



**4.95mW Diode-Pumped Solid State Class 3R  
Green and Red Laser Beam Projection System**



# **Operations Manual**

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## THANK YOU!

Thank you for purchasing the Q-Beam. The employees of PULSE Lasers are committed to building state of the art laser projectors. We know this commitment shows in the Q-Beam. Pulse, established in 2000, is part of OmniSistem Lights and effects, a company that has been distributing high-quality, innovative lighting products for nearly twenty years.

Utilizing our proprietary actuator technology and Diode Pumped Solid-State laser systems, the Q-Beam is capable of producing two colors with many different modes of operation.

The Q-Beam uses the industry standard DMX-512 protocol for controlling beam apertures. The Q-Beam also has its own sound activated modes for independent operation. All Q-Beam parameters are configured via a LCD control panel.

Our customer service department ensures that all questions will be dealt with in an efficient manner. Please feel free to call us Monday through Friday at 253-395-9500 - we are here to assist you.

For after hours support, feel free to call our tech department at 253-951-1865.

We have designed and manufactured the Q-Beam to be of the highest level of quality available in the world today. Our dedication to using only the highest quality parts combined with the commitment to manufacturing a state of the art projector ensures that every Q-Beam will conform to the highest standards in the laser industry.

# Safety Precautions

Your Q-Beam is an under 5mW, class 3R laser system. While systems with this power level are considered 'eye-safe', direct viewing of laser radiation can be an acute hazard to the eyes. Do not point beams directly at people.

Dangerous voltages may be present in the unit even when the power is turned off. Always remove AC power when performing any service on the system. Only qualified Pulse Laser personnel may perform electrical service to the system.

The following safety precautions should be observed at all times:

- No smoking, drinking, or eating materials should be allowed near the system.
- Avoid wearing rings, metallic watchbands, or other metallic and/or reflective objects when performing service on the system.
- Always use grounded plugs – Do not defeat ground!
- Make sure system is mounted rigidly before public performance.

## Q-Beam Manufacturers CDRH Declaration

The Q-Beam projection system is in conformance with the performance standards for laser products under 21 CFR part 1040, except with respect to those characteristics authorized by variance number 96V-0168, effective 6/20/1996.

## Q-Beam Electrical Safety Compliance

The Q-Beam, like most other laser projection products, is not UL or CE certified. However, unlike most other laser projection products, the Q-Beam is manufactured with these standards in mind, using 100% UL/CE/TUV/CSA certified components. The Q-Beam is also designed with compliance in mind for FCC standards for RF emissions, as well as IEC standards for ESD/EFT compliance. Compliance testing will be performed on Q-Beam early in 2000.

# Unpacking and Connecting Your Q-Beam

- The Q-Beam ships in a container designed to prevent shipping damage. Take the Q-Beam out of the shipping container and place it on a table or other area that will allow inspection of the unit.
- Inspect the Q-Beam for any visible signs of damage. Make sure to check the LCD panel as well as each beam aperture. If your Q-Beam appears damaged and or the shipping materials appear damaged contact your dealer within 24 hours to initiate a shipping claim. \*
- Connect DMX-512 cabling if desired, and set the two dipswitch settings for your application. (Rear Panel)
- Ensure your projection area is clear for initial tests.
- The Q-Beam is now ready to be turned on. (Refer to the operation section.)

\*PULSE recommends that the original shipping materials be saved. These materials insure safe transport back to PULSE for upgrades or service.

Shipping your projector without the yoke attached or the factory packing materials will void the warranty and may incur charges.

# Q-Beam Quick Start

Energize the system. A beep will sound, and the following will be displayed for 2 seconds.

**\*Q\*B\*E\*A\*M\***  
**(C) 2000 LPD Inc**

Before the system begins its normal operating mode, it will toggle through all of the internal actuators. Listening for gaps in the sequence can help determine if all actuators are functioning correctly.

At startup, two different modes of operation are possible. Normal DMX and/or sound activated mode, or the non-DMX, non-sound activated time based chase mode. The latter mode will be described later.

**QBEAM -- LPD**  
**Enter = Setup**

Pressing **Enter** now will display the following:

**Test/Align ->**  
**General Setup ->**

Press **Up** for test and alignment mode. BE CAREFUL – laser light could emit from any aperture! The following will be displayed:

**Up/Down = Port #**  
**Enter = Exit**

Q-Beam will enter this mode with no apertures selected. At this time, open the alignment port on the side of Q-Beam. Green laser light should be emitted from this opening when no apertures are selected. If there is no light, see the section on alignment and insure the remote interlock shorting plug is installed. Replace the alignment port plug. Pressing **Up** will open the first aperture. Continue to press **Up** and **Down** to check the remaining apertures. This mode is useful for aligning the beam apertures when DMX-512 isn't convenient or available. Press **Enter** when finished. Q-Beam will restart.

## Q-Beam Quick Start, Cont.

Q-Beam ships with the following default setup:

DMX-512	Enabled
DMX Universe	0
DMX Base Address	0
Sound Activation	Enabled
Chase Mode	Sequential
Color Mode	Random/Sequential
Fixed Color Setting*	Green
Chase Speed **	500mS (120bpm)

\*Fixed color setting only valid when color mode is fixed.

\*\*Chase speed only valid when DMX-512 mode and sound activation mode are both disabled.

If these defaults are acceptable, you're ready to start using your DMX-512 console to control Q-Beam! Channels 1-10 control beam port actuators 1-10. The arrangement is lowest takes precedence. Channel 11 is the color control channel. Less than 50% equals green laser output. Above 50% changes the color to red. Channel 12 is the sound activation control channel. When below 50%, operation is controlled normally via DMX. Over 50% enables sound activated mode.

See the section on control system for further instructions and setup options.

## Q-Beam Control System Overview

At power on, Q-Beam responds with a beep and:

**\*Q\*B\*E\*A\*M\* x.xx**  
**(C)2000 LPD Inc**

Where x.xx indicates the software revision.

After two seconds, Q-Beam will present you with one of the following two operational level screens:

Screen 1 – Normal DMX or simple sound activated mode:

**Qbeam --- LPD**  
**Enter = Setup**

Screen 2 – Timer based chase mode:

**100mS Up/Down**  
**Enter = Setup**

Press **Up** to speed up (numbers go down)  
Press **Down** to slow down (numbers go up)

**Note: Increased chase speeds will produce a simulated scan effect from each aperture. In this mode your Q-Beam will produce multiple sheets of laser sky. This is a very popular effect however, you will lose beam targeting while in this high speed scanning effect mode. To resume beam bouncing slow your chase rate until beams appear and are hitting their targets clearly.**

At any time, press **Enter** for setup mode. Q-Beam responds with:

**Test/Align ->**  
**General Setup ->**

Press **Up** for alignment mode – see q-uick start.  
Press **Down** for setup mode.

**DMX-512 Mode On/Off**  
**On Enter to set**

Either **Up** or **Down** will toggle on or off. When DMX-512 mode is off, Q-Beam will respond to sound by default, if enabled. Otherwise Q-Beam will enter its timer chase mode.

When DMX-512 mode is enabled, Q-Beam responds to the following DMX-512 channels:

Channel 1-10	Beam actuator 1-10, least takes precedence
Channel 11	< 50%, Green; > 50%, Red
Channel 12	< 50%, DMX-512 control; > 50%, Sound Activated Control

Press **Enter** to set the DMX mode.

**DMX Universe**  
**000 Enter to set**

The DMX universe value is rarely used. It is part of the DMX specification, so it is included. The universe value is defined as the first valid byte of the DMX packet. It's typically used in concert lighting systems or large stage productions where more than 512 channels are needed on one chain.

Press **Enter** to set the universe value.

Valid only when DMX is enabled:

## **DMX Base Address**

**000 Enter to set**

The DMX base address is the DMX channel number that Q-Beam begins responding to. Q-Beam listens to 12 DMX channels. When the offset is set to 0, it listens to channels 1-12. If set to 10, Q-Beam listens to channels 11-22 etc.

Press **Enter** to set the base address.

(Maximum DMX address per universe is 244)

## **Sound Activation On/Off**

**On Enter to Set**

DMX Enabled:

Sound activation mode is activated when DMX control channel 12 > 50%.

DMX Disabled:

Sound activation setting determines the start up mode for Q-Beam.

Sound mode enabled:

Q-Beam starts up in sound activated mode.

Sound mode disabled:

Q-Beam starts up in a timer based chase mode.

Sound activation mode is optimized for frequencies below 150Hz. This should be adequate for most reasonably bassy audio equipment. Systems with sub-woofers will benefit the most. The sound level sensitivity of this mode is set via front panel control. Turning the control fully counter clockwise will increase the sensitivity to the point that life itself will trigger it. Likewise, fully clockwise will decrease the sensitivity beyond full concert level volume.

Press **Enter** to set the sound mode.

## **Chase Mode**

**Random or Sequential**

Chase style is applicable to the sound activated mode and the timer-based mode. When set to sequential, each trigger (sound or time) opens each beam aperture in succession. In Random mode beam apertures are selected at random.

Use **Up** or **Down** to select mode, and then press **Enter** to set.

## **Color Mode**

**Random/Sequential or Fixed**

Color mode selects how Q-Beam chooses colors during sound/timer modes.



Sequential/Random color mode:

Sequential Chase: Colors alternate at each aperture. Colors switch again when wrapping around, i.e.: the first pass is red, green, red, green; the second pass is green, red, green, red.

Random Chase: Colors are picked at random.

Fixed color mode: The next menu selection will allow the choice of either red only, or green only.

Press **Enter** to set color mode.

Fixed Color Mode Only:

**Fixed Color Mode**  
**Red or Green**

Use **Up** or **Down** to select mode, and then press **Enter** to set.

**Save** ->  
**Cancel** ->

Select **Up** to save changes, **Down** to cancel changes.

Saving changes also saves chase speed – after setting desired chase speed, use the menu system without changing other options to save speed for next power cycle.

Q-Beam will restart in the selected mode.

## Maintenance and Service for the Q-Beam

**CAUTION!!** Maintenance of the Q-Beam can be hazardous if the proper procedures are not followed. Take precautions to avoid exposure of any part of your body from laser radiation. Do not wear rings, metal watchbands or anything else reflective while performing maintenance or service on the Q-Beam. Avoid inserting any material into the beam path while the laser is on. Keep all non-essential personnel out of the area while cleaning or servicing the Q-Beam. Be sure to warn any remaining personnel of the hazards associated with laser light exposure.

**How often should maintenance take place?** This depends on the environment and frequency of use for your Q-Beam. Typical run time between servicing is approximately 12 months.

**Field Service of the Q-Beam is to be done by certified service personnel only. Certification is granted by PULSE only.**

Once certified, the service person is expected to contact PULSE before any servicing begins.

# Cleaning the Q-Beam

Before beginning any service to the unit, be sure that AC power has been turned off and power cords removed. Hazardous voltages may be present inside the enclosure, even with the power off!

Laser diodes are VERY sensitive to Electrostatic Discharge (ESD). During any cleaning operations, take extra care not to contact with any of the electronics, lasers, or connectors in the system. You can easily store over 3000 volts on your body, and transfer it to innocent components without your knowledge!

To clean the optical components, use a cotton swab with a wood or paper stem (not plastic) and reagent grade acetone. Do NOT use acetone from the hardware store, this is NOT the same! Take an eyedropper and put 3 drops of acetone onto a swab, then shake the swab to remove excess acetone. Draw the swab across the optical component being cleaned. Do not use too much pressure. As the swab moves from the left to the right side of the optical component, twist the swab with a clockwise rotation. A clean part of the swab is then always in contact with the optical component. The dirty part of the swab is rotated away from the glass. If the swab is rotated all the way around before the optical component is clean, discard the dirty swab and finish cleaning with a new, clean swab. Never use a swab on more than one optical component. Each pass across an optical component necessitates a fresh, clean swab. Check to make sure you have a clean wipe with no streaks or residue left on the optical component. Clean all optical components that appear dirty.

*Please do NOT re-use swabs.*

## Optical Alignment of the Q-Beam

Optical alignment of the Q-Beam consists primarily of adjusting beam convergence. This can be accomplished simply by using a small, lightweight flat head screwdriver, and inserting it into the two alignment holes in the top of the Q-Beam.

Remove the small plastic caps on the top and side of the projector.

In the **Test/Align** menu put the Q-Beam into align mode.

Once in the align mode the lasers are emitting inside the projector. Use the X/Y alignment screws making small adjustments until the laser beam is centered in port#1, after this process is done the other 9 ports are aligned.

Exit out of the **Test/Align** menu, replace the plastic caps and resume normal control.

# Q-Beam Final Checklist and Test Data

System Serial Number	Date of Manufacture

<b>+5V:</b> _____ <b>-5V:</b> _____ <b>+7.5V:</b> _____ <b>-7.5V:</b> _____	<b>+ Current</b> _____ <b>- Current</b> _____
<b>Red Power</b> _____ <b>Green Power</b> _____	<b>PCB Serial #</b> _____

Test:	√	Test:	√
Initial power up – three beeps		LCD contrast and brightness calibrated	
Buttons tested		Sound activation mode tested	
DMX-512 tested		Remote Interlock tested	
Beam path alignment/red-green convergence adjustment		Minimum 500K ohms – Chassis ground to DC ground.	
Optics cleaned.		Beam actuators calibrated for 45° (all actuator test)	
Screws double-checked for tightness.		Outer case checked for chassis ground connection	
PULSE Q-Beam Rear Panel Information Labels (1010.3)		Aperture labels on all beam ports (1040.10 (G) (5))	
Q-Beam Logo Label		Min. 8 Hours Burn In	

Tested By:		Date:	
Quality Check:		Date:	

# Appendix A – Specifications

## Laser Modules

Red: < 5mW laser module @ 650nm – Typical output power: 3-5mW  
Green: < 5mW DPSS laser module @ 532nm – Typical output power 4-6mW

Operating Temperature Range: 10°-40°C (50°-104°F)

## Power Supply Specifications

25W each, +/-7.5VDC = 50W total  
Power Input: 110/220VAC, 50-60Hz +/-5% - Auto switching

# Appendix B – Connector Pinouts

## Remote Interlock Connector

<b>DIN-5 Pin Number</b>	<b>Function</b>
1	Interlock Signal
2	N/C
3	N/C
4	N/C
5	Interlock Return

## DMX-512 Connectors

<b>XLR-3 Pin Number</b>	<b>Function</b>
1	Ground
2	DMX -
3	DMX +