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Laser Chorus, Inc.
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INTRODUCTION

Laser Chorus entertainment lasers use new developments in electromechanical and computer engineering to give you total control of the laser housed within each fixture. The Viper, so called for its sleek cast design, uses a Helium/Neon laser which emits a beam from both ends of the tube. Two individual scanning systems make for the ultimate control of the both laser beams.

The word "chorus" in the name Laser Chorus refers to the ability of the laser beams projected from multiple Viper heads to stay in synchronized together as the beams move along horizontal and vertical planes. On the back of each Viper head there are two "mirror image" switches that when used can individually "mirror" the horizontal, vertical, or both movements of the scanners.

With the Laser Chorus controller you can easily and quickly select one of the many beam projection patterns and incorporate them into a memory. You may also, if you wish, enhance those projections with audio control by providing an external audio source to of the controller. It is also possible to control selected laser projections with a professional "joystick" to give you that "hands on" feeling.

Laser Chorus Viper heads are available in four colors: red, yellow, orange, and green; and up to twelve lasers can be operated by the Laser Chorus controller - for a total of twenty-four separate projections. It is also possible to switch each laser "on and off" by remote input connectors found at the rear of the controller. This feature allows for remote touchpanel or sequencer operation.
APPLICATIONS

The flexibility of Laser Chorus, Inc. Systems with regard to power requirements and ease of installations make it suitable for a wide range of applications. Arrays of Viper heads may be placed to the rear of a stage behind entertainers. Audio modulated projections of multiple colors may be shown on light colored walls or screens. "Rear Screen Material" which allows projections to be seen from the front and rear of a screen, can be used to provide a "doubling" in the area in which the projections can be seen. Exciting aerial beam patterns may be shown above the heads of dancers in discotheques and nightclubs.

Multiple laser head systems have the advantage of wider viewing angles. A single head laser system, if projected from single location always looks best when viewed towards the laser source. With multiple laser heads, you acquire more sources, thus you increase the number of best possible viewing areas.

Observe safety precautions on page 13.

DANGER

Center for Devices, and Radiation Health (CDRH) warning logotypes, similar to that shown here, appear on each laser. They indicate and certify that the output power of the laser will not exceed the power level printed on the logotype.
<table>
<thead>
<tr>
<th>Specification</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>LASER CHORUS VIPER</strong></td>
<td></td>
</tr>
<tr>
<td>Power Emission</td>
<td>4.95 milliwatts maximum Class IIIa</td>
</tr>
<tr>
<td>Laser Wavelength</td>
<td></td>
</tr>
<tr>
<td>Red</td>
<td>632.8 nm</td>
</tr>
<tr>
<td>Orange</td>
<td>612.0 nm</td>
</tr>
<tr>
<td>Yellow</td>
<td>594.1 nm</td>
</tr>
<tr>
<td>Green</td>
<td>543.5 nm</td>
</tr>
<tr>
<td>Laser supply input</td>
<td>24 volts DC</td>
</tr>
<tr>
<td>Beam stop input</td>
<td>24 volts DC</td>
</tr>
<tr>
<td>Scanner input X</td>
<td>0 - 8 volts DC</td>
</tr>
<tr>
<td>Scanner input Y</td>
<td>0 - 8 volts DC</td>
</tr>
<tr>
<td>Connection cable</td>
<td>100 feet</td>
</tr>
<tr>
<td>Physical dimensions</td>
<td></td>
</tr>
<tr>
<td>H</td>
<td>5.50&quot; (14.0 cm)</td>
</tr>
<tr>
<td>W</td>
<td>23.00&quot; (58.4 cm)</td>
</tr>
<tr>
<td>D</td>
<td>11.50&quot; (29.2 cm)</td>
</tr>
<tr>
<td>Weight</td>
<td>22 lbs. (9.98 kg)</td>
</tr>
<tr>
<td>Shipping dimensions</td>
<td></td>
</tr>
<tr>
<td>H</td>
<td>13.50&quot; (34.3 cm)</td>
</tr>
<tr>
<td>W</td>
<td>31.00&quot; (78.7 cm)</td>
</tr>
<tr>
<td>D</td>
<td>18.00&quot; (45.7 cm)</td>
</tr>
<tr>
<td>Shipping Weight</td>
<td>30 lbs. (13.6 kg)</td>
</tr>
</tbody>
</table>

Specifications subject to change without prior notice.
SPECIFICATIONS

LASER CHORUS CONTROLLER

Operating voltage (selectable) 120V/60Hz - 240V/50Hz
Factory Set 100V/50-60Hz

Current consumption
3.75 amps @ 120V
2.00 amps @ 240V
4.50 amps @ 100V

Fuse
120V - 5.0 amp Slow Blow
240V - 3.5 amp Slow Blow
100V - 6.0 amp Slow Blow

Analog input +5 VDC - +24 VDC

Audio Input voltage .3 VRMS - 100 VRMS

Controlling processor 8088

Programs 16

Memories 3

Steps per memory 64

Joystick Inductive

Physical dimensions
H 5.25" (13.3 cm)
W 19.00" (48.3 cm)
D 13.40" (34.0 cm)

Weight 27 lbs. (12.4 kg)

Shipping dimensions
H 10.00" (25.4 cm)
W 22.50" (57.2 cm)
D 18.00" (45.7 cm)

Shipping Weight 32 lbs. (14.5 kg)

Specifications subject to change without prior notice.
The box that contains each Viper head should also include:

one - 100 ft. cable with connectors

one - yoke

two - handles and washers

one - clamp

After assembling the clamp to the yoke, mount the head in the desired location. Connect and lock into place one of the male din connectors from the cable to the rear of the head. Route the cable to the rear of the controller and connect the din connector to the corresponding laser output number. Always take advantage of the locking ring located on the cable din connector. Turn the locking ring clockwise around the mated female to lock it firmly in place. After mounting all Viper heads in the desired locations, and all cables are run, plug in the controller and you are now ready to proceed with the operations section of this manual.
OPERATIONS

POWER UP

To power up the controller and the Viper heads, turn the key switch clockwise. This enables all electronics in the Laser Chorus controller and activates the laser power supplies in all Viper heads. Upon initial turn on of the controller, four LEDs should glow in the Viper head front panel. The red LEDs signify the laser is emitting. The yellow LEDs signify the emission is being blocked by the dark shutter controlled by the BEAM "enable" switch located on the front panel of the controller. Turn on the controller at least 20 minutes before use to allow the lasers to warm up to their full potential.

BEAM enable

To enable laser light to be projected from Viper heads, depress BEAM "enable" switch. The yellow LEDs on the front of Viper heads will go out and the laser light will be emitted. To switch off laser light emission from Viper heads, depress the BEAM "enable" switch again. You may also switch off the laser emission by turning the key switch located on the front panel of the controller counterclockwise.

PROGRAM level switching

The dual level switch enables the controller to run up to 32 PROGRAMS. Level 1 controls PROGRAMS 1 through 16, level 2 enables PROGRAMS 17 through 32. The PROGRAMS are assigned a projection pattern which is permanently stored in the EPROM of the controller. To change to a program, simply depress the desired PROGRAM button located within the PROGRAM keypad. PROGRAMS can be sequenced in a user determined order with the use of MEMORY.

MEMORY enable

To enable storage of PROGRAMS into MEMORY m1, m2, or m3, the MEMORY "enable" switch must first be depressed followed by switch m1, m2, or m3. Next depress PROGRAM switches 1 through 16 in the order you would like to "change" them upon playing them back. Up to 64 "changes" are available for each MEMORY. When 64 steps are recognized by the controller, the MEMORY "enable" LED and the corresponding MEMORY LED you have chosen will go off. Depressing a PROGRAM more than once while storing your sequence alloys you to sustain any given PROGRAM longer than others during playback.
MEMORY PLAY

Depress MEMORY switches 1, 2, or 3. MEMORY LED lights up and recorded programs "change" at a rate determined by the "change" adjustment knob. Depress MEMORY switch again to turn the MEMORY off or depress any PROGRAM switch. If a MEMORY is blank when it is depressed, all LEDs (except power) on the controller will turn off and the beam stops will be engaged. To continue you will need to choose a PROGRAM and enable the beam. Refer back to the MEMORY enable part of this manual to program the blank memory.

SCANNER auto, audio

Depress SCANNER auto switch. Auto LED lights and internal program projection rates or values change corresponding to the setting of the rate knob located below. Depress SCANNER audio switch. Audio LED lights and SCANNER auto LED goes out. Now, internal program projection rates or values are keyed to the audio "level" knob. Adjust audio "level" knob for the desired effect. To switch between SCANNER audio and SCANNER auto, simply depress the desired switch.

BEAM auto, audio

Depress BEAM auto switch. Auto LED goes on and BEAM "enable" LED flashes to the setting of the rate knob located below it. Depress BEAM audio switch. BEAM audio LED goes on and BEAM auto LED goes out. BEAM "enable" LED now flashes to audio and is controlled by the audio "level" knob.

JOYSTICK

Programs 1 through 16 can incorporate the use of the joystick. If the joystick is allowed, the vertical and/or horizontal LED above the joystick will be lit. To manually control the pattern, simply move the joystick and it will automatically take control of the program. Upon releasing the joystick, normal functions of the program will resume.

"MIRROR IMAGE" SWITCHES

Depending on the installation and personal preference, you may wish to reverse the horizontal axis "image" or the vertical axis "image" of the laser heads in certain locations. These "mirror image" switches are located at the rear of each laser head. The left switch will change the horizontal axis of the left scanner and the right switch will change vertical axis of the right scanner, giving you visual versatility in your projections from the Viper heads.
REMOTE ANALOG CONTROL

The dark shutter of each Viper head can be controlled with an external voltage input to the connectors marked "remote input" on the rear of the controller. Most touchpanels and any analog control device (such as a rock desk or stage lighting board) capable of providing at least 12 output channels with a logic output of +5VDC to +24VDC will be able to remote switch assigned Viper heads. To enable this function, set the "Remote Enable Switch" located at the rear of the controller to the "on" position. Remote input connector 1 and 2 have the following pin out information:

The pinouts for hookup are as follows:

<table>
<thead>
<tr>
<th>REMOTE INPUT CONNECTORS 1 - 6 &amp; 7 - 12</th>
</tr>
</thead>
<tbody>
<tr>
<td>KEY /CHANNEL NUMBER</td>
</tr>
<tr>
<td>----------------------</td>
</tr>
<tr>
<td>1 OR 7</td>
</tr>
<tr>
<td>2 OR 8</td>
</tr>
<tr>
<td>3 OR 9</td>
</tr>
<tr>
<td>4 OR 10</td>
</tr>
<tr>
<td>5 OR 11</td>
</tr>
<tr>
<td>6 OR 12</td>
</tr>
<tr>
<td>COMMON/NEGATIVE</td>
</tr>
<tr>
<td>NOT USED</td>
</tr>
</tbody>
</table>

Once all necessary connections have been made, depressing a keypad will open or close the corresponding Viper dark shutter. A touch panel was used for discussion in the example, although any of the above mentioned devices will function similarly. The manually chosen Program or Memory playback selection will remain as programmed during touch panel use.
MAINTENANCE

Cleaning of the front window of Viper heads may become necessary as dirty front windows will reduce performance. These may be cleaned with a soft tissue and the use of a mild glass cleaning solution. Always clean front windows with the system switched off.

Never open Viper heads or Laser Chorus controller. There are no user serviceable parts inside and this will void the warranty.

TROUBLE SHOOTING

The Viper system is equipped with LED trouble shooting indicators located on the front and rear of each Viper head. These LEDs can aid you in locating faulty cables or output from the controller. The controller supports 12 individual laser head outputs. Each output is individually fused internally with two fuses. One fuse (referred to as the 24 volt line fuse) operates the internal laser power supply, red front window LEDs, dark shutters and yellow front window dark shutter indicator LEDs. The other fuse (referred to as the 8 volt line fuse) operates the rear red logic LED and internal scanning amplifiers.

If a laser head should fail to operate, check to see that both the rear panel red LED and front panel red LEDs are lit. It is a good idea to check a head that may have a problem by plugging the head into a cable output that is known to be working.

NOTE: ALWAYS TURN OFF THE LASER CHORUS CONTROLLER BEFORE CONNECTING CABLES.

CAUTION: Take care when testing the same cable in more than one of the output connectors located on the rear of the controller. If the cable is faulty or shorted you risk blowing fuses and losing additional outputs.

WARNING: Internal output fuses and other internal components located in Viper heads and Laser Chorus controllers should be serviced only by qualified personnel.

For more trouble shooting information refer to page 15 of this manual.
SAFETY PRECAUTIONS

* Use of controls or adjustments or the performance of procedures other than those specified herein may result in hazardous radiation exposure.

* Do Not point lasers at an audience.

* There are no user serviceable parts inside Viper heads or Laser Chorus controllers. Refer servicing to qualified service personnel.

* Do not attempt to open Viper heads. This could expose personnel to High Voltage and Dangerous Radiation.

* Keep Laser Chorus systems away from moisture to reduce hazard of fire and electric shock.

* Safety labels and warning labels attached to front and rear of Viper heads and control systems are required by law. DO NOT REMOVE.

* Check with local and state laws regarding laser use and possible registration requirements.

* This laser system complies with Federal Regulations 21 C.F.R. 1040.10 and 1040.11.
WARRANTY

Laser Chorus Inc. warrants that Laser Chorus systems are free from defects in material and workmanship. The limited one year warranty period covers repair and/or replacement of parts including labor. It is the owner's responsibility to furnish receipts or invoices for verification of purchase, date and dealer or distributor. If unable to produce such proof, date of manufacture will determine warranty duration.

It is necessary to obtain a return authorization number (R.A. #) before any units are sent in for repair. The manufacturer will make the final determination of warranty coverage. Shipping will be paid by the purchaser. Under no circumstances will freight collect shipments be accepted! Warranted items shall have return shipping paid by the manufacturer in the continental United States. Prepaid shipping does not include rush expediting such as air freight. Air freight can be sent customer collect in the continental United States. Any damage incurred in shipping is the responsibility of the carrier. In the case of hidden damage, a claim should be made as soon as discovered and all packing retained for inspection.

ALL ITEMS MUST BE RETURNED IN THEIR ORIGINAL PACKING TO BE ACCEPTED FOR WARRANTY REPAIRS!

============================================================================

REPAIR OR REPLACEMENT AS PROVIDED FOR UNDER THIS WARRANTY IS THE EXCLUSIVE REMEDY OF THE CONSUMER. LASER CHORUS, INC. OR ITS AGENTS SHALL NOT BE LIABLE FOR ANY INCIDENTAL OR CONSEQUENTIAL DAMAGES FOR BREACH OF ANY EXPRESS OR IMPLIED WARRANTY ON THIS PRODUCT. EXCEPT TO THE EXTENT PROHIBITED BY APPLICABLE LAW ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE ON THIS PRODUCT IS LIMITED IN DURATION TO THE DURATION OF THIS WARRANTY.

============================================================================

Warranty is void if the product has been opened, misused, altered or modified. This warranty gives you specific legal rights, some of which may vary from state to state.
# V I P E R
# TROUBLE-SHOOTING
# CHART

<table>
<thead>
<tr>
<th>PROBLEM OR SYMPTOM</th>
<th>POSSIBLE CAUSES / REMEDIES</th>
</tr>
</thead>
<tbody>
<tr>
<td>ALL LEDS ON LASER HEAD ARE WORKING, BEAM WILL NOT ENABLE ON ANY LASERS</td>
<td>CHECK REMOTE ENABLE SWITCH, SWITCH SHOULD BE OFF UNLESS USING SEPARATE ANALOG CONTROL</td>
</tr>
<tr>
<td>SHUTTER INDICATOR WORKS AND SHUTTER OPENS WITH NO LASER EMISSION (OUTPUT)</td>
<td>1. ALLOW LASER TIME TO FIRE</td>
</tr>
<tr>
<td></td>
<td>2. LASER HAS FAILED, UNPLUG LASER AND CONTACT LOCAL SERVICE REP</td>
</tr>
<tr>
<td>RED-YELLOW LEDS ON LASER NEVER TURN ON</td>
<td>1. TEST LASER ON ANOTHER PORT</td>
</tr>
<tr>
<td></td>
<td>2. CONTACT LOCAL SERVICE REP, CHECK 24 VOLT FUSE FOR THAT CHANNEL IN CONTROLLER</td>
</tr>
<tr>
<td>SAME AS ABOVE - FUSE CONTINUES TO BLOW.</td>
<td>1. CHECK CABLE FOR SHORTS</td>
</tr>
<tr>
<td></td>
<td>2. LASER POWER SUPPLY MAY HAVE FAILED, CONTACT LOCAL SERVICE REP</td>
</tr>
<tr>
<td>LASERS DO NOT SCAN IN UNISON</td>
<td>CHECK MIRROR IMAGE SWITCHES ON THE REAR OF FIXTURE</td>
</tr>
<tr>
<td>LASER DOES NOT SCAN WHEN ANY PROGRAM IS USED</td>
<td>CHECK REAR LED, IF WORKING</td>
</tr>
<tr>
<td></td>
<td>1. CHECK FOR BAD CABLE</td>
</tr>
<tr>
<td></td>
<td>2. CONTROLLER CHANNEL MAY MAY BE BAD, USE ANOTHER CHANNEL UNTIL LOCAL SERVICE REP. CAN BE CONTACTED</td>
</tr>
<tr>
<td>SAME AS ABOVE - REAR LED NOT WORKING</td>
<td>1. CHECK 8 VOLT FUSE FOR THAT CHANNEL IN CONTROLLER</td>
</tr>
<tr>
<td></td>
<td>2. VOLTAGE REGULATOR MAY HAVE FAILED IN LASER, CONTACT LOCAL SERVICE REP</td>
</tr>
</tbody>
</table>