | continued) | 12 | circle and triangles 3 |
| 13 | point septagon | 12 | big wave | 13 | Circle and a squiggle |
| 14 | point octagon | 13 | starting to unravel | 14 | circle and squiggles |
| 15 | point nonagon | 14 | infinitely broken | 15 | bisected circle |
| 16 | point decagon | 15 | I don't know what to | 16 | circle with two lines |
| 17 | light point circle | | call this one | 17 | circle with three lines |
| 18 | RGB light point circle | 16 | feathers | 18 | copper core |
| 19 | medium point circle | 17 | art | 19 | ferrite core |
| 20 | RGB medium point | 18 | abstract laundry pod | 20 | 2 half circles |
| | circle | 19 | crumpled triangle | 21 | wifi |
| 21 | dense point circle | 20 | polar opposites | 22 | circle and 120 degree |
| 22 | RGB Dense point circle | 21 | bad hair | | lines |
| 23 | light point triangle | | | 23 | color circle and 120 |
| 24 | RGB light point triangle | | | | degree lines |
| 25 | medium point triangle | | | 24 | triangle and 120 |
| 26 | RGB medium point | | | | degree lines |
| | triangle | | | 25 | color triangle and 120 |
| 27 | dense point triangle | | | | degree lines |
| 28 | RGB Dense point | | | 26 | DMX |
| | triangle | | | 27 | aperture |
| 29 | light point square | | | 28 | throwing star |
| 30 | RGB light point square | | | 29 | spiral star |
| 31 | medium point square | | | 30 | cracked square |
| 32 | RGB medium point | | | 31 | jack |
| | square | | | 32 | stack of pennies |
| 33 | dense point square | | | 33 | peace |
| 34 | RGB dense point square | | | | |
| 35 | light point array | | | | |
| 36 | medium point array | | | | |
| 37 | dense point array | | | | |
| 38 | RGB dense point array | | | | |
| 39 | light point burst | | | | |
| 40 | medium point burst | | | | |
| 41 | dense point burst | | | | |
| 42 | light disordered point | | | | |
| | burst | | | | |
| 43 | medium disordered | | | | |
| | point burst | | | | |
| 44 | dense disordered point | | | | |
| | burst | | | | |
| 45 | point cascade | | | | |

| | Page 10 – Alpha | Pa | age 11 – Mike Dunn | Page | e 12 – Misc continued |
|-------|----------------------------|------------|------------------------------|-----------|-------------------------|
| Gobo | Gobo Name | Gobo | Gobo Name | Gobo | Gobo Name |
| 1 | ALPHA A | 1-60 | Various awesome | 21 | Chevrons |
| 2 | ALPHA B | | gobos designed by | 22 | Arrow |
| 3 | ALPHA C | | award winning Laser | 23 | Ghost |
| 4 | ALPHA D | | artist Mike Dunn | 24 | Invader |
| 5 | ALPHA E | | | 25 | animal trap |
| 6 | ALPHA F | | www.firstlight-laser.com | 26 | cursor |
| 7 | ALPHA G | | | 27 | 3D box |
| 8 | ALPHA H | | | 28 | notched wheel |
| 9 | ALPHA I | | | 29 | a maze ing |
| 10 | ALPHA J | | | 30 | icicle |
| 11 | ALPHA K | | | 31 | star of bethlehem |
| 12 | ALPHA L | | | 32 | shooting star |
| 13 | ALPHA M | | | 33 | the more you know |
| 14 | ALPHA N | | | 34 | puzzle piece |
| 15 | ALPHA O | | Page 12 – Misc | 35 | cause ribbon |
| 16 | ALPHA P | Gobo | Gobo Name | 36 | Heart |
| 17 | ALPHA Q | 1 | sunrise | 37 | Spiderweb |
| 18 | ALPHA R | 2 | CASH | 38 | tetris1 |
| 19 | ALPHA S | 3 | circuit traces | 39 | tetris2 |
| 20 | ALPHA T | 4 | clock hour hand | 40 | tetris3 |
| 21 | ALPHA U | 5 | clock minute hand | 41 | tetris4 |
| 22 | ALPHA V | 6 | clock second hand | 42 | tetris5 |
| 23 | ALPHA W | 7 | lightning | 43 | tetris6 |
| 24 | ALPHA X | 8 | prism | 44 | tetris7 |
| 25 | ALPHA Y | 9 | splat | 45 | bright idea |
| 26 | ALPHA Z | 10 | pac person | 46 | Quackers |
| 27 | ALPHA # | 11 | star eyed | 47 | Penrose |
| 28 | ALPHA @ | 12 | adam can't draw | 48 | Long road ahead |
| 29 | ALPHA ! | 13 | laser warning | | |
| 30 | ALPHA % | 14 | Mr yuck | | |
| 31 | ALPHA & | 15 | fallout | | |
| 32 | ALPHA JUMP | 16 | the eye | | |
| 33 | ALPHA PARTY | 17 | red eye | | |
| 34 | ALPHA LASERS | 18 | 5 stars | | |
| 35 | ALPHA PROM | 19 | sunflower | | |
| 36 | HAPPY BIRTHDAY | 20 | Remulak | | |
| 37 | CONGRATUALTIONS | | | | |
| 38 | ALPHA 2018 | | | | |
| 39 | ALPHA 2019 | | | | |
| 40 | ALPHA 2020 | | | | |
| 41 | ALPHA X-LASER | | | | |
| 42 | ALPHA SPACE | | | | |
| *Note | that DMX values begin at (|), so a DI | MX value of 0 will select go | bo 1 on c | n page, DMX1:Gobo2, etc |

Prism Modes

Your Mercury equipped laser comes with 12 digital prisms. You can also adjust the X and Y spacing on these prisms and rotate the segments for an even wider range of looks.

| DMX Channel Value | Prism type | Example |
|-------------------|---------------|---------------|
| 0-3 | None | 0 |
| 4-7 | 1x2 | $\circ \circ$ |
| 8-11 | 1x3 | 000 |
| 12-15 | 1x4 | 0000 |
| 16-19 | 1x5 | 00000 |
| 20-23 | 1x6 | 000000 |
| 24-27 | 3x triangular | |
| 28-31 | 2x2 square | |
| 32-35 | 5x pentagon | 000 |
| 36-39 | 6x hexagon | 000 |
| 40-43 | 2x3 | |
| 44-47 | 2x3 | |
| 48-51 | 2x2+1 | |

Basic builder color presets

For ease of operation there are many color presets built for use with the basic builder modes. Please note that these are presets for the color effects, to use these presets you still need to select RGB1 and RGB2 colors.

| Preset | Description | Preset | Description |
|--------|-------------------------------|--------|-----------------------------|
| 0 | No color effect | 26 | medium edge radial |
| 1 | Basic color override | 27 | soft edge radial |
| 2 | hard linear pre | 28 | thin horizontal bands |
| 3 | hard linear 90 degrees pre | 29 | medium horizontal bands |
| 4 | medium linear pre | 30 | thick horizontal bands |
| 5 | medium linear 90 degrees pre | 31 | unbalanced horizontal bands |
| 6 | soft linear pre | 32 | thin vertical bands |
| 7 | soft linear 90 degrees pre | 33 | medium vertical bands |
| 8 | hard linear post | 34 | thick vertical bands |
| 9 | hard linear 90 degrees post | 35 | unbalanced vertical bands |
| 10 | medium linear post | 36 | thin radial bands pre |
| 11 | medium linear 90 degrees post | 37 | medium radial bands pre |
| 12 | soft linear post | 38 | thick radial bands pre |
| 13 | soft linear 90 degrees post | 39 | thin radial bands post |
| 14 | angular pre | 40 | medium radial bands post |
| 15 | angular post | 41 | thick radial bands post |
| 16 | hard center radial pre | 42 | Single radial band pre |
| 17 | medium center radial pre | 43 | single radial band post |
| 18 | soft center radial pre | 44 | horizontal linear rainbow |
| 19 | hard center radial post | 45 | 45 degree linear rainbow |
| 20 | medium center radial post | 46 | vertical linear rainbow |
| 21 | soft center radial post | 47 | angular rainbow |
| 22 | hard corner radial | 48 | center radial rainbow pre |
| 23 | medium corner radial | 49 | center radial rainbow post |
| 24 | soft corner radial | 50 | corner radial rainbow |
| 25 | hard edge radial | 51 | edge radial rainbow |
| | | | 1 |

Basic builder motion presets

For ease of operation there are many motion presets built for use with the basic builder modes. These motion effects all have a default size and speed, but you can override these defaults using the Motion Macro speed and size controls on channels 27 and 28.

| Preset | Description | Preset | Description |
|--------|-------------------------------------|--------|-----------------------------------|
| 0 | No motion effect | 31 | Radial sine wave (before prism) |
| 1 | light sine wave (before prism) | 32 | radial ramp wave (before prism) |
| 2 | medium sine wave (before prism) | 33 | radial square wave (before prism) |
| 3 | dense sine wave (before prism) | 34 | Radial sine wave (after prism) |
| 4 | ultra light sine wave (after prism) | 35 | radial ramp wave (after prism) |
| 5 | light sine wave (after prism) | 36 | radial square wave (after prism) |
| 6 | medium sine wave (after prism) | 37 | radial morph 1 |
| 7 | dense sine wave (after prism) | 38 | radial morph 2 |
| 8 | light ramp wave (before prism) | 39 | radial morph 3 |
| 9 | medium ramp wave (before prism) | 40 | radial morph 4 |
| 10 | dense ramp wave (before prism) | 41 | radial morph 5 |
| 11 | ultra light ramp wave (after prism) | 42 | radial morph 6 |
| 12 | light ramp wave (after prism) | 43 | radial morph 7 |
| 13 | medium ramp wave (after prism) | 44 | radial morph 8 |
| 14 | dense ramp wave (after prism) | 45 | radial morph 9 |
| 15 | light triangle wave (before prism) | 46 | radial morph 10 |
| 16 | medium triangle wave (before prism) | 47 | party mode 1 |
| 17 | dense triangle wave (before prism) | 48 | party mode 2 |
| 18 | light triangle wave (after prism) | 49 | orbit |
| 19 | medium triangle wave (after prism) | 50 | orbit and rotate |
| 20 | dense triangle wave (after prism) | 51 | scroll left to right |
| 21 | moving wave 1 | 52 | scroll right to left |
| 22 | moving wave 2 | 53 | scroll 45 |
| 23 | moving wave 3 | 54 | scroll up |
| 24 | moving wave 4 | 55 | scroll down |
| 25 | moving wave 5 | 56 | ping pong vertical |
| 26 | moving wave 6 | 57 | ping pong 45 |
| 27 | moving wave 7 | 58 | ping pong horizontal |
| 28 | moving wave 8 | 59 | triangle orbit |
| 29 | moving wave 9 | 60 | square orbit |
| 30 | moving wave 10 | | |

ILDA Control

ILDA is an acronym for the International Laser Display Association and refers to both the organization and the analog control protocol standard for all laser projectors. Typically when you hear someone refer to ILDA control of a laser projector, they are talking about the control signal, not the organization.

The key difference between DMX and ILDA signals when it comes to controlling a laser projector such as the Mobile Beat is that DMX is used to control gobos built into your projector electronics and ILDA is used to play content from your computer or other ILDA compatible playback device. With DMX you can take the gobos programmed into the laser projector and modify them using the other DMX channels to changes size, color, position, etc. With ILDA you get complete control over the content displayed, you can draw entirely new gobos or display custom text and graphics.

X-Laser recommends the use of Quickshow-XL or Beyond by Pangolin Systems for controlling your laser projector by ILDA. For comprehensive information on how to control your projector by ILDA please consult the video tutorials that come with your software package.

Please note that ILDA uses a DB-25 cable similar in appearance to those used by parallel port printers. Use of a standard 25 pin printer cable IS NOT RECOMMENDED as ILDA cables use a different pin out and have additional shielding to prevent interference.

There are two ways to activate ILDA input on your Mobile Beat Mercury projector.

- Using DMX or Art-Net with one Master fixture patched, change the Enable channel (channel 1) to "External Input", or a value in the range of 4-7. This will route the External Input from your ILDA source through the projection area you have set using your Master zoning.
- In the System Menu on the laser, set your control source to "Manual". In your Manual Operation Menu, set your mode to "External input". Your laser can now output from your ILDA source.

ILDA Settings

When using Quickshow or Beyond there are some specific settings to use for your Mobile Beat. Go to the settings menu and select "Projector Settings"

1. Set your scan rate for 30,000 and refer to the next 3 pages for help setting the proper scan rate when using other scan angles. For the Scan Rate tab, leave the other settings at their default.

| jector settings | | : |
|--|-----------------|---------------|
| rojector | Test pattern | |
| Projector 1: Offline board | 💿 🖉 🍐 Show it i | now |
| Size and Position Scan rate Color Settings Vector display settings | | \square |
| Sample rate and color shift | | Ч Р/ 🛝 |
| Default Scan rate (PPS) | | \checkmark |
| | 30000 🛊 | \wedge |
| Color/Blanking shift (points) | | $ \rangle /$ |
| | — 4 🗧 🗙 | $\square X$ |
| Minimum number of points | | |
| | 200 ÷ | |
| | | 000 |
| Path between Tracks optimization settings | | |
| Fixed point number | 12 . | |
| | - 12 - | |
| ○ Spacing | 1000 | |
| | | |
| Beginning anchors Ending anchors | | |
| | - 4 🗦 | |
| | | |
| | | |

2. Set your color settings for 3 color RGB and Analog with log response.

| Projector settings | × |
|---|---------------|
| Projector | Test pattern |
| Projector 1: Offine board | A Show it now |
| Size and Position Scan rate Color Settings Vector display settings | |
| Number and type of lissers | |
| Single laser 2 laser 3 laser (RGB) 3 laser (RGV) | |
| Color system type | |
| TTL Analog with linear response | |
| Color output levels | |
| Min. voltage - red channel (%) 0 🔶 Max. voltage - red channel (%) 100 🗇 | |
| Min. voltage - green channel [3] 0 🐳 Max. voltage - green channel [3] 100 🐳 | |
| Min. voltage - blue channel (%) 0 ♀ Max. voltage - blue channel (%) 100 ♀ | |
| | OK Cancel |



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Scan Angle Reference Charts for Common Hardware & Applications

| | | Using 30K PPS scanners | Using 25K PPS scanners | Using 20K PPS scanners | | | | |
|------------|----------------------------|------------------------|------------------------|------------------------|--|--|--|--|
| Scan angle | | Recommended scan rate | | | | | | |
| 8° | Run at spec | 30000 | 30000 25000 20000 | | | | | |
| 10° | Reduce scan rate by 5% | 28500 | 23750 | 19000 | | | | |
| 16° | Reduce scan rate by 10% | 27000 | 22500 | 18000 | | | | |
| 20° | Reduce scan rate by 15% | 25500 | 17000 | | | | | |
| 25° | Reduce scan rate by 20% | 24000 | 20000 | 16000 | | | | |
| 30° | Reduce scan rate by 25% | 22500 | 18750 | 15000 | | | | |
| 40° | Reduce scan rate by 30% | 21000 | 17500 | 14000 | | | | |
| 45° | Reduce scan rate by 35% | 19500 16250 13000 | | | | | | |

Scan rate adjustment based on scan angle and scanner hardware

Projection Size @ Distance – Using **30K** scanners at **8°** scan angle*

| Distance (in feet) | lmage size (in inches) | lmage size (in feet) | lmage size (in cm) |
|-----------------------|---------------------------|-------------------------|-----------------------|
| 5 | 8.375 | 0.6979 | 21.2725 |
| 10 | 16.75 | 1.3958 | 42.545 |
| 15 | 25.125 | 2.0938 | 63.8175 |
| 20 | 33.5 | 2.7917 | 85.09 |
| 50 | 83.75 | 6.9791 | 212.75 |
| 75 | 125.65 | 10.4688 | 319.0875 |
| 100 | 167.5 | 13.9583 | 425.45 |
| 150 | 251.25 | 20.9375 | 638.175 |
| 200 | 335 | 27.9167 | 850.9 |
| 250 | 418.75 | 34.8958 | 1063.625 |
| 300 | 502.5 | 41.875 | 1276.35 |
| 500 | 837.5 | 69.7917 | 2127.25 |

*30K scanners and 8° scan angle are standard spec for X-Laser Mobile Beat Mercury projectors.

Troubleshooting

Here are a few simple solutions to common difficulties to try out first to get you up and running quickly. If you are having any difficulty with your laser projector, please feel free to contact us online, any time, at support@x-laser.com

| <u>Problem</u> | Solutions | | | | |
|--|---|--|--|--|--|
| Unit does not | Check if power cable is secure in the wall outlet and unit power inlet. | | | | |
| power on | Verify that the power cable is functional by exchanging it with a new one, or testing the cable with | | | | |
| | another known-good device. | | | | |
| | Check if the power switch is turned on and illuminated. | | | | |
| Power switch is not | Check if the fuse is intact, if not replace with a new 5x20mm 250V 6.3A fast-acting fuse | | | | |
| illuminated | Verify the function of the AC circuit that powers the laser. | | | | |
| Replacement fuses continue to break | Contact X-Laser to return the unit for service. | | | | |
| No output | | | | | |
| in ILDA Mode | Check that the laser functions in DMX or Art-Net mode. If not, refer to the "No output in any mode" troubleshooting steps below. | | | | |
| | Verify that the ILDA cable is properly connected at both the laser and at the ILDA interface end. | | | | |
| | Verify that the ILDA cable is functional by exchanging it with a new one, or testing the cable with another known-good device. | | | | |
| | Carefully inspect the ILDA connectors on the laser and cables and verify that they are in good condition. If any of the 25 pins on the ILDA connector are broken on a cable, replace it with a new cable. If any pins are broken on your laser contact X-Laser for service. | | | | |
| | Verify that your ILDA interface and/or software is functioning properlyrefer to the manufacturer(s) for proper troubleshooting steps. | | | | |
| | If using a Flashback 3 or 4 with Beyond or QuickShow XL, verify that the LED on the FB3/FB4 is rapidly flashing red. If not, check that the software has detected the FB3/FB4 and that your projection zones are routed to include the FB3/FB4 in question. | | | | |
| in DMX mode | Verify that the system status screen shows that the unit is configured for DMX control, and the DMX status is "Ready". | | | | |
| | If DMX status indicates "Too Slow" | | | | |
| | Check the refresh rate settings on your control system. By default, this system must receive a DMX packet at least once every 100ms to maintain output | | | | |
| | Check the DMX system for intermittent failures or marginal conditions that may be resulting in DMX packet loss. | | | | |
| | If DMX status indicates "Timeout!" | | | | |
| | Verify that your DMX cabling is properly connected and that the DMX signal is propagating to the laser's position on the DMX chain. Use a dedicated DMX tester or other known-good DMX equipment to test. | | | | |
| | Connect the unit to your DMX controller directly via a single known-good DMX cable with no other DMX devices connected and check its function. | | | | |
| | Check the refresh rate settings on your control system. By default, this system must receive a DMX packet at least once every 100ms to maintain output | | | | |
| | Check the DMX system for intermittent failures or marginal conditions that may be resulting in DMX packet loss. | | | | |
| | If DMX status indicates "Ready" | | | | |
| | Verify that the unit's DMX address matches the address set in your DMX controller. Try setting the unit to DMX address #1 and controlling it there to rule out DMX patching problems. | | | | |

| <u>Problem</u> | Solutions | | | | | |
|--------------------|---|--|--|--|--|--|
| | Verify that the DMX profile you are using, if any, matches the projector's configured DMX profile. Try controlling the laser directly via channel values to rule out problems with your DMX profile. Refer to the user manual for the correct DMX parameters. | | | | | |
| | Verify the function of your DMX controller with other known-good DMX equipment or with professional DMX testing tools. | | | | | |
| | Verify that no geometric or color adjustments are being applied that would move output out of the projection field or make the intensity zero (For example, RGB values set to 0/0/0). | | | | | |
| | Consult the user manual and Mercury Personality Guide and ensure that all required channels are set to proper values. Several channels must be non-zero to produce any visible output. | | | | | |
| | mode" troubleshooting steps below. | | | | | |
| | Test the unit in other control modes, if applicable. If the problems persist in all modes or you are unable to test them, refer to the troubleshooting steps in the "in all modes" subsection below. | | | | | |
| | Refer to the user manual's section on DIP switch/menu settings and verify that these are set correctly. | | | | | |
| in Art-Net mode | Verify that the system status screen shows that the unit is configured for Art-Net control, and the Art-Net status is "Ready". | | | | | |
| | If Art-Net status indicates "Too Slow" | | | | | |
| | Check the refresh rate settings on your control system. By default, this system must receive an ArtDMX packet at least once every 2000ms to maintain output | | | | | |
| | Check the Art-Net system for intermittent failures or marginal conditions that may be resulting in DMX packet loss. | | | | | |
| | If Art-Net status indicates "Timeout!" | | | | | |
| | Verify that your Art-Net cabling is properly connected and that the network signal is propagating to the laser's position in the network. The Link/Act light on the etherStop port on the laser should illuminate green and flash amber on receiving any network traffic. | | | | | |
| | If your controller supports Art-Net discovery, verify that the laser is detected. Otherwise, use an Art-Net discovery tool to verify that the laser is detected. | | | | | |
| | Verify that the laser's IP address and subnet mask are correct for your control network. | | | | | |
| | Verify that the laser's Art-Net universe is configured to match the controller's settings. The laser will only recognize ArtDMX packets directed to the universe for which it is configured. | | | | | |
| | Verify that there is no network equipment (routers, filters, firewalls, etc) between the controller and the laser that may be blocking Art-Net signals. | | | | | |
| | Check the refresh rate settings on your control system. By default, this system must receive an ArtDMX packet at least once every 100ms to maintain output | | | | | |
| | Check the network system for intermittent failures or marginal conditions that may be resulting in ArtDMX packet loss. | | | | | |
| | If Art-Net status indicates "Ready" | | | | | |
| | Refer to the section above for troubleshooting DMX mode. All of the DMX settings and troubleshooting steps apply to Art-Net as well. | | | | | |
| in all modes | Check that the system status screen shows that the Laser Status is "Enabled". If any others status is shown, refer to the manual on the Mercury system and the etherStop interface for guidance | | | | | |
| | Check that the remote interlock circuit or remote interlock plug, if applicable, are properly connected | | | | | |
| | to the laser and enabled. | | | | | |
| DMX control is | Verify that the DMX chain is properly wired. Generally DMX runs should: | | | | | |
| erratic or | - Use properly rated 120 Ω shielded twisted-pair cable specified for DMX use | | | | | |
| intermittent | - Be terminated after the last unit on the Chain - Have no more than 32 devices on a single chain | | | | | |
| | - Be absolutely no longer than 1000'/300m and preferably no longer than 300'/90m, total. from the | | | | | |
| | DMX controller to the last device in the chain | | | | | |
| | - Never be split or combined using passive adapters | | | | | |

| Problem | Solutions |
|---|---|
| | - Use an active, isolated splitter to isolate different DMX segments when run over a large area, long distances, or a larger number of devices. |
| Art-Net control is erratic or intermittent | Verify that only one Art-net controller is transmitting ArtDMX packets to the laser's universe. Refer to the troubleshooting steps above for "No Output in Art-Net Mode" |
| Output is undersized | , the wrong color, missing colors, or geometrically distorted |
| in ILDA mode | Test the unit in DMX and AutoArt-Net modes, if applicable. If the problems persist in all modes or you are unable to test them, refer to the troubleshooting steps in the "in all modes" subsection below. |
| | Refer to the other ILDA troubleshooting steps above. Many of the problems that can prevent output entirely or cause erratic operation may also cause unexpectedly distorted output. |
| | Ensure that the projector scan rate in your ILDA control software is set properly for your laser. Refer to the user manual for proper scan rate settings. Unless otherwise noted, the maximum scan rate is specified at a projected full angle of 8°. Projecting at a larger angle will require a reduced scan rate to eliminate distortion. More importantly, <u>scanning at a wider angle without reducing the scan rate</u> <u>will damage the scanners.</u> Repairs to scanners that have been damaged by overdriving may not be covered under warranty. |
| | Test the unit in Art-net or DMX modes, if applicable. If the problems persist in all modes or you are unable to test them, refer to the troubleshooting steps in the "in all modes" subsection below. |
| in DMX or Art- Net mode | Test the unit in other control modes, if applicable. If the problems persist in all modes or you are unable to test them, refer to the troubleshooting steps in the "in all modes" subsection below. Verify that no geometric or color adjustments are being applied that would move output out of the projection field or make the intensity zero (For example, RGB values set to 0/0/0) via DMX. Verify that the DMX profile in your control system is configured correctly and matches the DMX parameters of your laser. |
| | Consult the user manual and Mercury Personality Guide and ensure that all required channels are set to proper values. |
| | Refer to the "No outputin DMX mode" and "DMX control is erratic or intermittent" troubleshooting sections above. Many of the problems that can prevent output entirely or cause erratic operation may also cause unexpectedly distorted output. |
| | Test the unit in DMX and auto modes, if applicable. If the problems persist in all modes or you are unable to test them, refer to the troubleshooting steps in the "in all modes" subsection below. |
| | Power cycle the system, reset the system settings to defaults, and try again. |
| in all modes | Verify that size/color adjustments at the laser itself, if applicable, are set correctly. |
| Laser makes a rattling or "growling" sound that persists even when not outputting. | This is usually a sign of a failing cooling fan. If the sound does not stop within one minute of power on contact X-Laser to return the unit for service. |

| <u>Problem</u> | Solutions |
|----------------------|--|
| Output of laser | TURN OFF THE LASER IMMEDIATELY. These are symptoms of a serious problem with the laser's |
| projector is heavily | scanning hardware and continuing to operate the laser for even a few minutes may cause permanent |
| distorted and the | damage. If using ILDA mode, refer to the ILDA mode troubleshooting sections and carefully check |
| laser makes a high | your ILDA software settings and cables in particular before attempting to power the laser back on. If |
| pitched | these problems occur in DMX or auto modes, or continue to occur in ILDA mode, contact X-Laser to |
| "squealing" noise | return the unit for service. |
| when scanning | |
| | Note that a faint high pitched whine is not unusual with complex content and is not a cause for |
| | concern as long as the output is not distorted. This caution does not apply to stepper-based laser projectors which make more noise in normal operation and are not susceptible to catastrophic failure. |

Repair and Return Information

Product Registration

Register Your Product: You must first register your X-Laser product at www.x-laser.net/warranty.fwx to activate your warranty. Failure to do so may result in loss of warranty service. ALWAYS KEEP YOUR PRODUCT BOX FOR SAFE RETURN PACKAGING.

Return Material Authorization (RMA) and Shipping

PLEASE NOTE: All returns will incur a \$50 bench fee which will be waived if a) the product is repaired under warranty, b) the client elects to repair an out of warranty unit, or c) the unit is beyond repair and is disposed of with the client's authorization. The bench fee covers an initial evaluation, basic internal cleaning and basic alignment and calibration.

Please first contact X-Laser for an RMA number. Our support team will most likely spend a few minutes trying to diagnose the issue over the phone to find the fastest resolution for you. If the laser needs to be returned, you will be given an RMA number and a URL to complete the RMA process. All information you will need to return your laser is noted on the RMA web site. Upon completion of the online RMA form, a PDF with shipping instructions will appear.

Return shipping instructions will be located on the PDF form that pops up after you have completed and submitted the online RMA form. Follow shipping, packaging, and insurance instructions. X-Laser is not responsible for any shipping damages by shipper and/or poor client packaging.

Shipping within Continental USA

X-Laser pays return FedEx ground shipping to the customer for warranty and DOA repairs only. Out of warranty work shipping is paid by user in both directions. Faster shipping will incur an extra shipping fee.

Shipping outside Continental USA

X-Laser pays for FedEx return ground shipping to the customer or freight forwarder within continental USA for warranty or DOA repairs only. Out of warranty work shipping is paid by user in both directions. Shipping costs for parts, if approved by X-Laser, are paid by client. Faster shipping will incur an extra shipping fee.

Out of Warranty Repairs

X-Laser will evaluate the product and contact the user for repair authorization. Payment must be remitted by credit card or PayPal prior to service. Costs for repair are based on product model. Products not authorized for repair will be returned at user's expense. Following first request for repair authorization, a storage fee per month will be assessed. After sixty days product will be considered abandoned and disassembled.

General Notification

X-Laser at X-Laser's sole discretion reserves the right to:

- Change this policy without prior notification;
- Determine what is to be repaired and or replaced;
- Determine warranty status or repair and evaluation charges;

- Determine if a product has been misused, tampered, or damaged resulting in repair charges;
- Determine if user is to pay for return shipping;
- Determine charges for general maintenance and laser realignment.

Manufacturer's Limited Warranty

X-Laser warrants that this product will be free from defects of materials or workmanship for 12 months for the mechanical components of the laser system and 6 months for the laser diodes from the date of end-user purchase. This warranty will only apply to laser systems purchased from an authorized X-Laser dealer. This limited, non-transferable, warranty does not cover product abuse, exposure to the elements, accidental damage, shipping damage, improper usage, liquid or smoke damage (including fog juice), or units which have a broken factory seal, have been modified, rented, transferred to a third party, or are more than 12 months old.

Limitation of Liability

By using this product, the end user certifies that he/she is familiar with and agrees to practice all industry standard laser safety procedures and all such procedures contained herein. The purchaser of this product acknowledges that they have been advised that an FDA variance is required prior to use of any Class 3B or 4 laser system and the purchaser certifies that this product will only be operated by employees of the variance holder and in accordance with the terms of the variance. X-Laser specifically disclaims any liability arising from improper or unsafe usage of this product, usage without an active variance, or usage of this product in any manner other than intended. By using this product, the end user agrees to indemnify and hold harmless X-Laser LLC, its dealers and distributors, employees and staff, subsidiaries, and partners in any action arising from use of this product. Finally, the end user also agrees that prior to any use of this product, he/she shall have in effect a liability insurance policy with a sufficient per incident limit to cover any claims arising from the use of this product. Any purchaser who does not agree to these terms may return their unused X-Laser product within 7 days of purchase for a full and unconditional refund.

Return Policy

We want you to love using your X-Laser. If you don't love it, for whatever reason, please contact us so that we may help resolve whatever the issue may be. Factory sealed products may be returned to your dealer in accordance with their return policies. Used products may be returned for any reason within 14 days of purchase, assuming that they are in excellent condition, with a restocking fee of 15%. This fee is high in comparison to some other devices primarily because each returned unit has to be fully reconditioned and certified to be in compliance with FDA regulations before it can be resold to another client. This process is time consuming and costly, especially for just one unit at a time, and thus the restocking fee is required.

Sample Laser Operator Show Checklist

It is highly recommended that laser operators use a per show checklist to ensure their system is set up safely and in accordance with any federal or local regulations. This sample checklist can be used or modified as needed. Some blank rows have been added for your convenience. This checklist was designed for US compliance, for other countries please consult local laws. For a copy of the template so you can place your own logo, please contact support@x-laser.com.

| Operator Name: | | Show/Venue name: | | | | | |
|--|--|------------------|--|--|--|--|--|
| Show date: | | | | | | | |
| Laser projectors securely mounted | | | | | | | |
| Lasers properly connected to control | | | | | | | |
| Safe projection zone set in control | | | | | | | |
| Physical beam blocks securely attached | | | | | | | |
| All beams terminate safely | | | | | | | |
| All beams maintain required safety clearances | | | | | | | |
| Laser projectors respond to control inputs correctly | | | | | | | |
| Operator has clear view of all beam paths and termination points | | | | | | | |
| Operator is trained and holds a current variance or is employed by a variance holder | | | | | | | |
| Copy of active variance on site | | | | | | | |
| All laser emissions can be terminated by at least 2 methods | | | | | | | |
| Laser warning sign(s) posted if required | | | | | | | |
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Sample Laser Signage

Signage is not typically required, but is never a bad idea. Here's a sample laser notification sign you can use, just fill out the power level of your laser. Be aware that this is not accurate for audience scanning shows. For a copy of the template to put your own logo on, contact <u>support@x-laser.com</u>.

> trained and varianced laser operator 21CFR1040.10 and IEC 60825-1 and are being controlled by a Don't worry, these lasers are safe and compliant with Report any beam access to the laser operator. and/or direct injection diode lasers in the range of 405-660nm. The lasers used in today's show are Class 4, < ENJOY THE SHOW! watts and use DPSS

X-LASER

Questions? Feedback?

If you have any questions about any of the content of this manual or the safe operation of your new laser projector or would like to give us some feedback on our products or documentation, please do not hesitate to contact your dealer or X-Laser directly.



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