Studio Spot™

Automated Projection and Effect Luminaire

User's Manual

High End Systems, Inc.
2217 West Braker Lane
Austin, Texas U.S.A.

LIGHTWAVE RESEARCH®

Declaration of Conformity

according to ISO/IEC Guide 22 and EN45104

Manufacturer's name: Lightwave Research

Manufacturer's address: 2217 West Braker Lane
                                  Austin, Texas 78758
                                  U.S.A.

Distributor's name: High End Systems, Inc.

Distributor's address: 2217 West Braker Lane
                                  Austin, Texas 78758
                                  U.S.A.

Declares that the product

Product Name: Studio Spot

Product Number: Studio Spot

Product Options: All

conforms to the following EEC directives:

73/23/EEC, as amended by 93/68/EEC

89/336/EEC, as amended by 92/31/EEC and 93/68/EEC

Equipment referred to in this declaration of conformity first manufactured in 1998 in compliance with the following standards:

Safety: EN 60598-1 : 1993
                                  EN 60598-2-17 : 1989
                                     A1-A3 : 1993

EMC: EN 55022, 1987 Class A ITE
                                  IEC 801-2, 1991 Level 2 (4/8 kV)
                                  IEC 801-3, 1991 Draft 5 Level 2 (3 V/m)
                                  IEC 801-4, 1988 Level 2 (1 kV/0.5 kV)

U.S.A., October 12, 1998   Kenneth Hansen, Compliance Engineer

IMPORTANT SAFETY INFORMATION

Instructions pertaining to continued protection against fire, electric shock, exposure to excessive ultraviolet (UV) radiation, and injury to persons are found in Appendix D.

Please read all instructions prior to assembling, mounting, and operating this equipment.

IMPORTANT: INFORMATIONS DE SÉCURITÉ

Les instructions se rapportant à la protection permanente contre les incendies, l'électrocution, l'exposition à un rayonnement ultraviolet (UV) excessif et aux blessures corporelles se trouvent dans l'Annexe D.

Veuillez lire toutes les instructions avant d'assembler, de monter ou d'utiliser cet équipement.

WICHTIGE SICHERHEITSHINWEISE

Sicherheitsanleitungen zum Schutz gegen Feuer, elektrischen Schlag, übermäßige UV-Strahlung und Verletzung von Personen finden Sie in Anhang D.

Vor der Montage, dem Zusammenbau und der Inbetriebnahme dieses Geräts alle Anleitungen sorgfältig durchlesen.

INFORMAZIONI IMPORTANTI DI SICUREZZA

Le istruzioni sulla protezione da incendi, folgorazione, esposizione eccessiva a raggi ultravioletti (UV) e infortuni sono contenute nell'appendice D.

Si prega di leggere tutte le istruzioni prima di assemblare, montare e azionare l'apparecchiatura.

INFORMACION IMPORTANTE DE SEGURIDAD

En el Apéndice D de este manual se encuentran instrucciones sobre protección continua contra incendios, descarga eléctrica, exposición excesiva a radiación ultravioleta (UV) y lesiones personales.

Lea, por favor, todas las instrucciones antes del ensamblaje, montaje y operación de este equipo.

FCC Information

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

Warranty Information

Limited Warranty

Unless otherwise stated, your product is covered by a two year parts and labor limited warranty. Dichroic filters and Lithopatterns® are not guaranteed against breakage or scratches to coating. It is the owner's responsibility to furnish receipts or invoices for verification of purchase, date, and dealer or distributor. If purchase date cannot be provided, date of manufacture will be used to determine warranty period.

Returning an Item Under Warranty for Repair

It is necessary to obtain a Return Material Authorization Number (RMA#) from your dealer/point of purchase BEFORE any units are returned for repair. The manufacturer will make the final determination as to whether or not the unit is covered by warranty. Lamps are covered by the lamp manufacturer's warranty.

Any Product unit or parts returned to High End Systems must be packaged in a suitable manner to ensure the protection of such Product unit or parts, and such package shall be clearly and prominently marked to indicate that the package contains returned Product units or parts and with a Return Material Authorization (RMA#) number. Accompany all returned Product units or parts with a written explanation of the alleged problem or malfunction.

Please note: Freight Damage Claims are invalid for fixtures shipped in non-factory boxes and packing materials. Ship returned items to 2227 Braker Lane, Austin, Texas 78758.

Freight

All shipping will be paid by the purchaser. Items under warranty shall have return shipping paid by the manufacturer only in the Continental United States. **Under no circumstances will freight collect shipments be accepted.** Prepaid shipping does not include rush expediting such as air freight. Air freight can be sent customer collect in the Continental United States.

REPAIR OR REPLACEMENT AS PROVIDED FOR UNDER THIS WARRANTY IS THE EXCLUSIVE REMEDY OF THE CONSUMER. HIGH END SYSTEMS, INC. MAKES NO WARRANTIES, EXPRESSED OR IMPLIED, WITH RESPECT TO ANY PRODUCT, AND HIGH END SPECIFICALLY DISCLAIMS ANY WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. HIGH END SHALL NOT BE LIABLE FOR ANY INDIRECT, INCIDENTAL, OR CONSEQUENTIAL DAMAGE, INCLUDING LOST PROFITS, SUSTAINED OR INCURRED IN CONNECTION WITH ANY PRODUCT OR CAUSED BY PRODUCT DEFECTS OR THE PARTIAL OR TOTAL FAILURE OF ANY PRODUCT REGARDLESS OF THE FORM OF ACTION, WHETHER IN CONTRACT, TORT, (INCLUDING NEGLIGENCE), STRICT LIABILITY, OR OTHERWISE, AND WHETHER OR NOT SUCH DAMAGE WAS FORESEEN OR UNFORESEEN.

Warranty is void if the product is misused, damaged, modified in any way, or for unauthorized repairs or parts. This warranty gives you specific legal rights, and you may also have other rights which vary from state to state.

Product Modification Warning

High End Systems products are designed and manufactured to meet the requirements of United States and International safety regulations. Modifications to the product could affect safety and render the product non-compliant to relevant safety standards.

Mise En Garde Contre La Modification Du Produit

Les produits High End Systems sont conçus et fabriqués conformément aux exigences des règlements internationaux de sécurité. Toute modification du produit peut entraîner sa non conformité aux normes de sécurité en vigueur.

Produktmodifikationswarnung

Design und Herstellung von High End Systems entsprechen den Anforderungen der U.S. Amerikanischen und internationalen Sicherheitsvorschriften. Abänderungen dieses Produktes können dessen Sicherheit beeinträchtigen und unter Umständen gegen die diesbezüglichen Sicherheitsnormen verstoßen.

Avvertenza Sulla Modifica Del Prodotto

I prodotti di High End Systems sono stati progettati e fabbricati per soddisfare i requisiti delle normative di sicurezza statunitensi ed internazionali. Qualsiasi modifica al prodotto potrebbe pregiudicare la sicurezza e rendere il prodotto non conforme agli standard di sicurezza pertinenti.

Advertencia De Modificación Del Producto

Los productos de High End Systems están diseñados y fabricados para cumplir los requisitos de las reglamentaciones de seguridad de los Estados Unidos e internacionales. Las modificaciones al producto podrían afectar la seguridad y dejar al producto fuera de conformidad con las normas de seguridad relevantes.

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World Wide Web Sites
http://www.highend.com
http://www.studiospot.com

Service Web Site
http://info.highend.com/service/service.html

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Introduction

Congratulations and thank you for using the Studio Spot™ Automated Projection and Effect Luminaire from Lightwave Research®.

About This Manual

This manual provides the means to setup and operate Studio Spot. This manual is organized in the following sections:

Introduction—introduces you to this manual*,* provides the features, specifications, accessories, and explains the front and side panel functionality.

Chapter 1 *Installation and Setup*—explains how to install, setup, and control the fixture.

Chapter 2 *Operation*—describes how to use the fixture's features.

Chapter 3 *Menu System*—provides information on using the menu system and its functions.

Chapter 4 *Preset Scenes*—furnishes instructions on how to create, edit, and playback preset scenes from the on-board memory.

Appendix A *Troubleshooting and Maintenance*—supplies directions for troubleshooting problems, contacting technical support, routine maintenance, and uploading software.

Appendix B *Accessory Installation*—gives instructions on installing lenses, dichroic glass, LithoPatterns®, gobos, and effect glass.

Appendix D *Important Safety Information*—provides safety information in English, French, German, Spanish, Italian, and Danish.

Index—gives the page location(s) for pertinent terms and topics.

Manual Conventions

This manual uses the following conventions:

- a menu button will look like: press the <ENTER> button
- an L.E.D. display item on the front panel will look like: SET menu
- DOS prompts, computer file names, and input keyboard strokes will look like: Type a:\ setup.

Manual and Software Revisions

This manual and the operating software for Studio Spot are subject to change. Please visit our web site, contact your Authorized High End Systems dealer, or High End Systems for the latest updates.

Safety Instructions

- Heed all caution and warning messages throughout this manual and the documentation that accompanies your fixtures.
- Servicing must be conducted by the manufacturer or other qualified service personnel.
- Avoid allowing liquids in any form to come in contact with the fixture.

Caution and Warning Symbols

The following international symbols appear in margins throughout this manual to highlight caution and warning messages.

Caution: This symbol appears adjacent to Caution messages. Ignoring these messages could result in damage to equipment.

Warning: This symbol appears adjacent to High Voltage and Hazard messages. Ignoring these messages could result in serious personal injury.
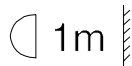
This symbol indicates that the minimum distance to a lighted object is 1 meter.

This symbol indicates that eye protection is required.

This symbol indicates a hot surface.

This symbol indicates an explosion hazard.

Studio Spot Feature Overview

Switching power supplies	Studio Spot features proprietary switching power supplies for the on-board electronics and the lamp power supply. The fixture automatically operates on all international voltages at 50 or 60 Hertz without changing a power tap or making any adjustments.
USITT DMX-512 control	Full control over all operating parameters of Studio Spot is achieved via 24 channels of DMX-512 protocol. This includes 16-bit accuracy for pan, tilt, and gobo indexing; and 8-bit accuracy for all other parameters. All parameters are controlled by a built-in Motorola® 68340 microprocessor.
Convection cooling	Studio Spot is convection cooled and does not use fans. This dramatically prevents excess fog, smoke, and dust particles from being introduced into the optical system and ensures quiet performance.
Movement	The moving yoke design utilizes 16-bit pan and tilt positioning accuracy over the 370° x 255° range of movement. The drive systems produce extremely smooth motion and near silent operation.
Color capabilities	Each of the two color wheels support five dichroic glass filters plus open. Custom color filters may be ordered from High End Systems and are easily installed. These dichroic filters are interchangeable with Studio Color® and Cyberlight®.
Rotating lithos and rotating effects	Studio Spot can project up to 35 combination patterns using 10 rotating litho/effects (plus two open) located on two independent wheels. Each wheel can be independently indexed and rotated in either direction at variable speeds. Superior optics support LithoPatterns® at 3300 dots per inch (d.p.i.). 'Slo' and lenticular glass effects are standard. Optional and custom LithoPatterns, effect glass, and prisms are available and are easily installed. Effect glasses are interchangeable with Technobeam®, Technopro™, and Technoray™ fixtures.

Custom 575 watt discharge lamps

Studio Spot utilizes a custom MSR 575/2 lamp. The MSR 575/2 provides a high color rendering index and a high color temperature of 6200 K. An optional MSD 575 lamp is available for architectural applications. The MSD 575 provides a color temperature of 5600 K and enhanced lamp life.

Elliptical/spherical reflector system

A custom elliptical/spherical reflector system (patent pending) delivers an extraordinary (>50%) gain in light output compared to systems in other fixtures.

Special effect functions

Special effect functions provide color spins, random color combinations, random gobos, or MSpeed to control the color and litho wheels. The 'blink' function quickly strobes the dimming system during color and/or litho changes.

Factory macros

Complicated looks can be quickly programmed using one of the 26 factory-programmed macros. Each macro modifies a specific set of constructs to produce a unique effect, while allowing the user to retain control of all other constructs. Sequences can be created by using an additional variable speed random macro.

Frost

A variable frost mechanism provides infinite beam diffusion. Thus the hard edge beam is easily softened to create a wash effect. Frost effects include variable periodic, random periodic, variable ramp/snap, and random ramp/snap strobes.

Dimming

A smooth mechanical dimming system provides seamless dimming without affecting the beam shape or the color temperature output.

Iris

An independent iris can remotely manipulate the beam diameter. Iris effects include variable periodic, random periodic, variable ramp/snap, and random ramp/snap strobes.

Focus

The variable remote focus lens can precisely focus on either litho/effect wheel at any distance.

Lenses

The standard lens provides an 18° beam angles. Optional 13° and 30° lenses are available for narrow and wide field projection. All lenses feature advanced aberration correction. The aberration correction eliminates chromatic shifts, image distortion, spherical astigmatism, and provides an impeccably flat focus field.

Strobing

The dimming system provides instant blackout, variable and random speed strobes, variable and random ramp/snap effects, and the blinking function. Additionally, Studio Spot can dim while strobing.

Internal preset scene memory

Up to 16 scenes can be programmed for playback without a controller. Scenes can be programmed from the front panel or 'captured' from DMX data. You can playback data in stand-alone mode or synchronize playback with up to 32 fixtures.

Optical encoders

Studio Spot utilizes optical encoders for the pan and tilt systems. The encoders automatically correct position(s) if the fixture is jolted from a programmed position.

L.E.D. display

A full function 15-segment four character alphanumeric display allows the user to easily program all functions of the fixture. A full set of diagnostic functions are available through the menu system. Studio Spot can also serve as a DMX tester to view channel values and DMX errors. The display can be remotely turned on, off, or dimmed via DMX.

L.E.D. status indicators

Five L.E.D. indicators visually provide the status of the lamp power supply, motor power supply, and data.

Mounting

Studio Spot can be truss mounted on 22-inch centers in any orientation or it can be floor mounted on its rubber feet.

Stepper motors

All motors are digitally controlled steppers. They provide precision control, high torque, smooth movement, near quiet performance, and very long life.

Fixture shutdown, lamp control, and homing

Fixture shutdown, lamp on/off, and homing can be accessed remotely via DMX. You can also turn the lamp on or off and home the fixture with the front panel menu system.

Integral AC power switch/breaker

The power switch/breaker is conveniently located on the side of the fixture.

Power factor correction

Studio Spot is fully power factor corrected to optimize the light source's efficiency and deliver maximized power economy.

Power saving mode   When the dimming system is closed, the lamp insti-
gates idle mode which decreases the wattage and
reduces heat. When the shutter is opened, the lamp
instantly returns to full power.

Ease of maintenance   Studio Spot has been designed for the professional
user. Studio Spot is constructed on the solid
premise of Studio Color. Changing the lamp is
quick (typically less than 30 seconds) and
convenient.

Software updates   Operating software can be uploaded from the
Lightwave Research Upload Dongle, the Status
Cue® lighting console, or from another fixture, thus
keeping the fixtures constantly updated with the
latest version. The latest software version is
available through the High End Systems World
Wide Web Site.

Safety   The lamp cover is secured through its wiring harness
for additional safety. Multi-point grounding is provided
throughout for complete assurance of safe operation.
The bezel is secured to the unit by an additional safety
cable. The fixture and all electronics comply with
current UL, ETL, ETLc, CE, FCC, CSA, and EMC
standards for professional lighting fixtures.

Specifications

Mechanical

Height: 713.34 mm (28.09 in.)

Width: 551.17 mm (21.7 in.)

Depth: 318 mm (12.52 in.)

Weight: 26.76 kg (59 lbs.)

For additional dimensions, refer to Figure 1 and Figure 2.
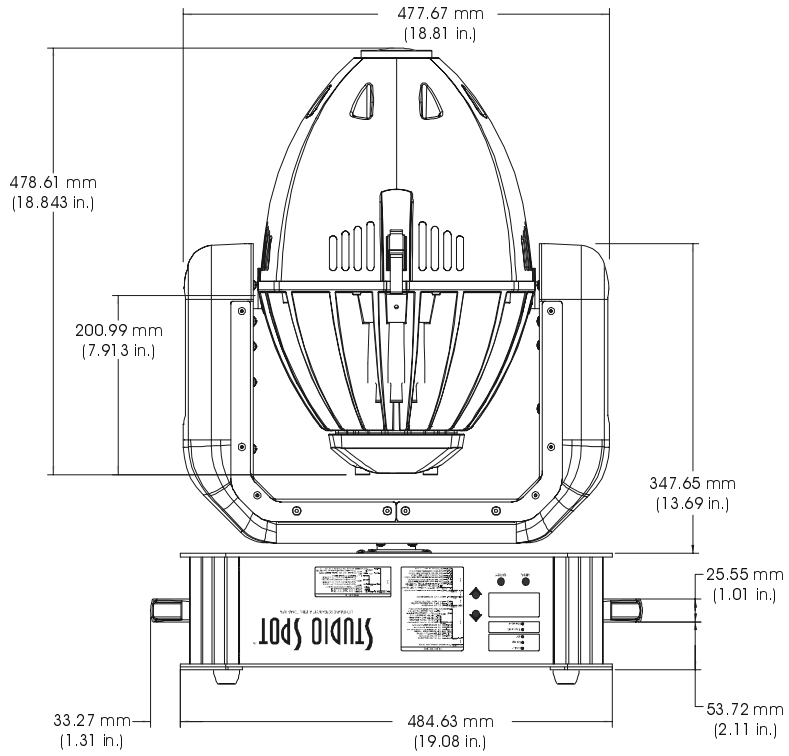
Figure 1. Front Dimensions
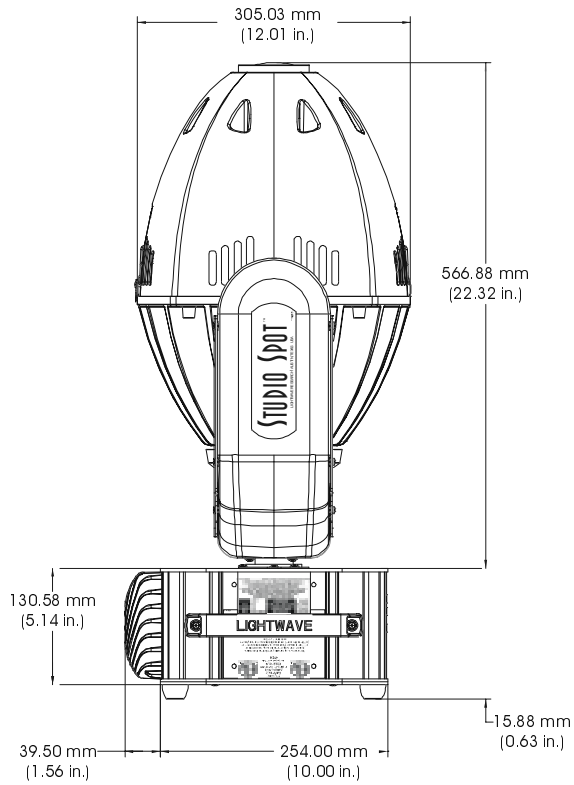
Figure 2. Side Dimensions

Electrical

Rated voltage:	100–230 V.A.C.[1]
Rated current:	7.0–3.0 A
Rated power:	700 W max
Rated frequency:	50/60 Hz
Max. ambient temperature, Ta:	40° C (104° F)
Max. exterior surface temperature:	200° C (392° F)
Power factor:	0.96 @ 230 V/50 Hz, 0.99 @ 100 V/60 Hz
Max. winding temperature, Tw:	130° C (266° F)
Max. capacitor temperature, Tc:	85° C (185° F)

[1]Supports international voltages up to 250 V.A.C.

Optical System

Dichroic Glass

Diameter	44.323 mm ±0.25 (1.745 in. ±0.010)
Thickness	1.778 mm ±0.25 (0.070 in. ±0.010)

Note: *the dichroic glass specifications for Studio Spot are identical to Studio Color, Cyberlight, Cyberlight CX, and Cyberlight SV.*

Effect Glass

Diameter:	36.322 mm ±0.25 (1.430 in. ±0.010
Image area:	31.750 mm ±0.25 (1.250 in. ±0.010)
Thickness:	3.175 mm ±0.25 (0.125 in. ±0.010)

Note: *the effect glass specifications for Studio Spot are identical to Technobeam, Technopro, and Technoray.*

LithoPatterns

Resolution:	3300 d.p.i.
Diameter:	36.449 mm ± 0.15 (1.435 in. ±0.006)
Image area:	31.750 mm ±0.25 (1.250 in. ±0.010)
Thickness:	1.778 mm ±0.25 (0.070 in. ±0.010)

Note: *use the above specifications for metal gobos.*

Lenses

Table 1: Lens Specifications

Lens	Minimum Focal Distance	Effective Focal Length	F-Stop	Elements
13°	1 M - ∞	140 mm	1:2	4
18°	1 M - ∞	100 mm	1:1.6	4
30°	1 M - ∞	60 mm	1:1.8	5

Note: *to determine which lens best suits your application, refer to "Calculating Beam Diameters" on page C-6.*
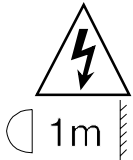
WARNING: risk of fire. Never light objects closer than 1 M.

1m

Lamps

Lamp type:	Philips® MSR 575/2 or Philips MSD 575
MSR 575/2 color temperature:	6500 Kelvin
MSD 575 color temperature:	5600 Kelvin

WARNING: use only M Series, GX 9.5 Base, 575 watt, metal halide type lamp.

Notes: *the above lamps were specifically designed for use in Studio Spot and Studio Color. Additionally, mixing MSR 575/2 and MSD 575 lamp types will result in undesirable color points between fixtures.*

Communication

Protocol:	USITT DMX-512
Start code:	00h
Maximum load:	21 fixtures per DMX link
Required channels:	24
Termination:	120 Ω

Compliance

Studio Spot is compliant to the following standards:

- UL 1572, Third Edition
- CAN/CSA 22.2 Number 9, 1989
- EN 60598-1 : 1993
- EN 60598-2-17 : 1989 A1-A3 : 1993
- EN 55022, 1987 Class A ITE
- IEC 801-2, 1991 Level 2 (4/8 kV)
- IEC 801-3, 1991 Draft 5 Level 2 (3 V/m)
- IEC 801-4, 1988 Level 2 (1 kV/0.5 kV)
- FCC-Class A digital device

$C\;E$

Accessories

The following subsections provide the accessories that are currently available for Studio Spot by category. Their corresponding part number is listed in the right column.

Cables and Connectors

10-foot heavy duty data cable with Neutrik XLRs	55050005
25-foot heavy duty data cable with Neutrik XLRs	55050006
50-foot heavy duty data cable with Neutrik XLRs	55050007
100-foot heavy duty data cable with Neutrik XLRs	55050008
Male XLR terminator	90404039
Neutrik 5/3 pin and 3/5 pin XLR convertor set	55050015

Controllers and Upload Devices

Status Cue® Lighting Console	22020002
Lightwave Research Upload Dongle	26040002

Dichroic Filters

Aqua†	80510171
Blue	80510116
Dark Blue	80510061
CTO††	80510246
Cyan†	80510244
Light Cyan†	80510245
Green	80510117
Indigo†	80510248
Magenta†	80510242
Orange	80510060
Pink†	80510243
Purple	80510063
Red	80510170
Yellow†	80510247
Light Yellow†	80510241

† Factory installed.
Note: *custom colors are available from High End Systems. Contact your authorized dealer or High End Systems for ordering information.*

Lenses

13° narrow field lens	80160029
18° standard field lens (factory installed)	80160030
30° wide field lens	80160031

Literature

Studio Spot User's Manual	60600093
Studio Spot Quick Reference Card	60600119

Mounting Hardware

Cheeseborough clamp	55040014
Safety cable	12040001
Rubber feet	90410089

LithoPatterns and Effects

Hollywood Stars†	14040125
Shatters†	14040126
Wavy Tunnel (indigo)†	14040127
Pickup Sticks	14040128
Lava (cyan)†	14040137
Lava (magenta)†	14040138
Triwing†	14040129
Building Blocks†	14040130
Studio Wedges	14040131
Gatlin Gun (red)†	14040136
Jax†	14040135
Lenticular Effect Glass†	80530031
Hammered Effect Glass	80530028
Slo Effect Glass†	80530029
Five Facet Prism	99090035

† Factory installed.

Notes: *additional and custom LithoPatterns® and effect glass are available from High End Systems. A complete catalogue is available on the High End Systems web site. Contact your authorized dealer or distributor for ordering information. The cyan and magenta Lava lithos are combined to make up the Lava litho.*

Road Cases

Keal road case for one fixture	39070001
Keal road case for two fixtures	39070002

Lamps

Philips MSR 575/2 lamp	55030052
Philips MSD 575 lamp	55030050

Note: *the above lamps were specifically designed for High End Systems, Inc.*

Front and Side Panel Functionality
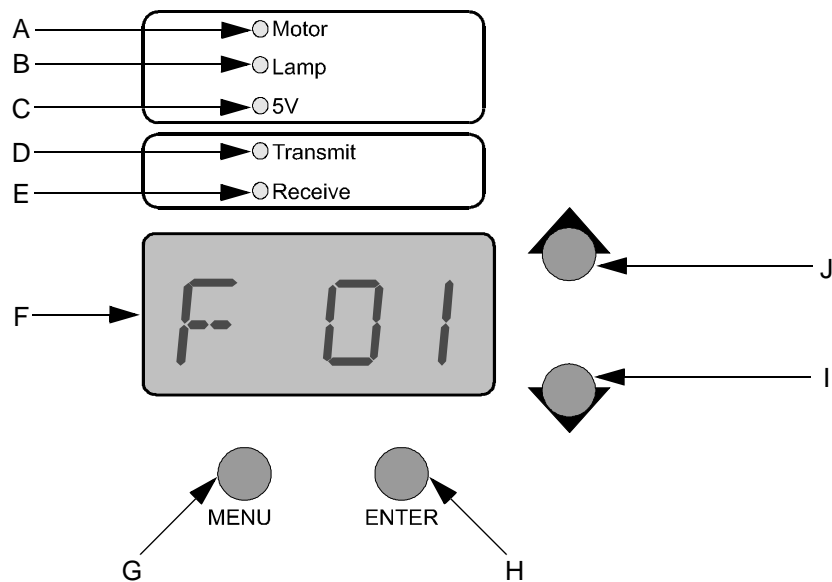
Figure 3. Front Panel

A- *Motor* power supply indicator. This LED is on when the motor power supply has voltage.

B- *Lamp* power supply indicator. This LED is on when the lamp is on, off if the lamp is turned off, or flashing if there is a malfunction.

C- *5V* supply indicator. This LED is on when the logic board is supplied with +5 volts.

D- *Transmit* data indicator. This LED is on when the fixture is the bus master (not the controller), when the fixture is the master during a crossload, and during preset playback.

E- *Receive* data indicator. This LED flickers to reflect received data.

F- 15-segment four character alpha-numeric L.E.D. display. The display provides data, status, and internal diagnostic features.

G- <MENU> button. This button unlocks the menu system and backs out of the current field.

H- <ENTER> button. This button enters the current field and stores data.

I- Down button. This button scrolls downward through data fields and values.

J- Up button. This button scrolls upward through data fields and values.
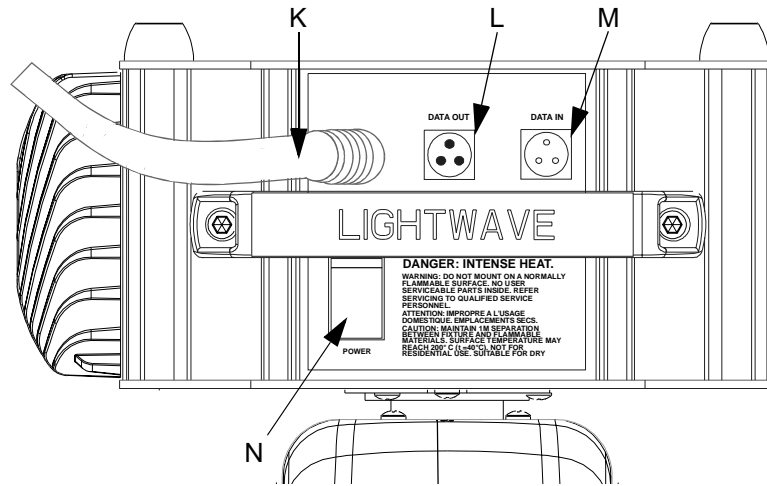
Figure 4. Left Side Panel

K- Line cord.

L- *DATA OUT* connector.

M- *DATA IN* connector.

N- Breaker/power switch.
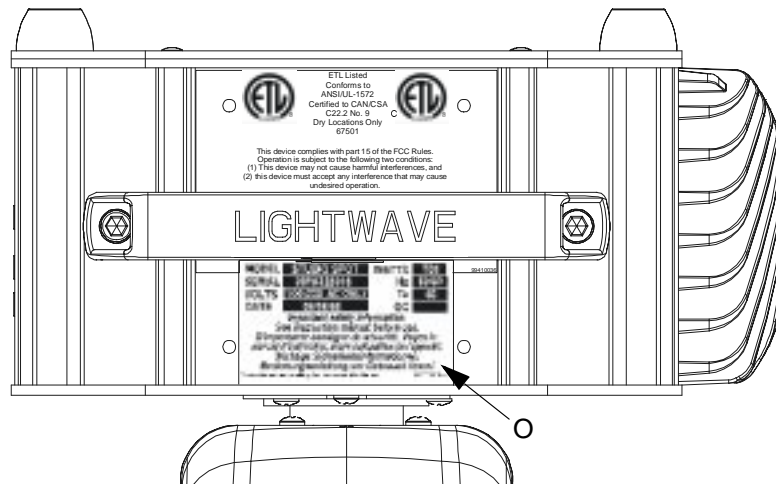
Figure 5. Right Side Panel

O- QC/rating label.

Chapter 1
Installation and Setup

In this chapter you will:

❏ *unpack the fixture (1-1)*
❏ *register your fixture (1-2)*
❏ *construct a road case (1-3)*
❏ *construct a line cord cap (1-5)*
❏ *learn the power requirements (1-6)*
❏ *construct a data cable (1-6)*
❏ *construct a terminator (1-7)*
❏ *mount the fixture (1-7)*
❏ *connect data cables (1-9)*
❏ *power on the fixture (1-10)*
❏ *address the fixture (1-10)*
❏ *control the fixture with DMX 512 (1-12)*
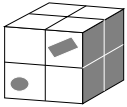
Unpacking Studio Spot

In this section you will unpack your Studio Spot and verify that it arrived complete and without any damage.

Save the shipping materials. Do not discard the shipping carton and packing materials. The carton and packing materials are specifically designed to protect the fixture during transport.

If you ever need to return a product for repair or maintenance, you must return it in its original shipping carton and packing materials. If you return your Studio Spot in a non-factory shipping carton or non-factory packing materials, you will be billed for the materials.

Note: *before returning anything to the factory, be sure to call your High End Systems Dealer/Distributor for a Return Material Authorization Number. The High End Systems cannot accept any goods shipped without an RMA number. Refer to "Acquiring Technical Support" on page A-2.*

Inspecting the Contents

The shipping carton contains the following items:

- Studio Spot fixture
- Philips MSR 575/2 lamp installed in the fixture
- *Studio Spot User's Manual*
- *Studio Spot Quick Reference Card*

Inspecting the Fixture

After unpacking the box, complete the following procedure to inspect the fixture:

1. Place the fixture upright on a flat surface.

2. Inspect the fixture for physical damage.

3. Remove the bezel by releasing the two latches located in the middle of the fixture head. Refer to Figure 1.1.
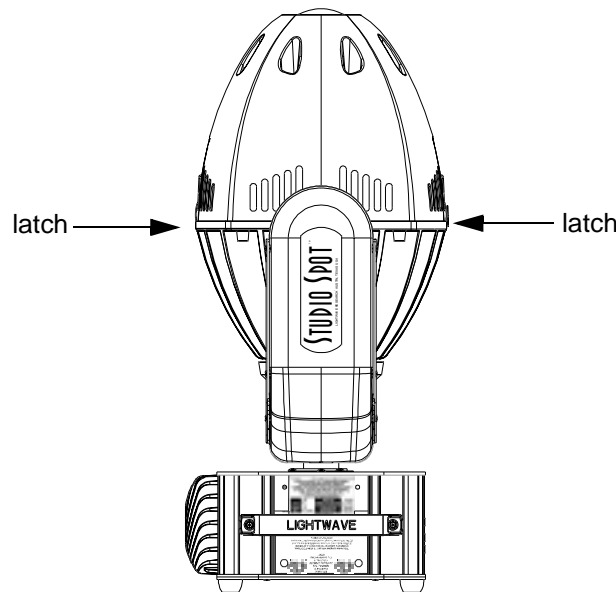
Figure 1.1 Removing the Bezel

4. Remove the safety cable from its latch and set the bezel aside.

5. Inspect the inside of the optical assembly for any visible damage to glass components.

6. Replace the bezel, secure the safety cable to its clamp, and relatch the bezel.

Registering Your Product

It is extremely important that you register your Studio Spot with High End Systems. To register your fixture, have your serial number(s) handy and call toll free at 888-696-5711 or register on-line at http://info.highend.com/service/service.html.

Road Cases

If Studio Spot fixtures will be transported after they are unpacked from their original shipping box, a professional road case is strongly recommended. Road cases can be purchased from High End Systems or constructed in accordance to the information in this section.

Minimum Material Requirements

Use the following materials to construct the road case:

- 3/4-inch pressed plywood
- 4 pound polyethylene foam
- steel or aluminum rivets

Construction Requirements

The road case must be constructed in a manner that supports the base and the handles with the head pointed down and the yoke rotated 90°. Refer to Figure 1.2 and Figure 1.3.

⚠ **Caution: allow a small gap in the foam around the heat sink to ensure that the foam is not damaged by the heat from the fixture.**
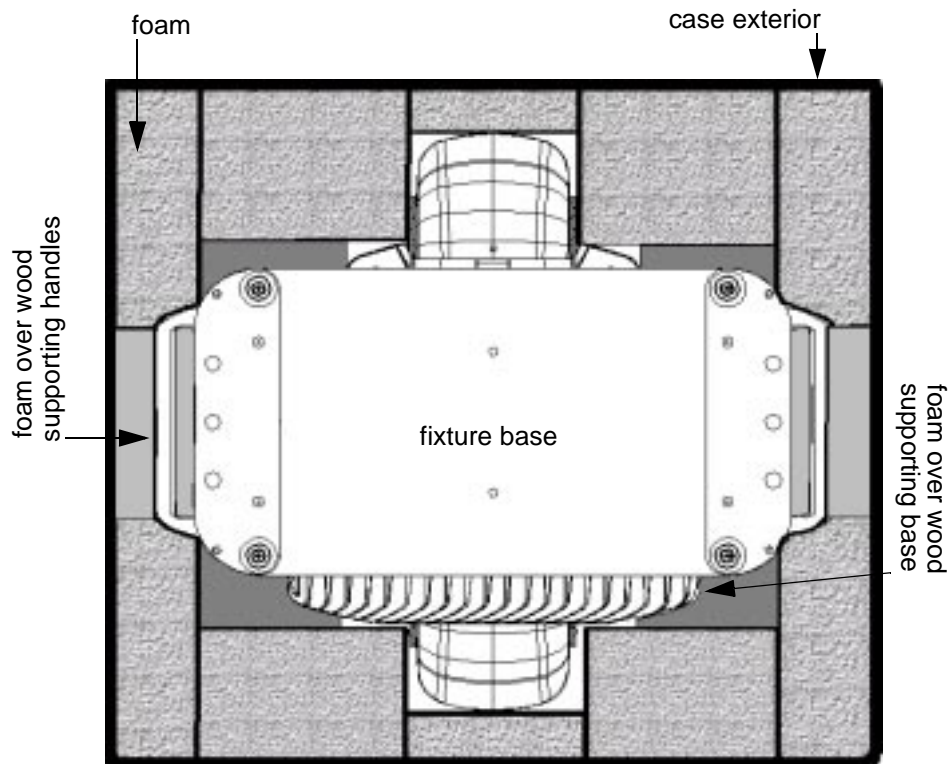
Figure 1.2 Road Case Construction Overhead View
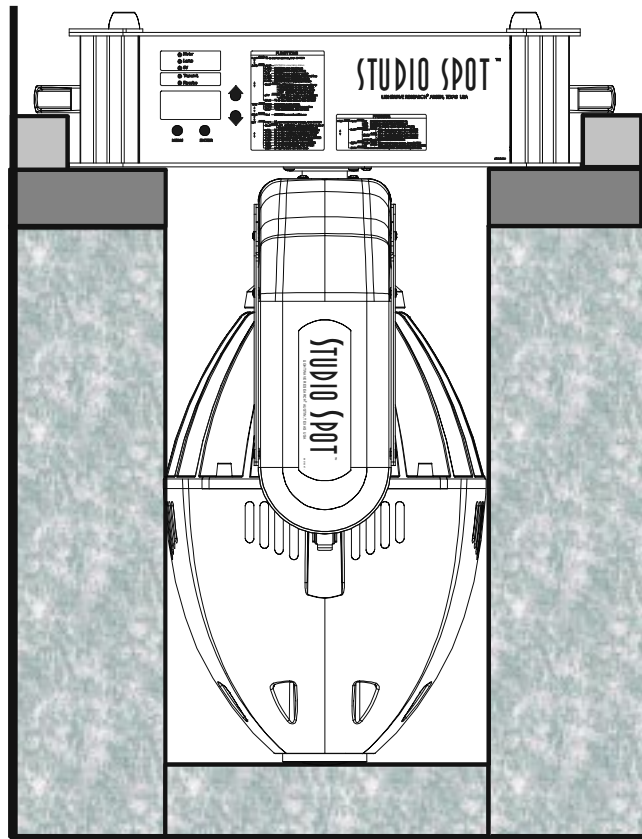
Figure 1.3 Road Case Construction Side View

Note: *do not scale the figures to design your road cases. They are provided for informational purposes only.*

Before Beginning Installation

Before you begin the installation read the following safety precautions:

- Disconnect the fixture from power before removing the bezel or changing the lamp.
- Allow the unit to cool for at least five minutes before removing cover or accessing the lamp.
- Wear protective gloves and goggles when working inside the unit.

Power and Breaker Requirements

Studio Spot automatically senses and adjusts itself to input voltages from 90–250 volts (which is ±10% of its rated voltages) and frequencies of 50 or 60 Hz. Due to variances between breaker types and manufacturers, wiring should be sized in accordance to the electrical code where the fixture(s) will be operated. Breakers should include 20 amp maximum branch circuit protection. A guideline for determining the number of fixtures that can be powered per breaker is shown in Table 1-1.

Table 1.1: Breaker Requirements

Voltage	*Fixtures Per 20 A Breaker*
100	2
110	3
200-208	5
220-240	6

Line Cord Cap Construction

Studio Spot is shipped without a line cord cap attached. Secure the line cord to a line cord cap in accordance with the following code:

- green and yellow– earth
- blue– neutral
- brown– live

In the United States, use an integral cord grip that is rated either at 125 V 20 A (NEMA 5-20) or 250 V 20 A (NEMA 6-20), depending on the available supply.

United Kingdom Line Cord Cap Construction

In the United Kingdom, as the colours of the cores in the mains lead of this equipment may not correspond with the coloured markings identifying the terminals in your plug, proceed as follows:

- The core which is coloured green and yellow must be connected to the terminal in the plug which is marked with the letter *E* or by the earth symbol, or coloured green or green and yellow.
- The core which is coloured blue must be connected to the terminal which is marked with the letter *N* or coloured black.
- The core which is coloured brown must be connected to the terminal which is marked with the letter *L* or coloured red.

WARNING: class I equipment. This equipment must be earthed.

VIGTIG FIKKER HEDS INFORMATION - DANMARK

Advarsel: Beskyttelse mod elektrisk chock.

Vigtigt!

Lederne med gul/groen isolation maa kun tilsluttes en klemme maerket ⏚ eller ⏚ .

Constructing Data Cables

Studio Spot uses standard 3-pin XLR connectors. You should use cable that meets the specifications for EIA RS-485 applications with characteristics listed below:

- 2-conductor, twisted pair plus a shield
- maximum capacitance between conductors - 30 pF/ft.
- maximum capacitance between conductor & shield - 55 pF/ft.
- maximum resistance of 20 W/1000 ft.
- nominal impedance 100−140 W
- 22−24 AWG with insulation having a dielectric rating of 300 volts or higher

An example of a cable that meets the above specification is Belden® 9841.

Construct data cables using shielded, two conductor cable with a male 3-pin XLR connector at one end and a female 3-pin XLR connector on the other end. Refer to Figure 1.4.
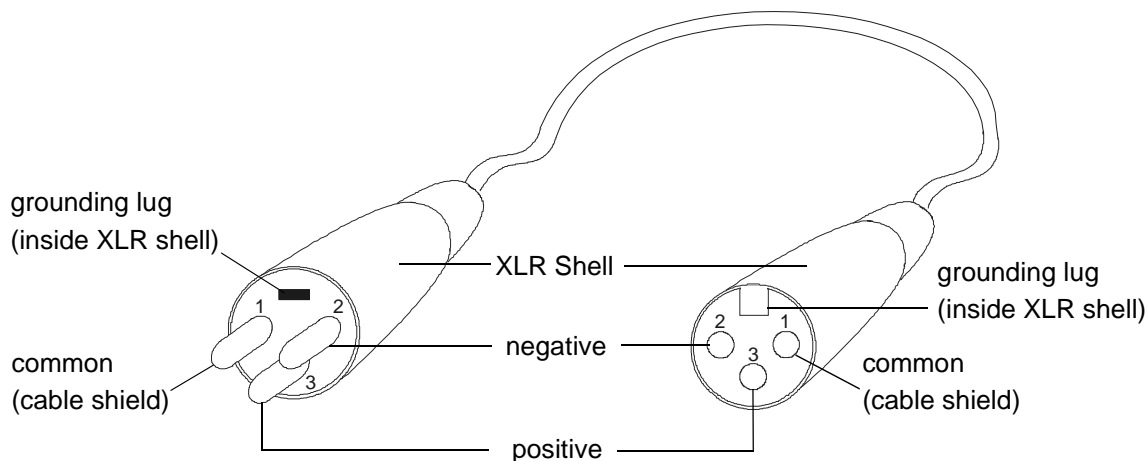
Figure 1.4 Data Cable Construction

Test each cable with a volt-ohm meter for correct polarity and ensure that the negative and positive pins are not grounded or shorted to the shield. Ensure that pin 1 is the shield. If your DMX controller uses 5-pin data cables, you will need to construct or purchase a 5-pin to 3-pin adapter.

Constructing Terminators

DMX-512 protocol recommends terminating resistors be used on the last fixture on the link. You will need the following items to construct a terminator:

- Male 3-pin XLR connector
- 120 Ω resistor (¼ watt minimum)

To construct a terminator, complete the following procedure:

1. Disassemble the male XLR connector.
2. Solder a 120 Ω resistor between pins 2 and 3. Refer to Figure 1.5.
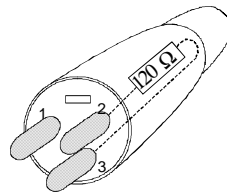
Figure 1.5 Terminator Construction

3. Reassemble the XLR connector.

Fixture Mounting

Studio Spot may be mounted on the upright on a floor or at any angle on a truss. Complete the instructions in the following subsections to mount the fixture properly.

WARNING: keep flammable materials at least 1 M away from fixture. Do not light objects closer than 1 M.

Floor Mounting

To mount a fixture on the floor, ensure that the rubber feet are installed on the base of the fixture and place it upright on a flat surface. Refer to Figure 1.6.
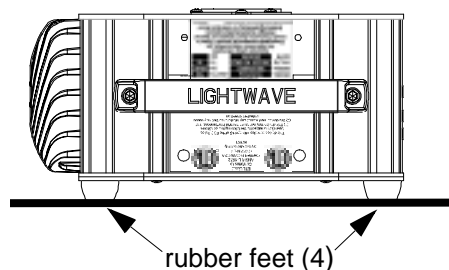
Figure 1.6 Floor Installation

Caution: do not mount a fixture on the floor without the rubber feet installed.

Truss Mounting

Studio Spot can be mounted in any orientation on 22-inch centers. To mount the fixture on a truss, you will need the following equipment:

- (2) safety cables
- (2) Cheeseborough clamps (recommended) or other mounting hardware

Complete the following procedure to mount the fixture to a truss:

1. Lay the fixture on its side and attach the mounting hardware the center holes on the base. Refer to Figure 1.7.

center holes
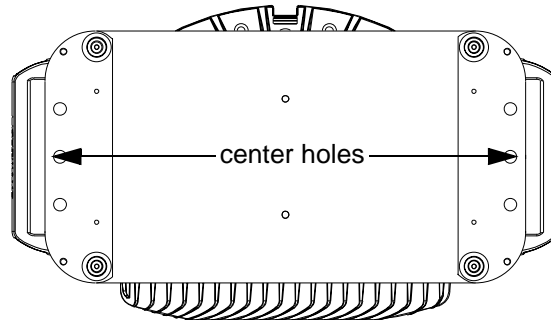
Figure 1.7 Attaching Mounting Hardware

2. Install the fixture on the truss and secure the mounting hardware.

3. Connect the safety cable ends by looping the cable over the truss, running it through an outer hole on the base of the fixture, around the handle, and out the other outer hole. Refer to Figure 1.8. Repeat this step to install another safety cable on the other side of the fixture.
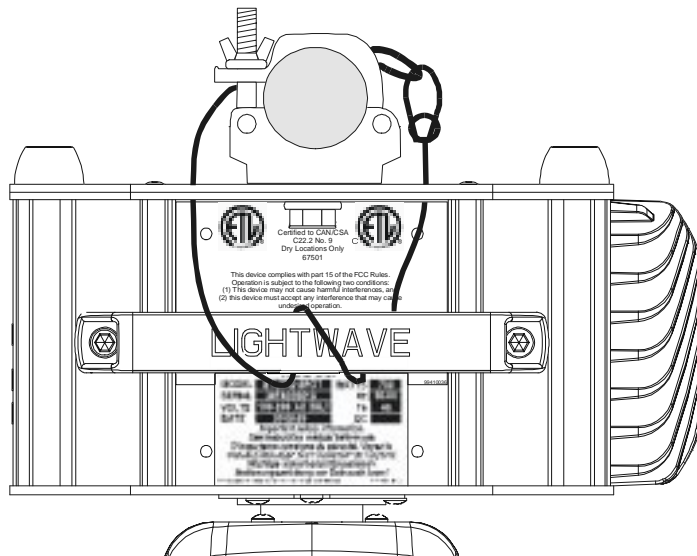
Figure 1.8 Safety Cable Installation

⚠ **Caution: do not place safety cables through the lower plate that connects to the fixture yoke. Doing so may cause interference with the fixture's pan movement.**

Data Cabling

You may connect up to 21 uniquely addressed fixtures per DMX link or up to 32 fixtures for synchronized playback of the internal presets. To connect the data cables, complete the following procedure:

1. Connect the data cable from the controller to the DATA IN connector located on the side of the first fixture. Refer to Figure 1.9.
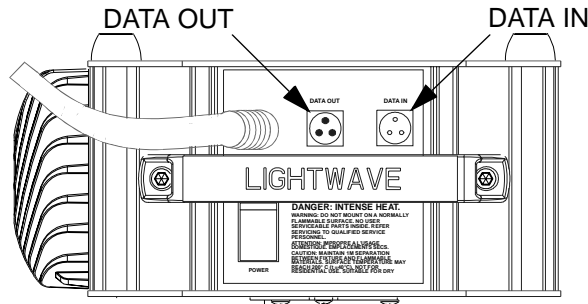
DATA OUT   DATA IN

Figure 1.9 Data In and Data Out Connectors

Note: *if you are cabling for synchronized preset playback, do not connect a controller unless you intend to capture DMX data.*

2. Daisy chain additional fixtures by connecting cables from the DATA OUT connector to the DATA IN connectors on subsequent fixtures. Refer to Figure 1.10.
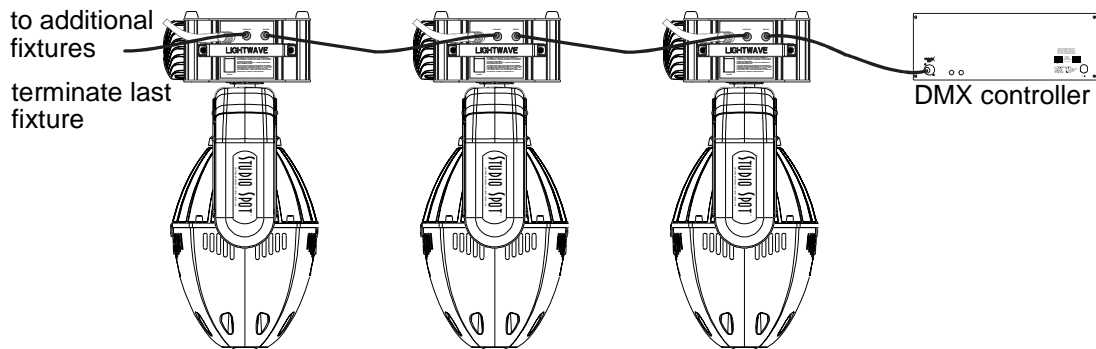
Figure 1.10 Daisy Chaining Fixtures

3. Install a terminator in the DATA OUT connector of the last fixture on each DMX link.

Caution: failure to terminate the last fixture on each link can result in erratic operation.

Note: *if you are not using a controller to capture data for synchronized playback, it is recommended that you install terminators on the first fixture's DATA IN connector and the last fixture's DATA OUT connector.*

Powering On the Fixture

To power on the fixture, complete the following procedure:

1. Connect AC mains (power) to the fixture.

2. Turn on the breaker located next to the line cord on the side of the fixture. Refer to Figure 1.9. The fixture will home.

Notes: *if any error messages are present on the display, refer to Troubleshooting in Appendix A. If the fixture was left in preset playback mode, indicated by cycling* ⌐⌐⌐⌐ *on the display and a dot in the lower right of the display, the fixture will begin playback of the preset scenes.*

Tip: t*o skip the homing process, simultaneously hold down the <MENU> and <ENTER> buttons immediately after applying power to the fixture.*

Setting the Fixture Address

Use the following subsections to set the fixture address. Fixtures may be addressed by fixture number (1-21) or by DMX starting channel number (1-489). Either way, each fixture uses 24 DMX channels.

Fixture Number Mode

To address Studio Spot by fixture number, complete the following procedure:

1. Apply power to the fixture.

2. Observe the display on the front of the fixture. Initially, it will display 5⌐⌐⌐ , the software version (*V* xxx), and then the fixture number (⌐ ⌐⌐). Refer to Figure 1.11.
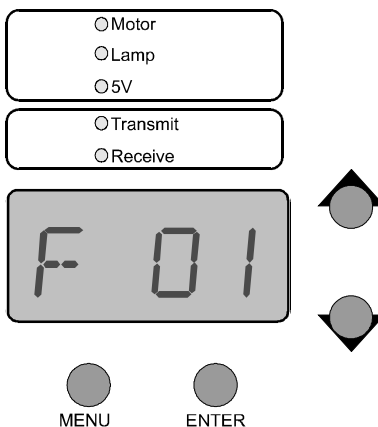
Figure 1.11 Using the Front Panel

3. Press and hold <MENU> until the display changes to ⌐⌐⌐⌐ . Press <ENTER> to manipulate the address field.

`F  01` `F  21`

4. Using the up and down keys, set the fixture number from `F  01` to `F  21`. The display will flash when it is moved from the stored value.

5. Press <ENTER> to store the fixture number. The display will stop flashing.

Note: *if <ENTER> is not pressed, the unit will not store the fixture number.*

6. Press <MENU> to exit the menu.

DMX Starting Channel Mode

To address Studio Spot by DMX starting channel, complete the following procedure:

`AddR`

1. Press and hold <MENU> until the display changes to `AddR`.

`SET`

2. Using the up and down keys, scroll to the `SET` field and press <ENTER>.

`CHNL`

3. Using the up and down keys, scroll to the `CHNL` field and press <ENTER>.

`dMX`

4. Using the up and down keys, scroll to the `dMX` field and press <ENTER>. Press <MENU> twice to back out to the `AddR` (address) field.

5. Press <ENTER> to address the fixture.

`C001` `C489`

6. Using the up and down keys, set a starting channel from `C001` to `C489`. Refer to Table 1.2 for assistance. The display will flash when it is moved from the stored value.

Table 1.2: DMX Starting Channels

Fixture #	DMX Starting Channel	Fixture #	DMX Starting Channel	Fixture #	DMX Starting Channel
1	1	8	169	15	337
2	25	9	193	16	361
3	49	10	217	17	385
4	73	11	241	18	409
5	97	12	265	19	433
6	121	13	289	20	457
7	145	14	313	21	481

Caution: if an incorrect address is given, channels could overlap and produce erratic results.

7. Press <ENTER> to store the desired starting channel. The display will stop flashing.

Note: *if <ENTER> is not pressed, the unit will not store the starting channel.*

8. Press and hold <MENU> to exit the menu.

Controlling Studio Spot With DMX

Studio Spot may be controlled by 8- or 16-bit DMX controllers. Chapter 2 discusses Studio Spot operation with its protocol in detail. Use the Table 1.3 to control Studio Spot via DMX.

Note: *Studio Spot's protocol, software, and documentation are subject to change. Visit the High End Systems web site at http://www.studiospot.com for the latest updates.*

Installation and Setup

Table 1.3: Studio Spot Protocol Version 6

DMX	Function	Description	Decimal	Fader Percent	Hex
1	Pan MSB	Coarse Positioning (8-bit controllers use only high byte)	0-255	0-100	0-FF
2	Pan LSB	Fine Positioning	0-255	0-100	0-FF
3	Tilt MSB	Coarse Positioning (8-bit controllers use only high byte)	0-255	0-100	0-FF
4	Tilt LSB	Fine Positioning	0-255	0-100	0-FF
5	Color Wheel 1	Function			
		Full Speeds			
		Indexed	0-31	0-12	0-1F
		Forward spin	32-47	13-18	2D-2F
		Reverse spin	48-63	16-24	30-3F
		Continuous	64-79	25-30	40-4F
		Fast scan	80-87	31-33	50-57
		Slow scan	88-95	34-37	58-5F
		Random	96-111	37-43	60-6F
		Blink-indexed	112-127	44-49	70-7F
		MSpeed Controlled			
		Indexed	128-159	50-62	80-9F
		Forward spin	160-175	63-68	A0-AF
		Reverse spin	176-191	69-74	B0-BF
		Continuous	192-207	75-80	C0-CF
		Fast scan	208-215	81-83	D0-D7
		Slow scan	216-223	84-87	D8-DF
		Random	224-239	88-93	E0-EF
		Blink-indexed	240-255	94-100	F0-FF

Table 1.3: Studio Spot Protocol Version 6 (Continued)

DMX	Function	Description	Decimal	Fader Percent	Hex
6	Color Wheel 1	Position			
		Indexed Mode			
		Color 1	0-19	0-7	0-13
		Color 1 and 2	20-39	8-15	14-27
		Color 2	40-59	16-23	28-3B
		Color 2 and 3	60-78	24-30	3C-4E
		Color 3	79-98	31-38	4F-62
		Color 3 and 4	99-118	39-46	63-76
		Color 4	119-137	47-53	77-89
		Color 4 and 5	138-157	54-61	8A-9D
		Color 5	158-177	62-69	9E-B1
		Color 5 and 6	178-196	70-76	B2-C4
		Color 6	197-216	77-84	C5-D8
		Color 6 and 1	217-236	85-92	D9-EC
		Color 1	237-255	93-100	ED-FF
		Continuously Variable Mode			
		Color 1	0	0	0
		Color 2	43	16	2B
		Color 3	85	33	55
		Color 4	128	50	80
		Color 5	170	66	AA
		Color 6	213	83	D5
		Color 1	255	100	FF
		Continuously Variable Forward Spin Mode			
		Spin stop	0-3	0-1	0-3
		Spin forward slowest	4	2	4
		Spin forward fastest	255	100	FF
		Continuously Variable Reverse Spin Mode			
		Spin stop	0-3	0-1	0-3
		Spin reverse slowest	4	2	4
		Spin reverse fastest	255	100	FF
		Random Mode			
		Random stop	0-3	0-1	0-3
		Random slowest	4	2	4
		Random fastest	255	100	FF

Table 1.3: Studio Spot Protocol Version 6 (Continued)

DMX	Function	Description	Decimal	Fader Percent	Hex
6 cont.	Color 1 Wheel Position	*Combined Continuous Mode*			
		Color 1	0	0	0
		Color 2	8	3	8
		Color 3	15	5	0F
		Color 4	22	8	16
		Color 5	29	11	1D
		Color 6	36	14	24
		Color 7	43	16	2B
		Color 8	50	19	32
		Color 9	57	22	39
		Color 10	64	25	40
		Color 11	72	28	48
		Color 12	79	30	4F
		Color 13	86	33	56
		Color 14	93	36	5D
		Color 15	100	39	64
		Color 16	107	41	6B
		Color 17	114	44	72
		Color 18	121	47	79
		Color 19	128	50	80
		Color 20	136	53	88
		Color 21	143	55	8F
		Color 22	150	58	96
		Color 23	157	61	9D
		Color 24	164	64	A4
		Color 25	171	66	AB
		Color 26	178	69	B2
		Color 27	185	72	B9
		Color 28	193	75	C1
		Color 29	200	78	C8
		Color 30	207	80	CF
		Color 31	214	83	D3
		Color 32	221	86	DA
		Color 33	228	89	E4
		Color 34	235	91	EB
		Color 35	242	94	F2
		Color 36	249	97	F9

Table 1.3: Studio Spot Protocol Version 6 (Continued)

DMX	Function	Description	Decimal	Fader Percent	Hex
6 cont.	Color Wheel 1 Position	*Combined Mode*			
		Color 1	0-6	0-2	0-6
		Color 2	7-13	3-5	7-0D
		Color 3	14-20	6-7	0E-14
		Color 4	21-27	8-10	15-1B
		Color 5	28-34	11-13	1C-22
		Color 6	35-41	14-16	23-29
		Color 7	42-47	17-18	2A-2F
		Color 8	48-54	19-21	30-36
		Color 9	55-61	22-23	37-3D
		Color 10	62-68	24-26	3E-44
		Color 11	69-75	27-29	45-4B
		Color 12	76-82	30-32	4C-52
		Color 13	83-89	33-34	53-59
		Color 14	90-96	35-37	5A-60
		Color 15	97-103	38-40	61-67
		Color 16	104-110	41-42	68-6E
		Color 17	111-117	43-45	6F-75
		Color 18	118-124	46-48	76-7C
		Color 19	125-130	49-50	7D-82
		Color 20	131-137	51-53	83-89
		Color 21	138-144	54-56	8A-90
		Color 22	145-151	57-58	91-97
		Color 23	152-158	59-61	98-9E
		Color 24	159-165	61-64	9F-A5
		Color 25	166-172	65-67	A6-AC
		Color 26	173-179	68-69	AD-B3
		Color 27	180-186	70-72	B4-BA
		Color 28	187-193	73-75	BB-C1
		Color 29	194-200	76-78	C2-C8
		Color 30	201-207	79-80	C9-CF
		Color 31	208-213	81-83	D0-D2
		Color 32	214-220	84-85	D3-D9
		Color 33	221-227	86-88	DA-E3
		Color 34	228-234	89-91	E4-EA
		Color 35	235-241	92-94	EB-F1
		Color 36	242-248	95-96	F2-F8
		Color 1	249-255	97-100	F9-FF

Installation and Setup

Table 1.3: Studio Spot Protocol Version 6 (Continued)

DMX	Function	Description	Decimal	Fader Percent	Hex
7	Color Wheel 2 Function	*Full Speeds*			
		Combined Operation	0-15	0-5	0-F
		Indexed	16-31	6-12	10-1F
		Forward spin	32-47	13-18	20-2F
		Reverse spin	48-63	16-24	30-3F
		Continuous	64-79	25-30	40-4F
		Fast scan	80-87	31-33	50-57
		Slow scan	88-95	34-37	58-5F
		Random	96-111	37-43	60-6F
		Blink (indexed)	112-127	44-49	70-7F
		MSpeed Controlled			
		Indexed	128-159	50-62	80-9F
		Forward spin	160-175	63-68	A0-AF
		Reverse spin	176-191	69-74	B0-BF
		Continuous	192-207	75-80	C0-CF
		Fast scan	208-215	81-83	D0-D7
		Slow scan	216-223	84-87	D8-DF
		Random	224-239	88-93	E0-EF
		Blink (indexed)	240-255	94-100	F0-FF

Table 1.3: Studio Spot Protocol Version 6 (Continued)

DMX	Function	Description	Decimal	Fader Percent	Hex
8	Color Wheel 2 Position	*Indexed Modes*			
		Color 1	0-19	0-7	0-13
		Color 1/2	20-39	8-15	14-27
		Color 2	40-59	16-23	28-3B
		Color 2/3	60-78	24-30	3C-4E
		Color 3	79-98	31-38	4F-62
		Color 3/4	99-118	39-46	63-76
		Color 4	119-137	47-53	77-89
		Color 4/5	138-157	54-61	8A-9D
		Color 5	158-177	62-69	9E-B1
		Color 5/6	178-196	70-76	B2-C4
		Color 6	197-216	77-84	C5-D8
		Color 6/1	217-236	85-92	D9-EC
		Color 1	237-255	93-100	ED-FF
		Continuously Variable Mode			
		Color 1	0	0	0
		Color 2	43	16	2B
		Color 3	85	33	55
		Color 4	128	50	80
		Color 5	170	66	AA
		Color 6	213	83	D5
		Color 1	255	100	FF
		Continuously Variable Forward Spin Mode			
		Spin stop	0-3	0-1	0-3
		Spin forward slowest	4	2	4
		Spin forward fastest	255	100	FF
		Continuously Variable Reverse Spin Mode			
		Spin stop	0-3	0-1	0-3
		Spin reverse slowest	4	2	4
		Spin reverse fastest	255	100	FF
		Random Mode			
		Random stop	0-3	0-1	0-3
		Random slowest	4	2	4
		Random fastest	255	100	FF

Table 1.3: Studio Spot Protocol Version 6 (Continued)

DMX	Function	Description	Decimal	Fader Percent	Hex
9	Litho Wheel 1 Function	*Full Speed*			
		Indexed	0-15	0-5	0-0F
		Forward rotate	16-31	6-12	10-1F
		Reverse rotate	32-47	13-18	20-2F
		Wheel spin	48-63	19-24	30-3F
		Scan	64-79	25-30	40-4F
		Random	80-95	31-37	50-5F
		Blink wheel (indexed)	96-111	38-42	60-6F
		Blink aperture (indexed)	112-127	43-49	70-7F
		MSpeed Controlled			
		Indexed	128-143	50-55	80-8F
		Forward rotate	144-159	56-62	90-9F
		Reverse rotate	160-175	63-68	A0-AF
		Wheel spin	176-191	69-74	B0-BF
		Scan	192-207	75-80	C0-CF
		Random	208-223	81-87	D0-DF
		Blink wheel (indexed)	224-239	88-93	E0-EF
		Blink aperture (indexed)	240-255	94-100	F0-FF
10	Litho Wheel 1 Position	Position 0	0-36	0-14	0-24
		Position 1	37-73	15-28	25-49
		Position 2	74-109	29-42	4A-6D
		Position 3	110-146	43-57	6E-92
		Position 4	147-182	58-71	93-B6
		Position 5	183-219	72-85	B7-D8
		Position 0	220-255	86-100	D9-FF

Table 1.3: Studio Spot Protocol Version 6 (Continued)

DMX	Function	Description	Decimal	Fader Percent	Hex
11	Litho Wheel 1 Rotation High Byte	*Indexed Mode*	0-255	0-100	0-FF
		Variable Forward Rotate Mode			
		Rotate stop	0-3	0-1	0-3
		Rotate forward slowest	4	2	4
		Rotate forward fastest	225	100	FF
		Variable Reverse Rotate Mode			
		Rotate stop	0-3	0-1	0-3
		Rotate reverse slowest	4	2	4
		Rotate reverse fastest	225	100	FF
		Continuously Variable Wheel Spin Mode			
		Fastest forward spin	0	0	0
		Slowest forward spin	127	49	7F
		Slowest reverse spin	128	50	80
		Fastest reverse spin	255	100	FF
		Scan Mode			
		Scan slowest	0	0	0
		Scan fastest	255	100	FF
		Random Mode			
		Random stop	0-3	0-1	0-3
		Random slowest	4	2	4
		Random fastest	255	100	FF
12	Litho Wheel 1 Rotation Low Byte	*Indexed Mode*	0-255	0-100	0-FF

Installation and
Setup

Table 1.3: Studio Spot Protocol Version 6 (Continued)

DMX	Function	Description	Decimal	Fader Percent	Hex
13	Litho Wheel 2 Function	*Full Speed*			
		Indexed	0-15	0-5	0-0F
		Forward rotate	16-31	6-12	10-1F
		Reverse rotate	32-47	13-18	20-2F
		Wheel spin	48-63	19-24	30-3F
		Scan	64-79	25-30	40-4F
		Random	80-95	31-37	50-5F
		Blink wheel (indexed)	96-111	38-42	60-6F
		Blink aperture (indexed)	112-127	43-49	70-7F
		MSpeed Controlled			
		Indexed	128-143	50-55	80-8F
		Forward rotate	144-159	56-62	90-9F
		Reverse rotate	160-175	63-68	A0-AF
		Wheel spin	176-191	69-74	B0-BF
		Scan	192-207	75-80	C0-CF
		Random	208-223	81-87	D0-DF
		Blink wheel (indexed)	224-239	88-93	E0-EF
		Blink aperture (indexed)	240-255	94-100	F0-FF
14	Litho Wheel 2 Position	Position 0	0-36	0-14	0-24
		Position 1	37-73	15-28	25-49
		Position 2	74-109	29-42	4A-6D
		Position 3	110-146	43-57	6E-92
		Position 4	147-182	58-71	93-B6
		Position 5	183-219	72-85	B7-D8
		Position 0	220-255	86-100	D9-FF

Table 1.3: Studio Spot Protocol Version 6 (Continued)

DMX	Function	Description	Decimal	Fader Percent	Hex
15	Litho wheel 2 rotation high byte	*Indexed Mode*	0-255	0-100	0-FF
		Variable Forward Rotate Mode			
		Rotate stop	0-3	0-1	0-3
		Rotate forward slowest	4	2	4
		Rotate forward fastest	255	100	FF
		Variable Reverse Rotate Mode			
		Rotate stop	0-3	0-1	0-3
		Rotate reverse slowest	4	2	4
		Rotate reverse fastest	255	100	FF
		Continuously Variable Wheel Spin Mode			
		Fastest forward spin	0	0	0
		Slowest forward spin	127	49	7F
		Slowest reverse spin	128	50	80
		Fastest reverse spin	255	100	FF
		Scan Mode			
		Scan slowest	0	0	0
		Scan fastest	255	100	FF
		Random Mode			
		Random stop	0-3	0-1	0-3
		Random slowest	4	2	4
		Random fastest	255	100	FF
16	Litho Wheel 2 Rotation Low Byte	*Indexed Mode*	0-255	0-100	0-FF
17	Frost	No frost	0	0	0
		Variable frost	1-127	1-49	1-7F
		Full frost	128-143	50-55	80-8F
		Periodic frost strobes	144-159	56-62	90-9F
		Random frost strobes	160-175	63-68	A0-AF
		Ramp open/ snap shut	176-191	69-74	B0-BF
		Snap open/ ramp shut	192-207	75-80	C0-CF
		Random ramp/ snap	208-223	81-87	D0-DF
		Random snap/ ramp	224-239	88-93	E0-EF
		Open	240-255	94-100	F0-FF

Table 1.3: Studio Spot Protocol Version 6 (Continued)

DMX	Function	Description	Decimal	Fader Percent	Hex
23	Factory Macros	No macro	0-7	0-2	0-7
		Macro 1	8-15	3-5	8-0F
		Macro 2	16-23	6-9	10-17
		Macro 3	24-31	10-12	18-1F
		Macro 4	32-39	13-15	20-27
		Macro 5	40-47	16-18	28-2F
		Macro 6	48-55	19-21	30-37
		Macro 7	56-63	22-24	38-3F
		Macro 8	64-71	25-27	40-47
		Macro 9	72-79	28-30	48-4F
		Macro 10	80-87	31-34	50-57
		Macro 11	88-95	35-37	58-5F
		Macro 12	96-103	38-40	60-67
		Macro 13	104-111	41-43	68-6F
		Macro 14	112-119	44-46	70-77
		Macro 15	120-127	47-49	78-7F
		Macro 16	128-135	50-52	80-87
		Macro 17	136-143	53-55	88-8F
		Macro 18	144-151	56-59	90-97
		Macro 19	152-159	60-62	98-9F
		Macro 20	160-167	63-65	A0-A7
		Macro 21	168-175	66-68	A8-AF
		Macro 22	176-183	69-71	B0-B7
		Macro 23	184-191	72-74	B8-BF
		Macro 24	192-199	75-77	C0-C7
		Macro 25	200-207	78-80	C8-CF
		Macro 26	208-215	81-84	DD-D4
		Variable speed random macros	216-247	85-96	D5-F7
		No macro	248-255	97-100	F8-FF
24	Control[1]	Safe	0-9	0-3	0-9
		Disable MSpeed for pan and tilt	10-19	4-7	0A-13
		Display off	20-28	8-11	14-1C
		Display dim	30-38	12-14	1E-26
		Display bright	40-48	15-18	28-30
		Home	60-68	23-26	3C-44
		Lamp on	80-88	31-34	50-58
		Lamp off	90-98	35-38	5A-62
		Shutdown	120-130	46-50	78-82
		Reserved	131-255	51-100	83-FF

[1] Note: the shutter must be closed to access control channel.

Table 1.3: Studio Spot Protocol Version 6 (Continued)

DMX	Function	Description	Decimal	Fader Percent	Hex
18	Focus	Focus image closer	0	0	0
		Focus image farther	256	100	FF
19	Iris	Closed	0	0	0
		Variable	1-127	1-49	1-7F
		Open	128-143	50-55	80-8F
		Periodic strobes	144-159	56-62	90-9F
		Random strobes	160-175	63-68	A0-AF
		Ramp open/ snap shut	176-191	69-74	B0-BE
		Snap open/ ramp shut	192-207	75-80	BF-CF
		Random ramp/ snap	208-223	81-87	DD-DC
		Random snap/ ramp	224-239	88-93	E0-EF
		Open	240-255	94-100	F0-FF
20	Shutter	Closed	0-31	0-12	0-1F
		Periodic strobes	32-63	13-24	20-3F
		Random strobes	64-95	25-37	40-5F
		Ramp open/ snap shut	96-127	38-49	60-7F
		Snap open/ ramp shut	128-159	50-62	80-9F
		Random ramp open/ snap shut	160-191	63-74	A0-BF
		Random snap open/ ramp shut	192-223	75-87	C0-DF
		Open	224-255	88-100	E0-FF
21	Dim	Closed	0	0	0
		Open	255	100	FF
22	MSpeed	Controller crossfade	0-3	0-1	0-3
		longest (252.7 sec.)	4	2	4
		shortest (0.15 sec.)	255	100	FF

Chapter 2
Operation

In this chapter you will use:

Pan and Tilt

Studio Spot has the capability of 370° pan and 255° tilt movement. DMX channels 1 and 3 provide coarse positioning of approximately 1°, while channels 2 and 4 provide fine positioning between the 1° steps.

The MSpeed construct provides 16-bit internal processing of pan and tilt movement to provide extremely smooth motion between programmed positions. By default, MSpeed is enabled on the pan and tilt systems. However, you can disable MSpeed on pan and tilt systems and allow your controller to crossfade the fixture. Refer to "Disabling MSpeed for Pan and Tilt" on page 2-11.

Optical encoders for the pan and tilt systems instantly correct positions if the fixture is jarred from its programmed position. The fixture will attempt to correct the position(s) numerous times before it times out. The time-out prevents wear on the motor and belt systems in the event of a physical obstruction. If a fixture times out, remove the obstruction and home the fixture to return it to operation.

Color Functions

Color functions determine how each color wheel moves. Each color function can run at *full speed* (eight functions) or *MSpeed* (eight functions).

Color functions are controlled by DMX channel 5 for color wheel 1 and channel 7 for color wheel 2. To simplify programming, you can use combined mode. In combined mode, set channel 7 to combined mode (0-15) and use channel 5 to assign the color function to both wheels simultaneously.

Refer to Table 2.1 for the available color functions and descriptions.

Table 2.1: Color Functions

Function	*Description*
Indexed	Allows the color wheel(s) to take the quickest path and snap to whole and half colors.
Forward spin	Allows variable speed forward spins.
Reverse spin	Allows variable speed reverse spins.
Continuous	Allows the wheel to rotate continually for one complete revolution (0-360°). Combined continuous mode rotates both wheels to allow all 36 positions to be reached.
Fast scan	Allows fast scans between whole and half colors.
Slow scan	Allows slow scans between whole and half colors.
Random	Allows variable speed random color selection.
Blink-indexed[1]	Allows the dim flags to quickly close during color change. The flags will instantly reopen when the next programmed position is reached.

[1] Long crossfade and MSpeed times could result in undesirable effects as there will be no light output.

Note: *combined mode will not allow colors to be combined with the aqua or indigo positions because they do not mix.*

Color Wheel Positioning

Color wheel positioning controls the movement of the colors wheels, thus allowing you to select the desired color. Color wheel positioning is controlled by DMX channel 6 for color wheel 1 and channel 8 for wheel 2 (unless combined mode is used). Refer to "Color Combinations" on page C-5 for a list of combined colors with the factory color wheels.

The factory color wheels contain the following dichroic colors:

Color Wheel 1

- Position 1- white (open)
- Position 2- yellow
- Position 3- full CTO (color temperature orange)
- Position 4- aqua
- Position 5- pink
- Position 6- magenta

Note: *color wheel 1 is physically located closest to the lamp.*

Color Wheel 2

- Position 1- white (open)
- Position 2- cyan
- Position 3- light cyan
- Position 4- indigo
- Position 5- pink
- Position 6- magenta

2
Operation

Litho Functions

Litho functions determine how each litho wheel moves. Each litho function can run at *full speed* (eight functions) or *MSpeed* (eight functions).

Litho functions are controlled by DMX channel 9 for litho wheel 1 and channel 13 for wheel 2.

Refer to Table 2.2 for the available litho functions and descriptions.

Table 2.2: Litho Functions

Function	*Description*
Indexed	Allows the litho wheel to be indexed (rotated) to the proper orientation.
Forward rotate	Allows variable forward rotation of the litho.
Reverse rotate	Allows variable reverse rotation of the litho.
Wheel spin	Allows variable forward and reverse rotation of the litho wheel.
Indexed scan	Allows variable speed scans between adjoining litho positions.
Random	Allows random litho selection at variable speeds.
Blink wheel[1]	Allows the shutter to quickly close during a litho change. The shutter will reopen when the wheel has reached its destination.
Blink aperture[1]	Allows the shutter to quickly close when a litho is indexed. The shutter will reopen when the litho has reached its destination.

[1] Long crossfade and MSpeed times could result in undesirable effects as there will be no light output.

Litho Wheel Positioning

Litho wheel positioning controls the aperture to aperture (indexed) movement for each litho wheel, thus allowing you to select the desired LithoPattern or effect. However, if a litho function is set for wheel spin or random, litho wheel positioning will not override these functions.

Litho wheel positioning is controlled with DMX channel 10 for litho wheel 1 and channel 14 for wheel 2.

The factory litho wheels contain the following patterns and effects:

Litho Wheel 1

- Position 1- open
- Position 2- Triwing
- Position 3- Lava
- Position 4- Hollywood Stars
- Position 5- Wavy Tunnel
- Position 6- Shatters

Litho Wheel 2

- Position 1- open
- Position 2- Lenticular effect glass
- Position 3- Slo effect glass
- Position 4- Building Blocks
- Position 5- Jax
- Position 6- Gatlin Gun

Notes: *litho wheel spin and random mode speeds are controlled by the litho rotation channel. Litho wheel 1 is located closest to the lamp.*

Litho Rotation

Litho rotation utilizes 16-bit resolution for precise positioning. Litho rotation moves the lithos and moves the wheel in wheel spin and random modes.

Litho rotation for wheel 1 is controlled by DMX channel 11 for coarse positioning (high byte) and channel 12 for fine positioning (low byte). Litho rotation for wheel 2 is controlled by DMX channel 15 for coarse positioning (high byte) and channel 16 for fine positioning (low byte).

Refer to Table 2.3 for the available rotation options and descriptions.

Note: *the litho rotation channels also control wheel spin, litho scan, and random litho functions.*

Table 2.3: Litho Rotation

Option	*Description*
Indexed	Indexes the litho from 0-360°.
Forward rotate	Stops or rotates the litho clockwise (projected view) at variable speeds.
Reverse rotate	Stops or rotates the litho counter-clockwise (projected view) at variable speeds.
Wheel spin	Stops or spins the litho wheel in either direction at variable speeds.
Scan	Scans between two lithos at variable speeds.
Random	Randomly switches between lithos at variable speeds.

Frost

Frost effects are achieved with two frost flags. The frost system provides infinite beam diffusion, variable and random frost strobing, and variable and random ramp/snap effects.

Frost is controlled by DMX channel 17. Refer to Table 2.4 for the available frost functions and descriptions.

Table 2.4: Frost Functions

Function	*Description*
No Frost	Removes the frost flags from the optical path.
Variable	Allows variable diffusion.
Full Frost	Allows variable full diffusion.
Periodic strobe	Allows variable strobing of the frost flags.
Random frost strobe	Allows random strobing of the frost flags.
Ramp open and snap shut	Allows the system to ramp open at variable speeds and snap shut at full speed.
Snap open and ramp shut	Allows the system snap open at full speed and ramp shut at variable speeds.
Random ramp open and snap shut	Allows the system to ramp open at random speeds and snap shut at full speed.
Random snap open and ramp shut	Allows the system to snap open at full speed and ramp shut random speeds.

Focus

The variable focus mechanism physically moves the lens assembly inside the bezel. This allows both litho wheels to be brought in or out of focus from 1 meter to infinity. Due to the short focal distance between litho wheels, patterns can be easily morphed. Additionally, combination patterns can be created by mixing patterns and/or effects. Focus is controlled by DMX channel 18.

Iris

The precision iris manipulates the beam diameter. Additionally, the iris offers strobing, random strobing, and ramp/snap effects.

The iris is controlled by DMX channel 19. Refer to Table 2.5 for iris functions and descriptions.

Table 2.5: Iris Functions

Function	*Description*
Variable	Allows variable beam diameter.
Variable strobe	Allows variable strobing of the beam diameter.
Random strobe	Allows random strobing of the beam diameter.
Ramp open and snap shut	Allows the system to ramp open at variable speeds and snap shut at full speed.
Snap open and ramp shut	Allows the system to snap open at full speed and ramp shut at variable speeds.
Random ramp open and snap shut	Allows the system to ramp open at random speeds and snap shut at full speed.
Random snap open and ramp shut	Allows the system to snap open at full speed and ramp shut at random speeds.

Strobing

Studio Spot utilizes the flags in the dimming system to produce instant blackout, variable and random speed strobes, and variable and random ramp/snap strobes. Additionally, Studio Spot can dim while strobing.

The strobe system is controlled by DMX channel 20. Refer to Table 2.6 for strobe functions and descriptions.

Table 2.6: Strobe Functions

Function	*Description*
Open	Opens the strobe system.
Closed	Allows instant blackout.
Variable	Allows variable speed strobing.
Random	Allows random speed strobing.
Ramp open and snap shut	Allows the system to ramp open at variable speeds and snap shut at full speed.
Snap open and ramp shut	Allows the system to snap open at full speed and ramp shut at variable speeds.
Random ramp open and snap shut	Allows the system to ramp open at random speeds and snap shut at full speed.
Random snap open and ramp shut	Allows the system to snap open at full speed and ramp shut at random speeds.

Dimming

Studio Spot has full dimming capability without changing the color temperature or the shape of the projection. This is accomplished with dimming flags that are positioned out of the focal length. Dimming is linearly scaled with 256 values to provide smooth and accurate motion. Dimming is controlled by DMX channel 21.

MSpeed

MSpeed (movement speed) is a separate timing construct provided on all automated Lightwave Research fixtures. MSpeed is the amount of time required to complete movement(s) from one position to another. All fixtures that have the same MSpeed value reach their destination at the same time, regardless of the distance traveled. By allowing the fixture to control its own movements, the motion will be extremely smooth, as it is not dependent on DMX refresh rates.

Typically, MSpeed applies to pan and tilt positioning; however, it can be selectively applied to color selection, litho selection, and litho rotation.

It is important to understand that MSpeed is not linearly scaled, it is exponentially scaled. Refer to Figure 2.1.
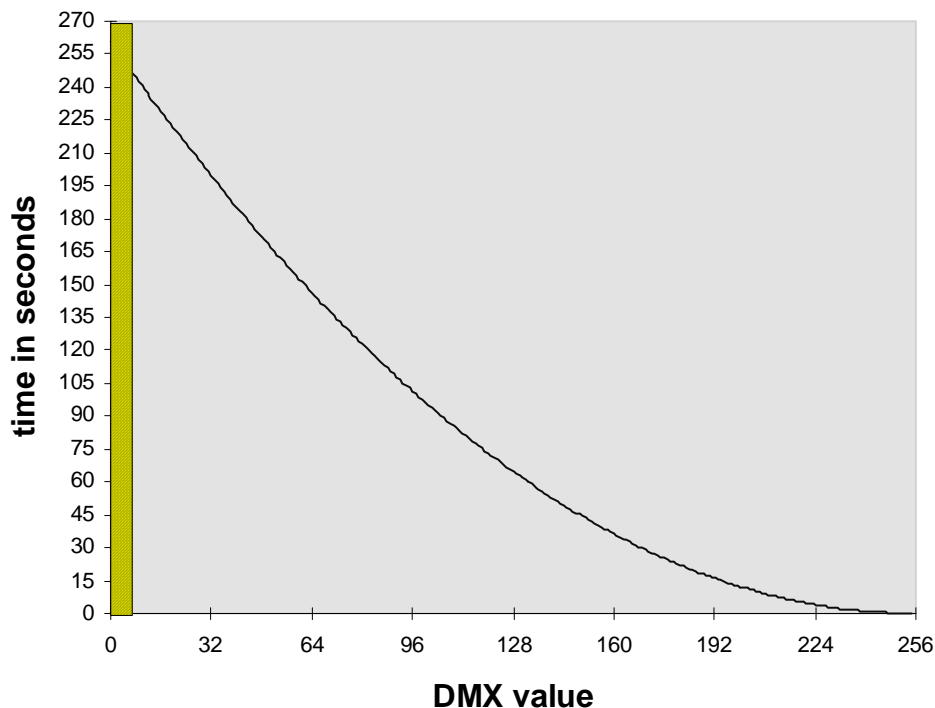
Figure 2.1. MSpeed Values

Notes: *the darker region in the above figure indicates DMX values 0-3 which disable MSpeed and allow the controller to crossfade the fixture. MSpeed times for Studio Spot and Studio Color are identical.*

To determine exact MSpeed times, refer to "Converting DMX Values to MSpeed Times" on page C-1.

Additionally, MSpeed can be independently disabled on the pan and tilt systems to allow controller crossfading. Refer to "Disabling MSpeed for Pan and Tilt" on page 2-11.

Factory Macros

Complicated looks can be quickly programmed by using one of the 26 factory-programmed macros. Additionally, sequences can be created using the variable speed random macro which randomly plays all 26 macros. Each macro modifies a specific set of constructs to produce a unique look, while allowing you to retain control of all other constructs. For a list of the macro functions, refer to "Determining Macro Functions" on page C-7.

When a macro is in use, you will be unable to manipulate the constructs it controls. For example, if you turn on Macro x and it sets Litho wheel 1 to position 5 and rotates it forward at 20 r.p.m., you will be unable to change the litho position, rotational direction (function), and rotational speed.

Macros are controlled by DMX channel 23.

Control Channel

The control channel allows you to access and control special fixture functions. Use the following subsections to operate the control channel parameters.

Disabling MSpeed for Pan and Tilt

MSpeed for pan and tilt can be independently disabled to allow the controller to crossfade fixture positions. When MSpeed is disabled for pan and tilt, you can selectively use MSpeed for litho and color wheels movements.

To disable MSpeed for pan and tilt, set DMX channel 24 (Control) to a value from 10 -19. The controller will now crossfade the pan and tilt systems.

Note: *disabling MSpeed does not require the shutter to be closed. However, you must close the shutter to operate all other control channel parameters.*

Remote Display Adjustment

You can remotely adjust the intensity of the display via DMX.

To set the display's intensity, complete the following procedure:

1. Set DMX channel 20 (Shutter) to a value of 0 on the appropriate fixture(s). This will unlock the channel 24 (Control channel).

2. Set DMX channel 24 (Control) to the desired value for at least one second:

   - Off: 20-28
   - Dim: 30-38
   - Bright: 40-48

3. Set DMX channel 20 to a value other than 0.

4. Set DMX channel 24 to 0 (safe).

Note: *to manually adjust the display intensity (using the front panel), refer to "Setting Display Intensity" on page 3-25.*

Remote Homing

Homing is the process of recalibrating the fixture's mechanical positions. This ensures that fixtures attain the correct positions from DMX data.

To remotely home a fixture, complete the following procedure:

1. Set DMX channel 20 (Shutter) to a value of 0 on the appropriate fixture(s). This will unlock the channel 24 (Control channel).

2. Set DMX Channel 24 (Control) to 60-68 for at approximately one second. The display will indicate RST (reset), strike the lamp if it is off, and the display will indicate $HOME$ while all motor systems reset. After the fixture has homed, it will return to its programmed position.

3. Set DMX channel 20 to any value other than 0.

4. Set DMX channel 24 to 0 (safe).

Note: *to manually home the fixture (using the front panel), refer to "Homing the Fixture" on page 3-21.*

Remote Lamp Control

You can restrike and extinguish the lamp via DMX. The lamp can be turned off at any time. However, if the fixture has been in operation, you must allow the lamp to cool for approximately 5 minutes before it can restrike.

To restrike or extinguish the lamp, complete the following procedure:

1. Set DMX channel 20 (Shutter) to a value of 0 on the appropriate fixture(s). This will unlock the channel 24 (Control channel).

2. Set DMX Channel 24 (Control) to 80-88 to restrike the lamp or at 90-98 to extinguish the lamp for at least 3 seconds. The fixture(s) will respond accordingly.

3. Set DMX channel 20 to any value other than 0.

4. Set DMX channel 24 to 0 (safe).

Note: *to manually use the lamp functions (from the front panel), refer to "Turning the Lamp On and Off" on page 3-21.*

Remote Shutdown

Studio Spot can be remotely shutdown via DMX. When a fixture is shutdown, the lamp is extinguished, power to the motor systems is removed, and the front panel display and indicators are turned off. Fixture shutdown allows you to remotely deactivate a fixture or a range of fixtures without manually turning off each breaker. Once a fixture is shutdown, you must home it to bring it back into operation.

To shutdown a fixture, complete the following procedure:

1. Set DMX Channel 20 (Shutter) to a value of 0 on the appropriate fixture(s). This will unlock the Channel 24 (Control channel).

2. Set DMX Channel 24 (Control) to a value of 120-130 (50%) on the appropriate fixture(s). The value must be sent for approximately 3 seconds before the fixture(s) will shutdown.

3. Set DMX channel 20 to any value other than 0.

4. Set DMX channel 24 to 0 (safe).

Chapter 3
Menu System

In this chapter you will use the:

❑ *menu map (3-2)*
❑ *address menu (3-14)*
❑ *information menu (3-14)*
❑ *test menu (3-22)*
❑ *mode menu (3-23)*
❑ *set menu (3-24)*

Overview

Studio Spot's menu system on the front panel offers a vast number of features from basic addressing to viewing DMX data. The display is composed of four 15-segment light emitting diodes (L.E.D.s). Four keys allow you to manipulate the display. Refer to Figure 3.1.
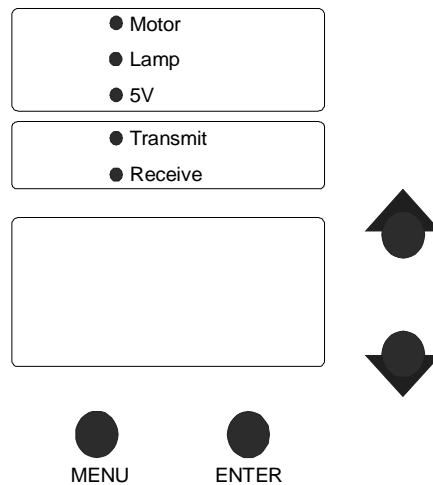
Figure 3.1. Menu System

Use the keys on the front panel to perform the following functions:

● <MENU> button. This button unlocks the menu system and backs out of the current field.

● <ENTER> button. This button enters the current field and stores data.

● Down button. This button scrolls downward through data fields and values.

● Up button. This button scrolls upward through data fields and values.

Menu Navigation

Use the following table to navigate through and understand the menu fields.

Table 3.1: Menu Map

Level 1	Level 2	Level 3	Level 4	Level 5	Description
AddR					address main menu
	F 01-F 21 or C001-C512				sets fixture address by fixture number or DMX start channel
INFO					information main menu
INFO	LAMP				lamp status
INFO	L/HR				lamp hours and minutes
INFO	L/ST				lamp strikes
INFO	VER				software version
INFO	L/RS				lamp reset menu
INFO	L/RS	REPR			resets lamp hours and strikes
INFO	F/HR				total hours and minutes the fixture has been on
INFO	F/RS				fixture reset menu
INFO	F/RS	REPR			resets fixture hours
INFO	TEMP				temperature menus (in degrees C)
INFO	TEMP	CURR			current internal temperature
INFO	TEMP	MINT			minimum internal temperature
INFO	TEMP	MAXT			maximum internal temperature
INFO	TEMP	RST			reset temperature
INFO	dMX				DMX value menu
INFO	dMX	FIXT			fixture menu
INFO	dMX	FIXT	ERRS		DMX errors
INFO	dMX	FIXT	CNTL		control channel value
INFO	dMX	FIXT	MACR		macro value
INFO	dMX	FIXT	MSPd		MSpeed value
INFO	dMX	FIXT	dIM		dim value

Level 1	Level 2	Level 3	Level 4	Level 5	Description
INFO	dMX	FIXT	SHUT		shutter value
INFO	dMX	FIXT	IRIS		iris value
INFO	dMX	FIXT	FCUS		focus value
INFO	dMX	FIXT	FRST		frost value
INFO	dMX	FIXT	LR2L		litho wheel 2 rotational value (low byte)
INFO	dMX	FIXT	LR2H		litho wheel 2 rotational value (high byte)
INFO	dMX	FIXT	LT2		litho wheel 2 aperture position value
INFO	dMX	FIXT	LTC2		litho wheel 2 control (function) channel value
INFO	dMX	FIXT	LRIL		litho wheel 1 rotational value (low byte)
INFO	dMX	FIXT	LRIH		litho wheel 1 rotational value (high byte)
INFO	dMX	FIXT	LTI		litho wheel 1 aperture position value
INFO	dMX	FIXT	LTCI		litho wheel 1 control (function) channel value
INFO	dMX	FIXT	CO2		color wheel 2 position value
INFO	dMX	FIXT	CO2C		color wheel 2 control (function) channel value
INFO	dMX	FIXT	COI		color wheel 1 position value
INFO	dMX	FIXT	COIC		color wheel 1 control (function) channel value
INFO	dMX	FIXT	TLTL		tilt value (low byte)
INFO	dMX	FIXT	TLTH		tilt value (high byte)
INFO	dMX	FIXT	PANL		pan value (low byte)
INFO	dMX	FIXT	PANH		pan value (high byte)
INFO	dMX	FIXT	STRT		start code
INFO	dMX	FIXT	OV		overrun errors
INFO	dMX	FIXT	FE		framing errors

Level 1	Level 2	Level 3	Level 4	Level 5	Description
INFO	dMX	FIXT	SRCE		indicates the data source values in the FIXT submenu
INFO	dMX	dATA			data menu
INFO	dMX	dATA	C001 - C512		views data on the selected DMX channel
INFO	SENS				sensor menu
INFO	SENS	PPOS			checks the pan position from the encoder
INFO	SENS	TPOS			checks the tilt position from the encoder
INFO	SENS	SENP			checks for pan homing tab on the sensor
INFO	SENS	SENT			checks for tilt homing tab on the sensor
INFO	SENS	COL			checks for color wheel homing tabs on the sensor (homed)
INFO	SENS	LT1			checks for litho wheel 1 homing tab on the sensor (homed)
INFO	SENS	LT2			checks for the litho wheel 2 homing tab on the sensor
INFO	SENS	SVCC			sensor power
TEST					test main menu
TEST	HOME				homes the fixture
TEST	S/UP				places the fixture in setup position for servicing (production homing)
TEST	SELF				self-test menu
TEST	SELF	ALL			runs each self-test twice and repeats until stopped
TEST	SELF	PAN			pan test
TEST	SELF	TILT			tilt test
TEST	SELF	CO1			color wheel 1 test
TEST	SELF	CO2			color wheel 2 test
TEST	SELF	LT1			litho wheel 1 test
TEST	SELF	LT2			litho wheel 2 test

Level 1	*Level 2*	*Level 3*	*Level 4*	*Level 5*	*Description*
TEST	SELF	FRST			frost test
TEST	SELF	FCUS			focus test
TEST	SELF	IRIS			iris test
TEST	SELF	SHUT			shutter test
TEST	SELF	dIM			dimmer test
TEST	dSPL				display test
TEST	bOOT				replaces the current boot code with the new one when the display indicates bOOT dIFF
TEST	LAMP				lamp menu
TEST	LAMP	LON			turns the lamp on
TEST	LAMP	LOFF			turns the lamp off
TEST	LAMP	STAT			lamp status
MOdE					mode main menu
MOdE	XLd				instigates fixture crossload
SET					set main menu
SET	FACT				returns fixture to factory defaults
SET	CHNL				channel addressing menu
SET	CHNL	AddR			addresses fixtures by fixture number mode (F01 -F 21)
SET	CHNL	dMX			addresses fixture by DMX starting channel mode (C001 - C512)
SET	dSPL				display menu
SET	dSPL	ON			turns the display on
SET	dSPL	OFF			turns the display off
SET	dSPL	dIM			dims the display
SET	d/IN				inverts the display (future)
SET	P/IN				inverts pan
SET	T/IN				inverts tilt
SET	SWAP				swaps pan and tilt

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Menu System

Level 1	Level 2	Level 3	Level 4	Level 5	Description
SET	S/dN				shutdown time menu
SET	S/dN	5 MN			sets shutdown for 5 minutes
SET	S/dN	10 MN			sets shutdown for 10 minutes
SET	PCAL				calibrates pan ±20 in .4° increments
SET	TCAL				calibrates tilt ±20 in .4° increments
PRST					preset main menu
PRST	PLAY				playback menu
PRST	PLAY	ON			starts playback
PRST	PLAY	OFF			stops playback
PRST	PLAY	SCN			displays which scene is playing
PRST	EdIT				editing menu
PRST	EdIT	SN01-SN16			scene 1 to scene 16 (submenus repeat for each scene)
PRST	EdIT	SN01-SN16	SHUT		shutter menu
PRST	EdIT	SN01-SN16	SHUT	CLSd	closed
PRST	EdIT	SN01-SN16	SHUT	OPEN	open
PRST	EdIT	SN01-SN16	SHUT	P 01 - P 32	periodic (variable) strobe slowest to fastest
PRST	EdIT	SN01-SN16	SHUT	R 01 - R 32	random strobe slowest to fastest
PRST	EdIT	SN01-SN16	SHUT	RS01 - RS32	ramp open and snap shut strobe slowest to fastest
PRST	EdIT	SN01-SN16	SHUT	SR01 - SR32	snap open and ramp shut strobe slowest to fastest
PRST	EdIT	SN01-SN16	SHUT	NR01 - NR32	random ramp open and snap shut strobe slowest to fastest
PRST	EdIT	SN01-SN16	SHUT	NS01 - NS32	random snap open and ramp shut strobe slowest to fastest
PRST	EdIT	SN01-SN16	dIM		dim menu

Level 1	Level 2	Level 3	Level 4	Level 5	Description
PRST	EdIT	SN01-SN16	dIM	d000-d255	no output to full output
PRST	EdIT	SN01-SN16	PAN		pan position menu
PRST	EdIT	SN01-SN16	PAN	-185 - +185	left to right positioning (when truss mounted)
PRST	EdIT	SN01-SN16	TILT		tilt position menu
PRST	EdIT	SN01-SN16	TILT	-112 - +112	down to up positioning (when truss mounted)
PRST	EdIT	SN01-SN16	COIC		color wheel 1 function
PRST	EdIT	SN01-SN16	COIC	IdX	index mode
PRST	EdIT	SN01-SN16	COIC	FSP	forward spin mode
PRST	EdIT	SN01-SN16	COIC	RSP	reverse spin mode
PRST	EdIT	SN01-SN16	COIC	CON	continuous mode
PRST	EdIT	SN01-SN16	COIC	FSC	fast scan mode
PRST	EdIT	SN01-SN16	COIC	SSC	slow scan mode
PRST	EdIT	SN01-SN16	COIC	RNd	random color mode
PRST	EdIT	SN01-SN16	COIC	bLK	indexed blink mode
PRST	EdIT	SN01-SN16	COIC	MIdX	index mode with MSpeed
PRST	EdIT	SN01-SN16	COIC	MFSP	forward spin mode with MSpeed
PRST	EdIT	SN01-SN16	COIC	MRSP	reverse spin mode with MSpeed
PRST	EdIT	SN01-SN16	COIC	MCON	continuous mode with MSpeed

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Menu System

Level 1	*Level 2*	*Level 3*	*Level 4*	*Level 5*	*Description*
PRST	EdIT	SN01-SN16	C01C	MFSC	fast scan mode with MSpeed
PRST	EdIT	SN01-SN16	C01C	MSSC	slow scan mode with MSpeed
PRST	EdIT	SN01-SN16	C01C	MRNd	random color mode with MSpeed
PRST	EdIT	SN01-SN16	C01C	MbLK	indexed blink mode with MSpeed
PRST	EdIT	SN01-SN16	C01		color wheel 1 position menu
PRST	EdIT	SN01-SN16	C01	• C1-C6/HC1-HC6 • F000-F255 • R000-R255 • d000-d358 • FC1-FC12 • MC1-MC12 • N000-N255 • b1-b6 and Hb1-Hb6 • C1-C36 • b1-b36	• colors 1 to 6 and half-colors 1 to 6 (indexed mode) • forward spin stop to fastest (forward spin mode) • reverse spin stop to fastest (reverse spin mode) • position in degrees (continuous mode) • position with half colors (fast scan mode) • position with half colors (scan set by MSpeed mode) • random colors slowest to fastest (random color mode) • color blink and half-color blink (indexed blink mode) • colors 1 to 36 (combined mode) (indexed mode) • colors 1 to 36 (combined mode) (indexed blink mode)
PRST	EdIT	SN01-SN16	C02C		color wheel 2 function
PRST	EdIT	SN01-SN16	C02C	CMbd	combined mode (refer to C01C for additional modes
PRST	EdIT	SN01-SN16	C02		color wheel 2 position (refer to C01 for positions)
PRST	EdIT	SN01-SN16	LTC1		litho wheel 1 function

Level 1	*Level 2*	*Level 3*	*Level 4*	*Level 5*	*Description*
PRST	EdIT	SN01-SN16	LTC1	IdX	indexed mode
PRST	EdIT	SN01-SN16	LTC1	FSP	forward litho rotate mode
PRST	EdIT	SN01-SN16	LTC1	RSP	reverse litho rotate mode
PRST	EdIT	SN01-SN16	LTC1	WSP	wheel spin mode
PRST	EdIT	SN01-SN16	LTC1	FSC	scan mode
PRST	EdIT	SN01-SN16	LTC1	RNd	random mode
PRST	EdIT	SN01-SN16	LTC1	bKW	blink wheel mode (during litho to litho change)
PRST	EdIT	SN01-SN16	LTC1	bKA	blink aperture mode (during index change)
PRST	EdIT	SN01-SN16	LTC1	MIdX	indexed mode with MSpeed
PRST	EdIT	SN01-SN16	LTC1	MFSP	forward litho rotate mode with MSpeed
PRST	EdIT	SN01-SN16	LTC1	MRSP	reverse litho rotate mode with MSpeed
PRST	EdIT	SN01-SN16	LTC1	MWSP	wheel spin mode with MSpeed
PRST	EdIT	SN01-SN16	LTC1	MFSC	fast scan mode with MSpeed
PRST	EdIT	SN01-SN16	LTC1	MRNd	random mode with MSpeed
PRST	EdIT	SN01-SN16	LTC1	MbKW	blink wheel mode (during litho to litho change) with MSpeed
PRST	EdIT	SN01-SN16	LTC1	MbKA	blink aperture mode (during index change) with MSpeed
PRST	EdIT	SN01-SN16	LT1		litho wheel 1 position

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Menu System

Table 3.1: Menu Map *(Continued)*

Level 1	*Level 2*	*Level 3*	*Level 4*	*Level 5*	*Description*
PRST	EdIT	SN01-SN16	LT1	• L1-L6 • LF1-LF6 • LR1-LR6 • SC1-SC8 • bW1-bW8 • bA1-bA8	• litho selection (indexed modes) • litho selection (forward rotate modes) • litho selection (reverse rotate modes) • litho selection (scan modes) • litho selection (blink wheel modes) • litho selection (blink aperture modes)
PRST	EdIT	SN01-SN16	LTR1		litho wheel 1 rotation
PRST	EdIT	SN01-SN16	LTR1	• d000-d358 • F000-F255 • R000-R255 • S000-S255 • N000-N255 • WF01-WF99/WR01-WR99	• litho position (indexed modes) • forward spin rotation speed stop to fastest (forward rotate modes) • reverse spin rotation speed stop to fastest (reverse rotate modes) • fast scan speed stop to fastest • random speed stop to fastest (random modes) • litho wheel spin speed forward slowest to fastest and litho wheel spin speed reverse slowest to fastest
PRST	EdIT	SN01-SN16	LTC2		litho wheel 2 function menu (refer to LTC1)
PRST	EdIT	SN01-SN16	LT2		litho wheel 2 position menu (refer to LT1)
PRST	EdIT	SN01-SN16	LTR2		litho wheel 2 rotation menu (refer to LTR2)
PRST	EdIT	SN01-SN16	FRST		frost menu
PRST	EdIT	SN01-SN16	FRST	OPEN	open (no frost)
PRST	EdIT	SN01-SN16	FRST	F001-F127	variable frost

Level 1	*Level 2*	*Level 3*	*Level 4*	*Level 5*	*Description*
PRST	EdIT	SN01-SN16	FRST	P1-P15	periodic (variable) strobe
PRST	EdIT	SN01-SN16	FRST	R1-R15	random strobe
PRST	EdIT	SN01-SN16	FRST	RS1-RS15	ramp open and snap shut strobe
PRST	EdIT	SN01-SN16	FRST	SR1-SR15	snap open and ramp shut strobe
PRST	EdIT	SN01-SN16	FRST	NR1-NR15	random ramp open and snap shut strobe
PRST	EdIT	SN01-SN16	FRST	NS1-NS15	random snap open and ramp shut strobe
PRST	EdIT	SN01-SN16	FCUS		focus menu
PRST	EdIT	SN01-SN16	FCUS	0-255	focusing
PRST	EdIT	SN01-SN16	IRIS		iris menu
PRST	EdIT	SN01-SN16	IRIS	OPEN	open
PRST	EdIT	SN01-SN16	IRIS	F001-F127	variable iris
PRST	EdIT	SN01-SN16	IRIS	P1-P15	periodic (variable) strobe
PRST	EdIT	SN01-SN16	IRIS	R1-R15	random strobe
PRST	EdIT	SN01-SN16	IRIS	RS1-RS15	ramp open and snap shut strobe
PRST	EdIT	SN01-SN16	IRIS	SR1-SR15	snap open and ramp shut strobe
PRST	EdIT	SN01-SN16	IRIS	NR1-NR15	random ramp open and snap shut strobe
PRST	EdIT	SN01-SN16	IRIS	NS1-NS15	random snap open and ramp shut strobe
PRST	EdIT	SN01-SN16	SHUT		shutter menu

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Table 3.1: Menu Map *(Continued)*

Level 1	*Level 2*	*Level 3*	*Level 4*	*Level 5*	*Description*
PRST	EdIT	SN01-SN16	SHUT	CLSd	closed
PRST	EdIT	SN01-SN16	SHUT	OPEN	open
PRST	EdIT	SN01-SN16	SHUT	P1 - P30	periodic strobe
PRST	EdIT	SN01-SN16	SHUT	N1-N30	random strobe
PRST	EdIT	SN01-SN16	SHUT	RS1-RS30	ramp open and snap shut strobe
PRST	EdIT	SN01-SN16	SHUT	SR1 - SR30	snap open and ramp shut strobe
PRST	EdIT	SN01-SN16	SHUT	NR1-NR30	random ramp open and snap shut strobe
PRST	EdIT	SN01-SN16	SHUT	NS1-NS30	random snap open and ramp shut strobe
PRST	EdIT	SN01-SN16	dIM		dim menu
PRST	EdIT	SN01-SN16	dIM	d000 - d255	dimming
PRST	EdIT	SN01-SN16	MSPd		MSpeed Menu
PRST	EdIT	SN01-SN16	MSPd	• FULL • dIS-0.15	• full speed • disable to fastest to slowest
PRST	EdIT	SN01-SN16	MACR		macro menu
PRST	EdIT	SN01-SN16	MACR	MR01 - MR26	macro 1 to macro 26
PRST	EdIT	SN01-SN16	XFAd		crossfade menu
PRST	EdIT	SN01-SN16	XFAd	• X0.1 - X9.9 • X10 - X166	• increments of 0.1 • increments of 1.0
PRST	EdIT	SN01-SN16	dLAY		delay menu

Level 1	Level 2	Level 3	Level 4	Level 5	Description
PRST	EdIT	SN01-SN16	dLAY	• X0.1-X9.9 • X10-X166	• increments of 0.1 • increments of 1.0
PRST	EdIT	SN01-SN16	TIME		time base menu
PRST	EdIT	SN01-SN16	TIME	SEC	sets time by seconds
PRST	EdIT	SN01-SN16	TIME	MIN	sets time by minutes
PRST	EdIT	SN01-SN16	TIME	HOUR	sets time by hour
PRST	EdIT	SN01-SN16	ZERO		zero scene (resets the scene to its null setting)
PRST	EdIT	SN01-SN16	ZERO	OK?	confirmation to reset scene
PRST	COPY				copy menu
PRST	COPY	FROM			From menu (source scene)
PRST	COPY	FROM	F 01-F 16		selects the scene to copy from
PRST	COPY	TO			To menu (destination scene)
PRST	COPY	TO	T 01-T 16		selects the scene to paste to
PRST	CAPT				capture menu
PRST	CAPT	SN01-SN16			sets the scene to capture DMX data to

Address Menu

Use the following subsection to use the $AddR$ menu.

Addressing the Fixture

Studio Spot can be addressed by fixture number or DMX starting channel. To change the way Studio Spot is addressed, refer to "Addressing By DMX Starting Channel or Fixture Number Mode" on page 3-24.

To address Studio Spot, complete the following procedure:

1. Observe the display. Initially, it will display $SPOT$, the software version ($Vxxx$), and then the fixture number ($F01 - F21$) or the DMX starting channel ($C001 - C489$).

$AddR$ 2. Press and hold <MENU> until the display changes to $AddR$.

3. Press <ENTER> to edit the $AddR$ field.

4. Using the up and down arrow buttons, set the desired fixture number or address. The display will flash when it is moved from the existing value.

5. Press <ENTER> to store the desired fixture number or DMX channel. The display will stop flashing.

Note: *if the* <ENTER> *key is not pressed, the fixture will not store the address.*

Information Menu

Use the following subsections to use the functions contained within the $INFO$ menu.

Viewing Lamp Status

To view the lamp status, complete the following procedure:

$AddR$ 1. Hold <MENU> until the display changes to $AddR$.

$INFO$ 2. Using the up and down buttons, scroll to the $INFO$ field and press <ENTER>. The display will indicate $LAMP$.

$LAMP$ 3. Press <ENTER> to view the lamp status. The fixture will display one of the following:

- ON - the lamp is on
- OFF - the lamp is off
- $STRK$ - the lamp is attempting to strike

Viewing Lamp Hours

To view the number of hours the lamp has spent on (ignited), complete the following procedure:

`AddR`

1. Hold <MENU> until the display changes to $AddR$.

`INFO`

2. Using the up and down buttons, scroll to the $INFO$ field and press <ENTER>.

`L/HR`

3. Using the up and down buttons, scroll to the L/HR field and press <ENTER> to view the lamp hours.

Note: *if the display indicates $OVER$, the counter has rolled over 9999 hours.*

Viewing Lamp Strikes

To view the number of times the ignitor has attempted to strike the lamp, complete the following procedure:

`AddR`

1. Hold <MENU> until the display changes to $AddR$.

`INFO`

2. Using the up and down buttons, scroll to the $INFO$ field and press <ENTER>.

`L/ST`

3. Using the up and down buttons, scroll to the L/ST field and press <ENTER>. The fixture will display the number of times the lamp has attempted to strike.

Notes: *lamp strikes are automatically reset when the lamp hours are reset. See "Resetting Lamp Hours" on page 3-16. If the display indicates $OVER$, the counter has rolled over 9999 lamp strikes and must be manually reset.*

Viewing System Version Number

To view the system version number (software revision level), complete the following procedure:

`AddR`

1. Hold <MENU> until the display changes to $AddR$.

`INFO`

2. Using the up and down buttons, scroll to the $INFO$ field and press <ENTER>.

`VER`

3. Using the up and down buttons, scroll to the VER field and press <ENTER>. The fixture will display the current system version.

Note: *the version number is also displayed after power on.*

Resetting Lamp Hours

To reset lamp hours and lamp strikes, complete the following procedure:

`AddR`

1. Hold <MENU> until the display changes to `AddR`.

`INFO`

2. Using the up and down buttons, scroll to the `INFO` field and press <ENTER>.

`L/RS`

3. Using the up and down buttons, scroll to the `L/RS` field and hold <ENTER> until the fixture resets the lamp hours to `0000`.

Viewing Fixture Hours

To view the time a fixture has spent turned on, complete the following procedure:

`AddR`

1. Hold <MENU> until the display changes to `AddR`.

`INFO`

2. Using the up and down buttons, scroll to the `INFO` field and press <ENTER>.

`F/HR`

3. Using the up and down buttons, scroll to the `F/HR` field and press <ENTER>. The fixture will display the total fixture hours.

Notes: *the display will indicate* `Hxxx` *for hours and* `M xx` *for minutes until* `H999`*. When fixture hours exceed 999, the display will no longer indicate minutes, instead it will use all four digits to display hours. If the display indicates* `OVER`*, the counter has rolled over 9999 hours and must be manually reset.*

Resetting Fixture Hours

To reset fixture hours, complete the following procedure:

`AddR`

1. Hold <MENU> until the display changes to `AddR`.

`INFO`

2. Using the up and down buttons, scroll to the `INFO` field and press the <ENTER> button.

`F/RS`

3. Using the up and down buttons, scroll to the `F/RS` field and hold down <ENTER> until the fixture resets the fixture hours to `0000`.

Viewing the Current Internal Temperature

To view the fixture's current internal temperature, complete the following procedure:

`AddR`

1. Hold <MENU> until the display changes to $AddR$.

`INFO`

2. Using the up and down buttons, scroll to the $INFO$ field and press <ENTER>.

`TEMP`

3. Using the up and down buttons, scroll to the $TEMP$ field and press <ENTER>.

`CURR`

4. Using the up and down buttons, scroll to the $CURR$ field and press <ENTER>.

5. The fixture will display the internal temperature followed by C (degrees centigrade).

Note: *the maximum recommended operating temperature is 96° C.*

Viewing the Minimum Internal Temperature

To view the fixture's minimum internal temperature (lowest ambient at power on), complete the following procedure:

`AddR`

1. Hold <MENU> until the display changes to $AddR$.

`INFO`

2. Using the up and down buttons, scroll to the $INFO$ field and press <ENTER>.

`TEMP`

3. Using the up and down buttons, scroll to the $TEMP$ field and press <ENTER>.

`MINT`

4. Using the up and down buttons, scroll to the $MINT$ field and press <ENTER>.

5. The fixture will display the minimum internal temperature followed by C (degrees centigrade).

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Viewing the Maximum Internal Temperature

To view the fixture's maximum internal temperature (since the last reset), complete the following procedure:

`AddR`

1. Hold <MENU> until the display changes to $AddR$.

`INFO`

2. Using the up and down buttons, scroll to the $INFO$ field and press <ENTER>.

`TEMP`

3. Using the up and down buttons, scroll to the $TEMP$ field and press <ENTER>.

`MAXT`

4. Using the up and down buttons, scroll to the $MAXT$ field and press <ENTER>.

5. The fixture will display the maximum internal temperature followed by C (degrees centigrade).

Note: *the maximum recommended operating temperature is 96° C.*

Resetting Temperature Readings

To reset the minimum and maximum temperature readings, complete the following procedure:

`AddR`

1. Hold <MENU> until the display changes to $AddR$.

`INFO`

2. Using the up and down buttons, scroll to the $INFO$ field and press <ENTER>.

`TEMP`

3. Using the up and down buttons, scroll to the $TEMP$ field and press <ENTER>.

`RST`

4. Using the up and down buttons, scroll to the RST field and press <ENTER>.

Viewing DMX Errors and Construct Values

DMX errors and individual construct values can be viewed by name. This feature is provided for advanced users to troubleshoot fixtures. Refer to "$FIXT$" on page 3-2 for a complete listing of the fields and descriptions.

To view any item listed above, complete the following procedure:

`AddR`
1. Hold <MENU> until the display changes to $AddR$.

`INFO`
2. Using the up and down buttons, scroll to the $INFO$ field and press <ENTER>.

`dMX`
3. Using the up and down buttons, scroll to the dMX field and press <ENTER>.

`FIXT`
4. Using the up and down buttons, scroll to the $FIXT$ field and press <ENTER>.

5. Using the up and down buttons, scroll to desired field and press <ENTER> to view its value (in decimal form).

Viewing DMX Data by Channel Number

Studio Spot provides a built-in DMX viewer. To view DMX data by channel, complete the following procedure:

`AddR`
1. Hold <MENU> until the display changes to $AddR$.

`INFO`
2. Using the up and down buttons, scroll to the $INFO$ field and press <ENTER>.

`dMX`
3. Using the up and down buttons, scroll to the dMX field and press <ENTER>.

`dATA`
4. Using the up and down buttons, scroll to the $dATA$ field and press <ENTER>.

`C001` `C512`
5. Using the up and down buttons, scroll to desired channel ($C001$ - $C512$) and press <ENTER> to view the DMX value (in decimal form).

Viewing Sensor Data

Sensor data is provided for advanced users to troubleshoot fixtures. Refer to "$SENS$" on page 3-4 for a a complete list of the fields and descriptions.

To view supplemental fixture data, complete the following procedure:

| $AddR$ |

1. Hold <MENU> until the display changes to $AddR$.

| $INFO$ |

2. Using the up and down buttons, scroll to the $INFO$ field and press <ENTER>.

| $SENS$ |

3. Using the up and down buttons, scroll to the $SENS$ field and press <ENTER>.

4. Using the up and down buttons, scroll to desired field and press <ENTER> to view the sensor information.

Test Menu

Use the following subsections to perform the functions contained within the $TEST$ menu.

Changing Boot Codes

When Studio Spot is uploaded, occasionally it is necessary to include a new boot code with the latest software. This is apparent when $bOOT$ $dIFF$ appears in the display. To accept and store the new boot code, complete the following procedure:

| $AddR$ |

1. Hold <MENU> until the display changes to $AddR$.

| $TEST$ |

2. Using the up and down buttons, scroll to the $TEST$ field and press <ENTER>.

| $bOOT$ |

3. Using the up and down buttons, scroll to the $bOOT$ field and press <ENTER>. The fixture will display $dONE$, RST, and home.

⚠ **Caution: Do not remove power from the fixture during the above procedure.**

Turning the Lamp On and Off

To turn the lamp on or off, complete the following procedure:

`AddR`

1. Hold <MENU> until the display changes to $AddR$.

`TEST`

2. Using the up and down buttons, scroll to the $TEST$ field and press <ENTER>.

`LAMP`

3. Using the up and down buttons, scroll to the $LAMP$ field and press <ENTER>.

`L ON` `LOFF`

4. Using the up and down buttons, scroll to $L\ ON$ or $LOFF$ and press <ENTER>. The fixture will respond accordingly.

Note: *to turn the lamp on and off via DMX, refer to* "Remote Lamp Control" on page 2-13*.*

Viewing the Lamp Status

To view the lamp status, complete the following procedure:

`AddR`

1. Hold <MENU> until the display changes to $AddR$.

`TEST`

2. Using the up and down buttons, scroll to the $TEST$ field and press <ENTER>. The display will indicate.

`LAMP`

3. Using the up and down buttons, scroll to the $LAMP$ field and press <ENTER>.

`STAT`

4. Using the up and down buttons, scroll to the $STAT$ field and press <ENTER>.
5. Press <ENTER> to view the lamp status. The fixture will display one of the following items:
   - $L\ ON$ - the lamp is on
   - $LOFF$ - the lamp is off
   - $STRK$ - the lamp is attempting to strike

Homing the Fixture

To home the fixture from the front panel, complete the following procedure:

`AddR`

1. Hold <MENU> until the display changes to $AddR$.

`TEST`

2. Using the up and down buttons, scroll to the $TEST$ field and press <ENTER>.

`HOME`

3. Using the up and down buttons, scroll to the $HOME$ field and press <ENTER> to home the fixture. The display will indicate RST (reset) and $HOME$ during the process.

Note: *to home the fixture via DMX, refer to* "Remote Homing" on page 2-12*.*

Moving the Fixture to Setup Position

⚠️ **Caution:** The setup position is used only by service personnel before maintenance routines.

To place the fixture in setup position before servicing, complete the following procedure:

AddR

1. Hold <MENU> until the display changes to $AddR$.

TEST

2. Using the up and down buttons, scroll to the $TEST$ field and press <ENTER>.

S/UP

3. Using the up and down buttons, scroll to the S/UP field and press <ENTER>. The display will indicate $SET\ NOW$ while the motors are electronically locked into place.

4. Perform the appropriate maintenance procedures.

5. Press <MENU> to reset and home the fixture.

Self-Tests

Studio Spot has a comprehensive set of self-tests to check each mechanical system. Refer to "$SELF$" on page 3-4 for a complete list of self-tests and descriptions.

To begin the self-test function, complete the following procedure:

AddR

1. Hold <MENU> until the display changes to $AddR$.

TEST

2. Using the up and down buttons, scroll to the $TEST$ field and press <ENTER>.

SELF

3. Using the up and down buttons, scroll to the $SELF$ field and press <ENTER>.

4. Using the up and down buttons, scroll to the desired test and press <ENTER>. The fixture will perform the desired test(s).

5. To exit the test in progress, press <MENU>.

Mode Menu

Use the following subsection to perform the functions contained within the $M\square dE$ menu.

Crossloading Fixtures

Studio Spot can crossload software from one fixture to additional Studio Spot fixtures on the same link (32 fixtures per link). To crossload software, complete the following procedure:

1. Disconnect the data cable between the controller and the first fixture.

`AddR` 2. Hold <MENU> on the master fixture (the fixture with the latest software version) until the display changes to $AddR$.

`MOdE` 3. Using the up and down buttons, scroll to the $M\square dE$ field and press <ENTER>.

`xLd` 4. Using the up and down buttons, scroll to the XLd field and press <ENTER>. The master fixture will upload its software to all connected fixtures on the link. The slave fixtures will display $UPLd$ during the process. After the fixtures have completed the upload, they will reset and home.

Notes: *if the fixture(s) take longer than one minute to reset after an upload, turn off the fixture(s) and repeat the procedure. If a new boot code was included with the latest software, you will need to store the boot code on each fixture. Refer to "Changing Boot Codes" on page 3-20.*

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Set Menu

Use the following subsections to perform the functions contained within the SET menu.

Reverting to the Factory Defaults

Studio Spot fixtures are shipped from High End Systems with the following factory defaults:

- addressing by fixture number mode
- five minute fixture shutdown time
- display on (bright)
- pan invert off
- tilt invert off
- swap pan and tilt off

To revert to the factory defaults, complete the following procedure:

| AddR |
1. Hold <MENU> until the display changes to AddR.

| SET |
2. Using the up and down buttons, scroll to the SET field and press <ENTER>. The display will indicate FACT.

| FACT |
3. Press <ENTER> again to enter the field.

4. Using the up and down buttons, scroll to the ON field and press <ENTER>. The fixture will return to the factory default listed above and home the fixture.

Addressing By DMX Starting Channel or Fixture Number Mode

To change the addressing method to DMX starting channel or to fixture number mode, complete the following procedure:

| AddR |
1. Hold <MENU> until the display changes to AddR.

| SET |
2. Using the up and down buttons, scroll to the SET field and press <ENTER>.

| CHNL |
3. Using the up and down buttons, scroll to the CHNL field and press <ENTER>.

| AddR | dMX |
4. Using the up and down buttons, select either AddR (fixture number mode) or dMX (DMX starting channel mode) and press <ENTER>.

Setting Display Intensity

To set the display's intensity, complete the following procedure:

`AddR`

1. Hold <MENU> until the display changes to $AddR$.

`SET`

2. Using the up and down buttons, scroll to the SET field and press <ENTER>.

`dSPL`

3. Using the up and down buttons, scroll down to the $dSPL$ field and press <ENTER>.

`ON` `OFF`
`dIM`

4. Using the up and down buttons, select either ON, OFF, or dIM and press <ENTER>.

Note: *to set the display intensity via DMX, refer to "Remote Display Adjustment" on page 2-12.*

Inverting Pan

When fixtures are mounted backwards, Studio Spot can invert pan movement via software. To invert pan, complete the following procedure:

`AddR`

1. Hold <MENU> until the display changes to $AddR$.

`SET`

2. Using the up and down buttons, scroll to the SET field and press <ENTER>.

`P/IN`

3. Using the up and down buttons, scroll to the P/IN field and press <ENTER>.

`ON` `OFF`

4. Using the up and down buttons, select ON to enable pan invert or OFF to disable pan invert and press <ENTER>.

Inverting Tilt

When fixtures are mounted on the floor (upside down), Studio Spot can invert tilt movement. To invert tilt, complete the following procedure:

`AddR`
1. Hold <MENU> until the display changes to $AddR$.

`SET`
2. Using the up and down buttons, scroll to the SET field and press <ENTER>.

`T/IN`
3. Using the up and down buttons, scroll to the T/IN field and press <ENTER>.

`ON` `OFF`
4. Using the up and down buttons, select either ON or OFF and press <ENTER>.

Swapping Pan and Tilt

When fixtures are mounted sideways, Studio Spot can swap the pan and tilt functions. To swap the pan and tilt functions, complete the following procedure:

`AddR`
1. Hold <MENU> until the display changes to $AddR$.

`SET`
2. Using the up and down buttons, scroll to the SET field and press <ENTER>.

`SWAP`
3. Using the up and down buttons, scroll down to the $SWAP$ field and press <ENTER>.

`ON` `OFF`
4. Using the up and down buttons, select either ON or OFF and press <ENTER>.

Setting the Fixture Shutdown Time

Studio Spot automatically shuts itself down when DMX data is removed. When a shutdown occurs, power is removed from all motors and the lamp is turned off.

To set the length of time Studio Spot takes before it powers down, complete the following procedure:

`AddR`
1. Hold <MENU> until the display changes to $AddR$.

`SET`
2. Using the up and down buttons, scroll to the SET field and press <ENTER>.

`S/dN`
3. Using the up and down buttons, scroll to the S/dN field and press <ENTER>.

`5 MN` `10MN`
4. Using the up and down buttons, select $5\ MN$ (5 minutes) or $10MN$ (10 minutes) and press <ENTER>.

Calibrating Pan

Pan position is easily calibrated to a precise preset position. Pan can be adjusted in 0.4° increments for up to 8.0°. To calibrate pan, complete the following procedure:

`AddR`
1. Hold <MENU> until the display changes to $AddR$.

`SET`
2. Using the up and down buttons, scroll to the SET field and press <ENTER>.

`PCAL`
3. Using the up and down buttons, scroll to the $PCAL$ field and press <ENTER>.

`-020` `+020`
4. Using the up and down buttons, set the pan calibration from (-020 to $+020$) and press <ENTER>.

5. Check the calibration by homing the fixture. Repeat the procedure as necessary.

Calibrating Tilt

Tilt position is easily calibrated for precise preset positions. Tilt can be adjusted in 0.4° increments up to 8.0°. To calibrate tilt, complete the following procedure:

`AddR`
1. Hold <MENU> until the display changes to $AddR$.

`SET`
2. Using the up and down buttons, scroll down to the SET field and press <ENTER>.

`TCAL`
3. Using the up and down buttons, scroll to the $TCAL$ field and press <ENTER>.

`-020` `+020`
4. Using the up and down buttons, set the tilt calibration from (-020 to $+020$) and press <ENTER>.

5. Check the calibration by homing the fixture. Repeat the procedure as necessary.

Preset Menu

The preset menu ($PRST$) allows you to program and playback scenes from Studio Spot's on-board memory. This information is covered in detail in *Chapter 4 Preset Scenes*.

Chapter 4
Preset Scenes

In this chapter you will:

❑ *understand scene terminology and concepts (4-1)*
❑ *edit a scene with the menu system (4-2)*
❑ *copy and paste a scene (4-6)*
❑ *capture a scene from DMX data (4-6)*
❑ *reset a scene (4-7)*
❑ *playback a sequence in stand-alone mode (4-8)*
❑ *playback a sequence in synchronized mode (4-9)*

Overview

Each Studio Spot fixture can store and play back up to 16 preset scenes. Scenes can be played back independently on any fixture without a DMX controller or up to 32 supported fixtures can be synchronized together with a data link. Supported fixtures include Studio Spot, Technobeam, Technopro, Technoray, and future Lightwave Research fixtures.

Understanding Preset Scene Terminology and Concepts

Before you begin using preset scenes, it is important that you read and understand the following terminology and concepts:

- a scene is a combination of constructs and timing controls.

- a construct is a unique fixture feature—for example, focus, color or rotating effects.

- a sequence is two or more scenes that continuously repeat (also known as a loop or a chase). Sequences will continue to play back until you turn the fixture off or manually stop playback.

- create sequences without skipping a scene. The fixture will automatically restart the sequence when it encounters the first unprogrammed scene.

- each value is permanently stored in memory until you change it so you do not have to 'save' each scene after it is edited.

- if power is removed during playback, when power is reapplied the fixture will home and begin playback at the first scene. Thus it is not necessary to manually start playback.

Editing Scenes

Editing allows you to create preset scenes by manipulating Studio Spot's constructs and timing controls. There are three ways to edit scenes:

- menu system
- copying and pasting an existing scene
- capturing construct data from a DMX link

Note: *if you capture DMX data, you must use the menu system to edit the timing controls.*

The editing methods are discussed in detail in the following subsections.

Editing with the Menu System

To edit (program) a scene using the menu system, complete the following procedure:

`AddR`
1. Press and hold <MENU> until the fixture unlocks the menu system (if necessary).

`PRST`
2. Using the up and down arrow buttons, scroll to the $PRST$ field and press <ENTER>.

`EdIT`
3. Using the up and down arrow buttons, scroll to the $EdIT$ field and press <ENTER>. $SN01$ (scene 1) will appear on the display.

`SN01` `SN16`
4. Press <ENTER> to begin with editing scene 1. Optionally, use the up and down arrow keys to select another scene ($SN02$-$SN16$) and press <ENTER>. The first construct will appear on the display.

Note: *during playback, the sequence will restart with scene 1 when the fixture reaches the first unprogrammed scene.*

5. Using the up and down arrow buttons, select the construct to edit and press <ENTER> to view and edit its value. Refer to "Menu Navigation" on page 3-2 for the construct order and explanations.

6. Using the up and down arrow buttons, change the construct to the desired value. The fixture will instantly respond to any changes that are made. Press <ENTER> to store the construct's value.

Note: *you can press <MENU> to back out of the current field and return to the previously programmed value.*

Tip: *to view the fixture's output, open the shutter and increase dim to a visible level.*

7. Repeat step 6 to program additional fixture constructs.

`TIME`
8. Using the up and down arrow keys, scroll to $TIME$ and press <ENTER>.

9. Using the up and down arrow keys, set the unit of time and press
    <ENTER>. For additional information, refer to "Using the Time
    Parameter" below.

`XFAd` `dLAY`
`MSPd`

10. Using the procedures outlined in steps 5 and 6, set the values for
    `XFAd` (crossfade), `dLAY` (delay), and `MSPd` (MSpeed). Refer to
    "Using Crossfade, Delay, and MSpeed" below for additional
    information.

11. Press <MENU> to back out of the current scene. Repeat steps 4
    through 10 until all desired scenes have been programmed.

Note: *for additional editing information, refer to "Step-By-Step Editing
    Example" on page 4-4.*

Using the Time Parameter

The `TIME` parameter determines the unit of time used in each scene for
crossfade and delay. Choose from the following options:

*   `SEC` - seconds
*   `MIN` - minutes
*   `HOUR` - hours

Crossfade and delay values can be set from 0.1 to 166. MSpeed values
can be set from 0.15 to 252.7.

Using Crossfade, Delay, and MSpeed

Crossfade, delay, and MSpeed are independent timing elements in each
preset scene. Crossfade and MSpeed determine the amount of time a
construct takes to move from one position (value) to another, while delay
is the length of each scene.

MSpeed controls the timing for pan and tilt and can be selectively applied
to color selection, litho selection, and litho rotation. Crossfade
controls the timing for all other constructs. This allows you to
program constructs that will reach their destinations at different
times within one scene. Refer to Figure 4.1.

Tip: *to make circular and ballyhoo motions with fixtures, experiment with
    setting Delay less than MSpeed.*
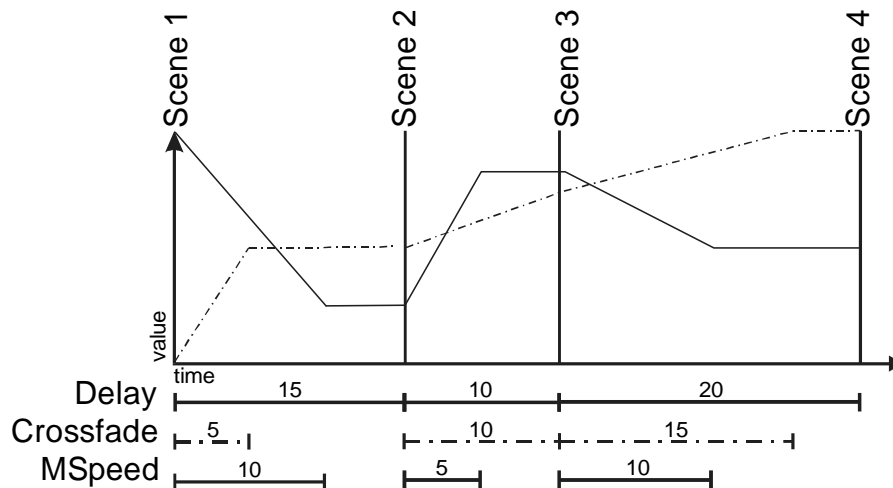
Figure 4.1. Crossfade, Delay, and MSpeed Example

Note: *the above figure shows how constructs using crossfade and MSpeed can reach their destination values at different times.*

Step-By-Step Editing Example

In this subsection, you will create a scene that requires editing most of the available constructs:

`AddR`   1. Press and hold <MENU> until the fixture unlocks the menu system (if necessary).

`PRST`   2. Using the up and down arrow buttons, scroll to the PRST field and press <ENTER>.

`EdIT`   3. Using the up and down arrow buttons, scroll to the EdIT field and press <ENTER>. SC01 (scene 1) will appear on the display.

`SN01`   4. Press <ENTER> to edit scene 1.

`SHUT`   5. Using the up and down arrow buttons, select SHUT (shutter) and press <ENTER>.

`OPEN`   6. Using the up and down arrow buttons, change the construct to OPEN and press <ENTER>.

`dIM`   7. Using the up and down arrow buttons, select dIM and press <ENTER>.

`d255`   8. Using the up and down arrow keys, change the dim value to d255 and press <ENTER>.

`TILT`   9. Using the up and down arrow buttons, select TILT and press <ENTER>.

`+27.5` 10. Using the up and down arrow keys, change the tilt value to $+27.5$ and press <ENTER>.

`CO1C` 11. Using the up and down arrow buttons, select $CO1C$ (color wheel 1 function) and press <ENTER>.

`MbLK` 12. Using the up and down arrow keys, select $MbLK$ (MSpeed blink mode) and press <ENTER>.

`CO1` 13. Using the up and down arrow keys, select $CO1$ (color wheel one) and press <ENTER>.

`b  4` 14. Using the up and down arrow keys, select $b\ 4$ (blink position 4 (aqua)) and press <ENTER>.

`LTC1` 15. Using the up and down arrow keys, select $LTC1$ (litho wheel 1 function) and press <ENTER>.

`FSP` 16. Using the up and down arrow keys, select FSP (forward spin) and press <ENTER>.

`LF 6` 17. Using the up and down arrow keys, select $LF\ 6$ (litho forward position 6 (Shatters)) and press <ENTER>.

`FCUS` 18. Using the up and down arrow keys, select $FCUS$ (focus) and press <ENTER>.

`000` `255` 19. Using the up and down arrow keys, focus the litho from 000 to 255 and press <ENTER>.

`TIME` 20. Using the up and down arrow keys, select $TIME$ and press <ENTER>.

`SEC` 21. Using the up and down arrow keys, select SEC and press <ENTER>.

`dLAY` 22. Using the up and down arrow keys, select $dLAY$ and press <ENTER>.

`d 20` 23. Using the up and down arrow keys, select $d\ 20$ and press <ENTER>.

`XFAd` 24. Using the up and down arrow keys, select $XFAd$ and press <ENTER>.

`X  10` 25. Using the up and down arrow keys, select $X\ 10$ and press <ENTER>.

`MSPd` 26. Using the up and down arrow keys, select $MSPd$ and press <ENTER>.

`15.1` 27. Using the up and down arrow keys, select 15.1 and press <ENTER>.

28. Playback the scene 1. Refer to "Playing Back Scenes in Stand-Alone Mode" on page 4-8.

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Preset Scenes

Copying and Pasting Scenes

Scenes are easily copied and pasted between locations. This is beneficial when you only want to modify a few constructs, such as pan and tilt.

To copy and paste a scene, complete the following procedure:

`AddR`
1. Press and hold <MENU> until the fixture unlocks the menu system (if necessary).

`PRST`
2. Using the up and down arrow buttons, scroll to the $PRST$ field and press <ENTER>.

`COPY`
3. Using the up and down arrow buttons, scroll to the $COPY$ field and press <ENTER>. $FROM$ will appear on the display.

`FROM`
4. Press <ENTER> again to select the scene to copy (source scene).

`FOO1` `FO 16`
5. Using the up and down arrow buttons, select the scene to copy ($FOO1$-$FO16$) and press <ENTER>. TO will appear in the display.

`TO`
6. Press <ENTER> again to select the scene to paste to (destination scene).

`TOO1` `TO 16`
7. Using the up and down arrow buttons, select the destination ($TOO1$-$TO16$) and press <ENTER>. The display will indicate $dONE$ and return to the $COPY$ field.

Capturing DMX Data Into a Scene

Studio Spot can create preset scenes by capturing data from a DMX controller. All constructs can be captured except for $TIME$, $XFAd$, and $dLAY$.

To capture DMX data, complete the following procedure:

1. Check and ensure that the fixture(s) are properly addressed and respond to your controller.

`AddR`
2. Press and hold <MENU> until the fixture unlocks the menu system (if necessary).

`PRST`
3. Using the up and down arrow buttons, scroll to the $PRST$ field and press <ENTER>.

`CAPT`
4. Using the up and down arrow buttons, scroll to the $CAPT$ field and press <ENTER>. $SNO1$ will appear on the display.

`SNO1` `SN 16`
5. Using the up and down arrow buttons, select the destination scene. **Do not** press <ENTER> yet.

6. Using your controller, program the desired look(s).

7. Press <ENTER> to capture the DMX data to the selected scene. The display will indicate $dONE$.

8. Press <MENU> to back out of the $CAPT$ menu.

$EdIT$

9. Using the up and down arrow keys, scroll to $EdIT$ and press <ENTER>.

$TIME$ $XFAd$
$dLAY$

10. Edit the $TIME$, $XFAd$, and $dLAY$ parameters using the menu system. Refer steps 8 through 10 located in "Editing with the Menu System" on page 4-2 for assistance.

11. Repeat the steps 3 through 9 of this procedure for additional fixtures and scenes.

Resetting (Re-Initializing) a Scene

Scenes are quickly reset to their blank (nullified) factory settings with the menu system.

To reset a scene, complete the following procedure:

$AddR$

1. Press and hold <MENU> until the fixture unlocks the menu system (if necessary).

$PRST$

2. Using the up and down arrow buttons, scroll to the $PRST$ field and press <ENTER>.

$EdIT$

3. Using the up and down arrow buttons, scroll to the $EdIT$ field and press <ENTER>. $SN01$ (scene 1) will appear on the display.

$SN01$ $SN16$

4. Using the up and down arrow buttons, scroll the scene to reset ($SN01$-$SN16$) and press <ENTER>.

$ZERO$ $OK?$

5. Using the up and down arrow buttons, scroll to the $ZERO$ field and press <ENTER>. $OK?$ will appear on the display.

6. Press <ENTER> to reset the selected scene.

4
Preset Scenes

Playing Back Scenes in Stand-Alone Mode

Scenes can be played back on each fixture without a controller through the menu system.

Note: *if a fixture is connected to a DMX link, the fixture will not respond to data while it is in playback mode.*

To playback scenes in stand-alone mode, complete the following procedure:

`AddR`

1. Press and hold <MENU> until the fixture unlocks the menu system (if necessary).

`PRST`

2. Using the up and down arrow buttons, scroll to the $PRST$ field and press <ENTER>.

`PLAY`

3. Using the up and down arrow buttons, scroll to the $PLAY$ field and press <ENTER>. OFF will appear on the display.

`ON`

4. Using the up and down arrow buttons, scroll to the ON field and press <ENTER>. The display will indicate $PRST$ with a dot in the lower right-hand corner to indicate you are in playback mode and the programmed scenes will begin playback. When playback finishes playing scene 16 or it comes to the first blank scene, the sequence will loop and restart at scene 1.

Determining the Active Scene

To determine the active scene during playback, complete the following procedure:

`AddR`

1. Press and hold <MENU> until the fixture unlocks the menu system (if necessary).

`PRST`

2. Using the up and down arrow buttons, scroll to the $PRST$ field and press <ENTER>.

`PLAY`

3. Using the up and down arrow buttons, scroll to the $PLAY$ field and press <ENTER>. OFF will appear on the display.

`SCN`

4. Using the up and down arrow buttons, scroll to the SCN field and press <ENTER>. The display will indicate the scene that is playing.

Synchronizing Preset Playback

Studio Spot provides synchronized playback for up to 32 supported fixtures[1]. Supported fixtures include the following:

- Studio Spot
- Technobeam
- Technopro
- Technoray
- future Lightwave Research products

Note: *you may use a DMX splitter to connect more than 32 fixtures for synchronized playback.*

Synchronized playback is accomplished by a proprietary time code signal generated by the master fixture and sent to the slave fixtures via DMX cables. The time code signal is similar to SMPTE and uses a 30 frame per second clock (non-drop frame).

The master fixture determines the total sequence length from the sum of its delay times. When the master fixture reaches the end of its last scene, all fixtures will restart at scene 1 and the clocks will be reset to zero. Thus playback is not dependent on the number of programmed scenes or the sequence length of the slave fixtures.

If the sequence length of slave fixture(s) is less than the master's, the slave fixture(s) will repeat their sequence until the master fixture resets the clock (slave 1 in Figure 4.2). If a slave fixture's sequence is longer than the master's, the slave fixture will restart its sequence before it has completed its entire sequence (slave 2 in Figure 4.2).
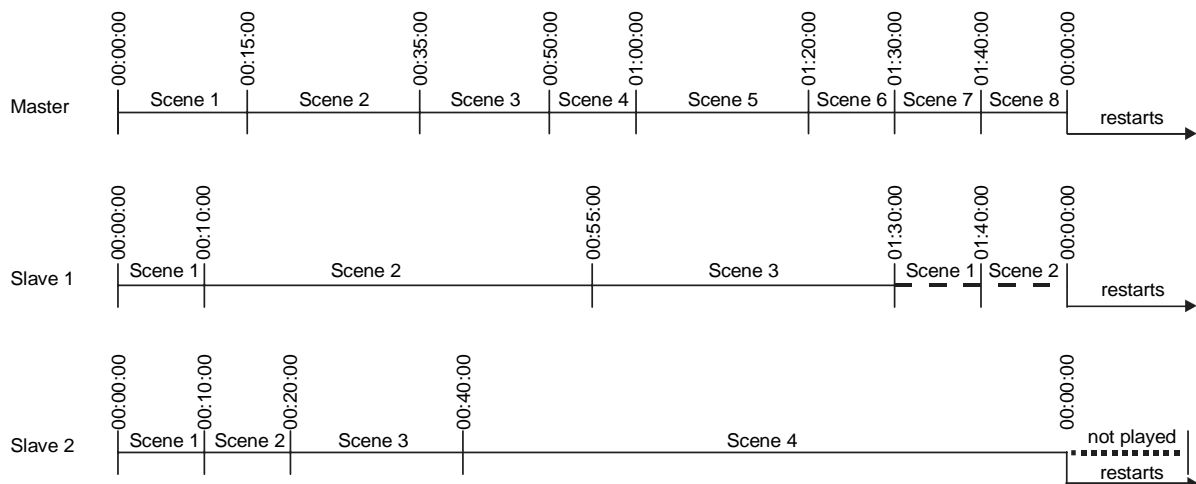
Figure 4.2. Synchronized Playback Example

[1]The 32 device limit complies with the EIA-485 standard. Connecting more than 32 devices per link will eventually deteriorate the square wave (digital signal).

Connecting and Addressing Fixtures for Synchronized Playback

To connect and address fixtures for synchronized playback, complete the following procedure:

1. Connect a data cable from the master fixture's DATA OUT connector to the first slave's DATA IN connector. Refer to Figure 4.3.
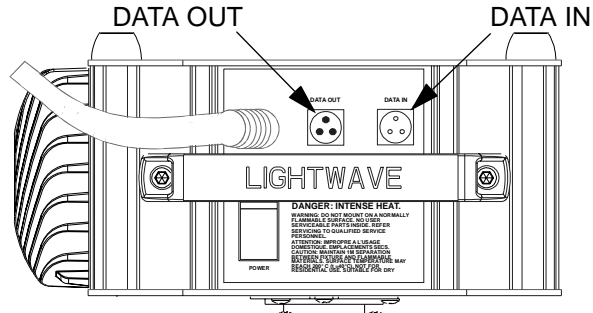
DATA OUT   DATA IN

Figure 4.3. Data In and Data Out Connectors

2. Daisy chain slave fixtures by connecting cables from the DATA OUT connector to the DATA IN connector on subsequent fixtures. Refer to Figure 4.4.
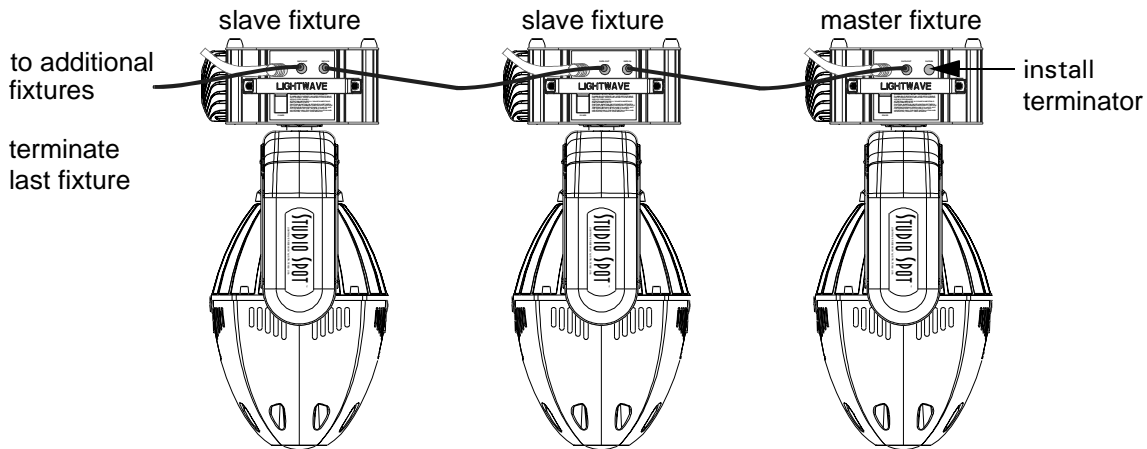
Figure 4.4. Daisy Chaining Fixtures

3. Install terminators on <u>both</u> ends of the link. Refer to Figure 4.4.

4. Power on all fixtures.

5. Press and hold <MENU> until the each fixture unlocks the menu system (if necessary).

6. Press <ENTER> to address the fixture.

7. Using the up and down arrow keys, set the master's DMX starting channel to $C001$ or to fixture $F\ 01$ (depending on which address mode you are in).

8. Set the slave fixtures' starting channels/fixture numbers to any address other than $C001$ or $F\ 01$.

Playing Back Synchronized Scenes

To playback synchronized scenes, complete the following procedure:

`AddR`

1. Press and hold <MENU> until the fixture unlocks the menu system (if necessary).

`PRST`

2. Using the up and down arrow buttons, scroll to the $PRST$ field and press <ENTER>.

`PLAY`

3. Using the up and down arrow buttons, scroll to the $PLAY$ field and press <ENTER>. OFF will appear on the display.

`ON`

4. Using the up and down arrow buttons, scroll to the ON field and press <ENTER>. The display will indicate $PRST$ with a dot in the lower right-hand corner to indicate you are in playback mode and the programmed scenes will begin playback. The slave fixtures will then synchronize their clocks to the master fixture.

Note: *if the master fixture is turned on after the slaves, it may take up to one sequence for all fixtures to synchronize.*

4

Preset Scenes

Appendix A
Troubleshooting and Maintenance

In this appendix you will:

❑ *fill out a technical support checklist (A-2)*
❑ *learn how to acquire technical support (A-2)*
❑ *troubleshoot problems (A-3)*
❑ *perform self-tests (A-9)*
❑ *replace the lamp (A-10)*
❑ *optimize the lamp (A-12)*
❑ *clean the fixture (A-13)*
❑ *upload software (A-14)*

Overview

This appendix provides directions for troubleshooting problems that may be preventing you from operating Studio Spot properly. It also includes instructions for properly maintaining your fixture.

Before calling technical support, follow the recommended procedures in this appendix to diagnose and solve many hardware and software problems.

If the procedures in this appendix do not solve your problem and you need to call for assistance, please provide the support technician with the information outlined in the "Support Checklist" in this appendix.

If you need to return your fixture for warranty or non-warranty service, please follow the procedures outlined in "Returning an Item Under Warranty for Repair" on page iv.

Before You Begin

Before you begin, read and understand the following warnings:

1. **Do not submerse in liquid! If any liquid has been spilled on or into the fixture, contact High End Systems technical support before attempting to service the fixture.**

2. **There are no user serviceable parts inside the top box. Servicing should only be conducted by a qualified technician.**

3. **High Voltage! Touching internal electrical components can result in electric shock!**

4. **Disconnect the fixture from power before servicing.**

5. **Exterior surfaces can reach 200° C and interior surfaces can exceed 250° C. Allow the fixture to cool for five minutes before touching any surface.**

6. **Always wear hand and eye protection when servicing the fixture.**
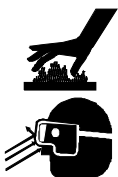
Support Checklist

Technical support can provide you with faster service if you can provide the following information:

❑ Customer and company name
❑ Country, if other than U.S.A.
❑ Phone number and fax number
❑ Fixture serial number
❑ Error message(s) on your Studio Spot display
❑ Description of your problem and the troubleshooting procedures that you have performed so far to diagnose and resolve your problem
❑ Software version

Acquiring Technical Support

If you can not resolve a problem with this appendix, contact your authorized High End Systems dealer or the High End Systems Service Department with the following information:

U.S. and the Americas	High End Systems, Inc. 2227 West Braker Lane Austin, Texas 78758 (512) 836-2242 or (800) 890-8989 FAX: (512) 834-9195
U.S. West Coast	High End Systems, Inc. 8200 Haskell Avenue Van Nuys, CA 91406 (818) 947-0550 FAX: (818) 908-8975
Singapore	High End Systems Singapore Pte. Ltd. 1 Tannery Road 06-05 Cencon 1 Singapore 1334 +65 742 8266 FAX: +65 743 9322
Europe	High End Systems GmbH Lohstrasse 22 D-85445 Schwaig Germany +49 8122 9903-0 FAX: +49 8122 9903-33
World Wide Web Sites	http://www.highend.com http://www.studiospot.com
Service Web Site	http://info.highend.com/service/service.html

Troubleshooting

This section provides information on diagnosing and solving operational problems. If a solution to your problem cannot be found in the following subsections, contact your authorized dealer or High End Systems Technical Support. Please note that nearly every possible problem is documented to speed troubleshooting, but most are extremely unlikely to ever occur.

The following troubleshooting topics are covered in their subsections:

- "Display Error Messages" on page A-3
- "General Troubleshooting" on page A-7
- "Upload Troubleshooting" on page A-8
- "Onboard Self-Tests" on page A-9
- "Testing DMX Data" on page A-9

Display Error Messages

Studio Spot contains an elaborate and comprehensive set of tests and messaging. Use the following table to identify, solve or report errors to a qualified service technician.

Table A.1: Display Error Messages

Display Message	*Problem*	*Explanation*	*Solution*
AddR LOST	EEPROM was unreadable	• fixture was unable to recover fixture address	• refer to qualified service personnel
AddR OVER	stored address exceeds 21 fixture limit	• fixture was addressed in a different channel configuration	• set a valid fixture address
bOOT dIFF	boot code difference	• new boot code does not match old boot code	• store new boot code. Refer to "Changing Boot Codes" on page 3-20
COOL	the lamp is too hot to strike	• lamp must cool before it can restrike	• the fixture will restrike the lamp as soon as it cools
EMEM ERR	EEPROM errors	• data is not readable from the EEPROM for various fields	• refer to qualified service personnel
FMEM ERR	Flash ROM error	• read/write error from flash ROM	• refer to qualified service personnel

A
Troubleshooting and Maintenance

Display Message	*Problem*	*Explanation*	*Solution*
ERSE FLSH	flash ROM could not be erased during an upload	• bad flash ROM	• refer to qualified service personnel
FPGA ERR	Field Programmable Gate Array error	• read/write error from FPGA	• refer to qualified service personnel
Id ERR	ID or unique number error	• error reading ID • error reading unique fixture number	• refer to qualified service personnel
LAMP OUT ERR	lamp has extinguished during operation	• dead lamp	• replace lamp, refer to "Replacing the Lamp" on page A-10
LAMP TOUT ERR	lamp time-out error	• lamp too hot to restrike • dead lamp • ignitor error	• allow time for the lamp to cool and restrike the lamp • replace lamp, refer to "Replacing the Lamp" on page A-10 • refer to qualified service personnel
LINK bUSY	other data present on the link during a crossload	• controller is connected to the link	• disconnect controller
LINK EMTY	no fixtures were found to crossload to	• additional Studio Spot fixtures are not connected to the master during a crossload	• connect additional fixtures • check cabling
LINK ERR	link error	• bad cable(s) • output from previous fixture is bad • bad comm board	• test and replace cable(s) as necessary • test by bypassing previous fixture • refer to qualified service personnel
OVER TEMP	logic board is over rated its temperature	• temperature exceeds limit for safe operation and the board has shutdown	• reduce ambient temperature and move significant heat sources • refer to qualified service personnel

Display Message	*Problem*	*Explanation*	*Solution*
PAN dRV ERR	pan driver error	• motor wire shorted to ground • bad driver chip	• refer to qualified service personnel
PAN ENCd	pan encoder error	• encoder sensor is not connected • encoder is not functioning properly	• connect encoder • refer to qualified service personnel
PAN ERR	pan homing error	• loose pinion gear • loose motor cable • incorrect cabling to pan input • bad sensor • bad motor	• run self-test and refer to qualified service personnel
PAN STOP	pan encoder position does not match physical position	• physical obstruction • encoder is out of calibration	• remove obstruction and home the fixture • refer to qualified service personnel
PRGM TIME	fixture failed to upload within allotted time	• complete data was not received	• try to upload again • refer to qualified service personnel
SVCC ERR	sensor power error	• bad board • loose cable	• refer to qualified service personnel
SENS TOUT	sensor time-out	• fixture attempted to correct pan/tilt position(s) without success	• remove the obstruction and reset the fixture • bad pan or tilt sensor
SEN1 ERR	litho wheel 1 sensor	• problem with litho wheel 1 tab • problem with litho wheel 1 motor • bad sensor 1	• check to ensure tab crosses sensor • test litho wheel • refer to qualified service personnel
SEN2 ERR	litho wheel 2 sensor	• problem with litho wheel 2 tab • problem with litho wheel 2 motor • bad sensor 2	• check to ensure tab crosses sensor • test litho wheel • refer to qualified service personnel

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Display Message	Problem	Explanation	Solution
SENC ERR	color wheel sensor	• problem with a color wheel tab • problem with a color wheel motor • bad color sensor	• check to ensure each tab crosses sensor • test color wheel • refer to qualified service personnel
THRM CHIP	microprocessor is over temperature	• ambient temperature is too high • too close to significant heat source (pyrotechnics, etc.)	• reduce ambient temperature • move the fixture or heat source away from each other
THRM PAN	pan driver is over temperature	• pan motor microchip is over specified temperature range	• reduce ambient temperature or proximity to other heat sources
THRM TILT	tilt driver is over temperature	• tilt motor microchip is over specified temperature	• reduce ambient temperature or proximity to other heat sources
TILT CONN	tilt sensor error	• tilt sensor is not connected	• check connections • refer to qualified service personnel
TILT dRV ERR	tilt driver error	• motor wire shorted to ground • driver chip bad	• refer to qualified service personnel
TILT ENCd	tilt encoder error	• encoder sensor is not connected • encoder is not functioning properly	• connect encoder • refer to qualified service personnel
TILT ERR	tilt homing error	• loose pinion gear • loose motor cable • incorrect cabling to tilt input • bad sensor • bad motor	• run self-test and refer to qualified service personnel
TILT STOP	tilt encoder position does not match physical position	• physical obstruction • encoder is out of calibration	• remove obstruction and home the fixture • refer to qualified service personnel

General Troubleshooting

Use the following table to troubleshoot problems that are not identified by the menu system.

Table A.2: General Troubleshooting

Problem	*Probable Cause*	*Solution*
Unit will not turn on	• no power • breaker is turned off • power connectors • power line filter	• connect power • turn breaker on • refer to qualified technician • refer to qualified technician
Unit functions but lamp does not strike	• bad lamp • lamp is too hot from operation (unit turned off and on) • ignitor connection is loose	• replace lamp • leave the unit turned on, when the lamp's temperature drops, it will restrike • refer to qualified technician
Lamp is dimmer than other units	• bad lamp • dirty optics	• replace lamp • dirty optics
Unit will not home properly	• belt(s) is loose • bad sensor(s)	• tighten belt(s) • refer to qualified technician
Color system is not producing the correct color	• unit is not homed properly	• home the unit
Pan or tilt position is off	• unit is not homed properly • belt tension too loose	• home the unit • tighten belt(s)
Unit is not responding to controller	• wrong fixture DMX address • bad data cable(s) • link not terminated	• set the address as outlined in "Address Menu" on page 3-14 • check and replace data cables as needed • terminate link as outlined in "Data Cabling" on page 1-9
Unit is producing unexpected results	• incorrect DMX starting address on the controller • last fixture is not terminated	• refer to "Setting the Fixture Address" on page 1-10 • terminate fixture
Display is not func-tioning	• display is turned off • power connectors are loose • bad logic board	• refer to "Setting Display Intensity" on page 3-25 • refer to qualified technician • refer to qualified technician

A

A Troubleshooting and Maintenance

Upload Troubleshooting

This subsection provides information for troubleshooting upload problems.

Table A.3: Upload Troubleshooting

Problem	*Probable Cause*	*Solution*
Not all fixtures on link are receiving download	• unit(s) turned off • bad cabling • cable(s) disconnected	• turn on unit(s) • test and replace cable(s) as necessary • reconnect cable(s)
Status Cue displays: **Fixture could not erase flash ROM**	• the XLR cable(s) was disconnected • bad cable(s) • the fixture's electrical circuitry is damaged	• reconnect XLR cable(s) • replace cable(s) • refer to qualified service personnel
Status Cue displays: **WARNING: No response from Fixture xx (Link xx Address xx)**	• Status Cue was configured with a Studio Spot at that address, but no fixtures were found there • another fixture type (possibly using RS-422) is connected before Studio Spot fixtures • a data distributor is being used	• If there is no fixture at that address, nothing is wrong • check connections • check to ensure fixture is turned on • remove the fixture(s) from the data link or move them after Studio Spot fixtures • disconnect the data distributor and reconnect fixtures
Fixture displays: ƃⱵⱵT ꓒIFF	• new software also included boot code (normal)	• store the new boot code. Refer to "Changing Boot Codes" on page 3-20
Fixtures are not cross-loading	• a controller is connected to the link • a fixture (possibly using RS-4222) is physically connected before Studio Spot fixtures that is inhibiting the cross-load	• disconnect the controller and attempt the upload again • remove the fixture(s) from the data link or move them after Studio Spot fixtures

Onboard Self-Tests

Studio Spot has on-board self-tests to diagnose problems. If you are experiencing problems that you suspect are mechanical, perform the tests outlined in "Self-Tests" on page 3-22.

Testing DMX Data

Studio Spot has the ability to view any of the 512 DMX channels on its link. This is a very useful feature to ensure Studio Spot and other fixtures are receiving the correct data from your DMX controller. To test individual DMX data by channel, perform the procedures outlined in "Viewing DMX Data by Channel Number" on page 3-19. To view DMX errors, overrun errors, framing errors, and start code errors refer to the procedures outlined in "Viewing DMX Errors and Construct Values" on page 3-19.

Maintenance

This section provides information for basic maintenance. If other maintenance is required, refer servicing to a qualified technician.

Replacing the Lamp

You will need the following items to replace the lamp:

- ¼ inch hex wrench
- Phillips MSR 575/2, MSD 575, or other factory approved GX 9.5 base, 575 watt, metal-halide lamp
- Protective gloves
- Protective goggles

To replace the lamp, complete the following procedure:

1. Remove power from fixture.
2. Using the ¼-inch hex wrench, loosen the hex screws located at the rear of the fixture and remove the lamp access cover. Refer to Figure A.1.
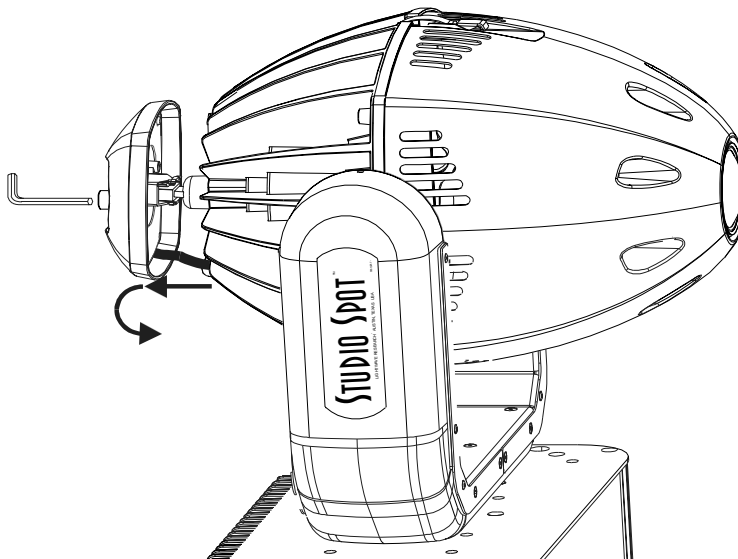
Figure A.1. Removing the Lamp Access Cap

3. Remove the old lamp from the socket by the base. Refer to Figure A.2.
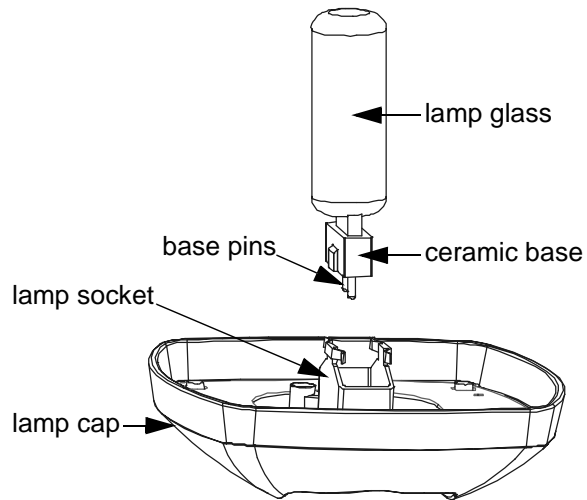
Figure A.2. Installing the Lamp

4. Holding the new lamp by its base, align the base pins to the socket and carefully push the lamp into the socket. Refer to Figure A.2.

Warning: do not touch the lamp with bare fingers. The oils from your skin can damage the lamp and cause it to explode. If the lamp is accidentally touched, clean it immediately with a soft cloth and isopropyl alcohol ((CH$_3$)$_2$CHOH). An alcohol cloth is provided with each lamp.

5. Place lamp assembly back into the housing and tighten the hex screws.

Caution: do not overtighten the hex screws.

Notes: *when a lamp is replaced, remember to reset the lamp hours as outlined in "Resetting Lamp Hours" on page 3-16 and optimize the lamp as outlined in "Optimizing the Lamp" on page A-12.*

Optimizing the Lamp

When a lamp is replaced, you will need to optimize the new lamp's position in the optical path. Optimizing the lamp ensures that you will have a flat field across the entire beam diameter.

To optimize the lamp, you will need the following items:

- #2 phillips screw driver
- smooth white surface to project the beam on
- table or a truss to mount the fixture on

To optimize the lamp, complete the following procedure:

1. Mount the fixture in an orientation so that it may be squarely projected onto a smooth white surface no less than 10 feet (3 meters) away.
2. Using a controller or the menu system, focus an open (white) beam onto the surface and observe the beam.
3. Using a #2 phillips-head screw driver, rotate the three lamp adjust screws until you achieve a uniform flat field. Refer to Figure A.3. When the lamp is correctly optimized, the field will have an even disbursement of light throughout the entire beam diameter.
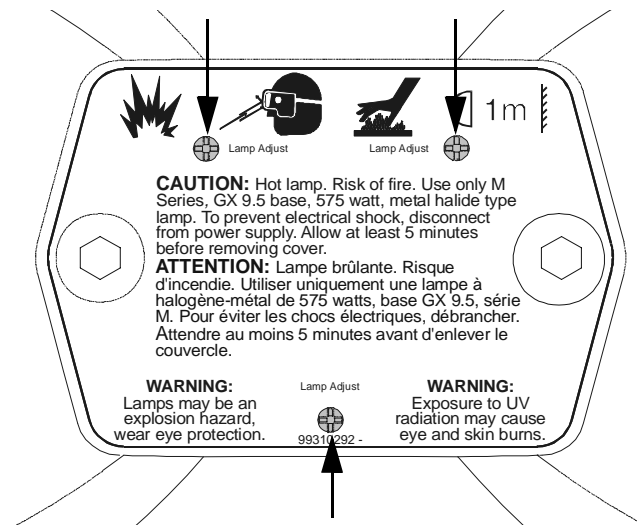
Figure A.3. Lamp Optimization Screws

Cleaning

You should clean your Studio Spot on a regular basis. Dust, fog, and smoke particles can accumulate and cause malfunctions.

To clean the exterior surfaces, wipe with a soft lent-free polyester cloth or use a small vacuum to remove any built-up dust and dirt. For stubborn substances (grime and serious build up), use Industrial Strength Green 409™ cleaner (sparingly) and a soft cloth.

⚠ **Caution: Do not use a blower because it will force foreign particles into the fixture.**

To clean interior surfaces and optical components, use a soft lent-free polyester cloth with isopropyl ($(CH_3)_2CHOH$) or ethyl (CH_3CH_2OH) alcohol.

Tip: for optimal cleaning, use a mixture of 70% alcohol to 30% water for the initial cleaning. Then clean the same parts with 100% alcohol.

Software Updates

Studio Spot software is easily upgradeable through the following means:

- Status Cue
- Upload Dongle
- another Studio Spot with the latest software version

To acquire the latest software version, refer to "Acquiring Technical Support" on page A-2.

Status Cue

To update Studio Spot software through Status Cue, complete the following procedure:

1. Copy the latest `stspot.s19` file to the `\statusq\programs` directory (if necessary).

2. Select **Device upload...** from the **File** drop-down menu. This brings up the **Device Code Upload** dialogue box. Refer to Figure A.4.

Figure A.4. Device Code Upload Dialogue Box

3. Select **Studio Spot** from the list of available devices.

4. Select the desired upload option to determine which fixture(s) to upload.

5. Click the **OK** button to start uploading. This brings up the **Device Upload Status** information box. Refer to Figure A.5. During the upload, the fixture's display will quickly flicker and display $UPLd$ to indicate it is uploading. The **Device Upload Status** dialogue box will indicate the number of fixtures that are being uploaded and the progress of the upload.
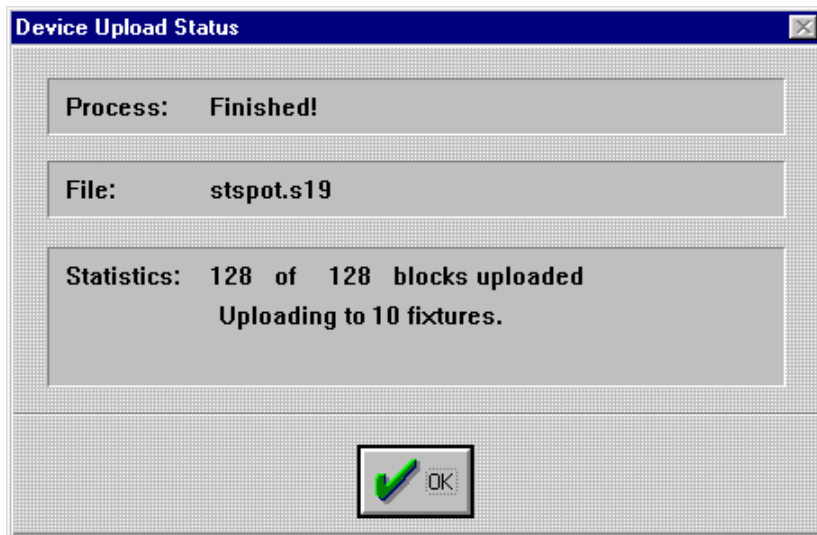
Figure A.5. Device Upload Status Information Window

6. When the update has successfully completed, the **Process** field will indicate **Finished!** Click the **OK** button to complete the procedure.

Note: *Status Cue provides bi-directional upload communication with Studio Spot fixtures. If any error messages are received, refer to "Upload Troubleshooting" on page A-8.*

Upload Dongle

To use the upload dongle, you will need the following items:

- High End Systems parallel-to-DMX dongle (p/n 99190009)
- 386-based or faster PC
- MS DOS® v3.3 or later
- 1 MB free disk space
- dongle software
- latest Studio Spot binary file (`stspotxx.bin`)

Connect the dongle to the computer as outlined in the instructions provided with the dongle.

To upload software from the dongle, complete the following procedure:

1. In DOS, enter the scupload directory by typing `cd scupload` at the `c:\` prompt.
2. Copy the latest `stspotxx.bin` file into the upload directory.
3. Type `upload` to start the program.
4. Select `Studio Spot` and press <Enter>.

5. The program will strobe the fixture(s) for 30 seconds and then it will start the upload. Optionally, you may press <R> to instantly run the upload or <Q> to quit the program.

6. The display will indicate the fixtures and the status of the download.

Note: *the dongle software provides bi-directional upload communication with Studio Spot fixtures. If any error messages are received, refer to "Upload Troubleshooting" on page A-8.*

Another Studio Spot

This procedure is covered in "Crossloading Fixtures" on page 3-23.

Appendix B
Accessory Installation

In this appendix you will install:

❏ *lenses (B-2)*
❏ *dichroic glass (B-4)*
❏ *LithoPatterns, effects, and gobos (B-7)*

Overview

This appendix provides information on how to correctly install approved accessories. A list of accessories is provided in the "Introduction" on page I-10. For ordering or additional information, contact your authorized dealer or High End Systems. Refer to "Contacting High End Systems, Inc." on page vi.

Specifications for dichroic glass, LithoPatterns, gobos, and effects are provided in "Optical System" on page I-8.

Before You Begin

It is extremely important that you understand and adhere to the following safety information.

Caution: **do not install accessories that are not specified by High End Systems. Doing so may damage the fixture, void the warranty, or render it unsafe. Failure to install dichroic glass and LithoPatterns in the proper orientation can damage them.**

Warning: **disconnect the fixture from power before servicing. Exterior surfaces can reach 200° C and interior surfaces can exceed 250° C. Wait at least five minutes before touching any surface.**

Lens Installation

Studio Spot offers three lenses to accommodate all applications. To determine the lens that best suits your application, refer to "Calculating Beam Diameters" on page C-6.

To install an accessory lens, complete the following procedure:

1. Remove power from the fixture and place it upright on a flat surface.

2. Remove the bezel by releasing the two latches located in the middle of the head. Refer to Figure B.1.

latch → ← latch
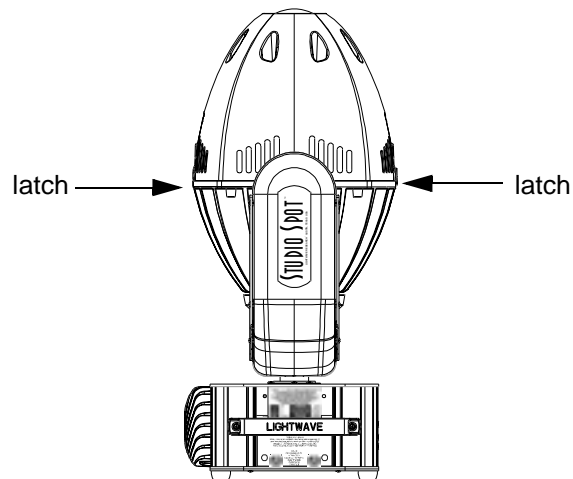
Figure B.1. Removing the Bezel

3. Remove the safety cable from its latch and set the bezel on a flat surface.

4. Loosen the thumb screw which holds the lens ring in place and pivot the ring away from the lens. Refer to Figure B-2.
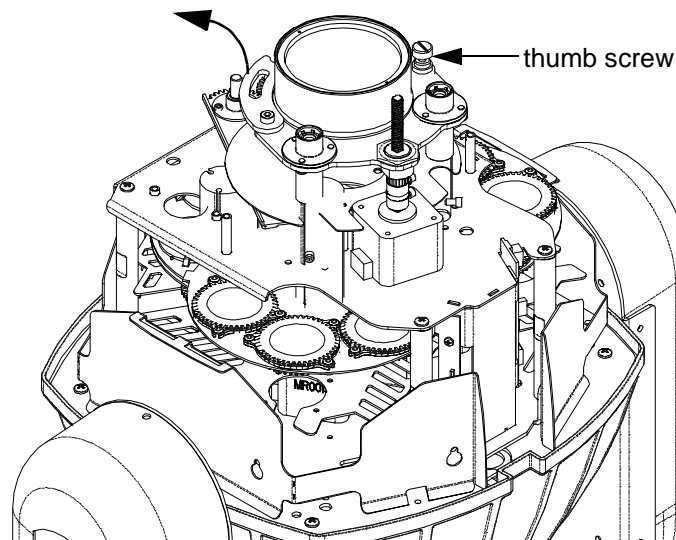
← thumb screw

Figure B-2. Loosening the Lens Ring Thumb-Screw

5. Remove the lens from the assembly and set it aside.

6. Align the lip of the new lens with the ring and slide it into the assembly. Refer to Figure B-3.
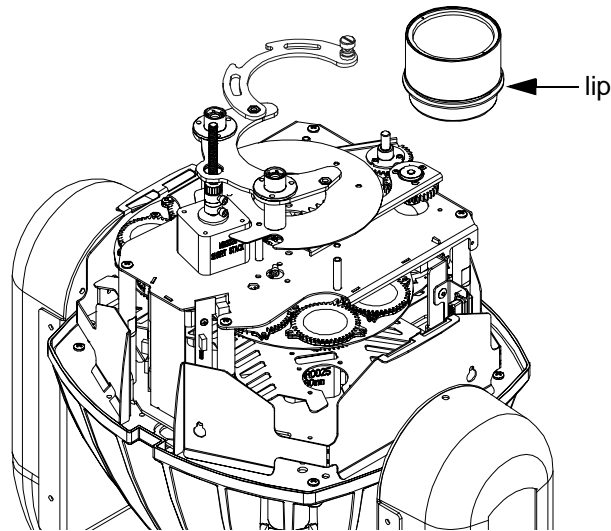
Figure B-3. Replacing the Lens

7. Pivot the ring back to secure the lens to its assembly and retighten the thumb screw.

8. Replace the bezel, attach the safety cable, and secure its latches.

Note: *the bezel can only be correctly replaced one way to allow the use of the safety cable.*

Dichroic Glass Installation

Studio Spot uses the same dichroic glass catalogue as Cyberlight, Cyberlight CX, and Studio Color. Additionally, custom colors can be ordered from High End Systems.

When replacing colors, plan ahead to ensure you will acquire the desired color combinations. Colors such as indigo and aqua can only be created by a dedicated filter and they do not mix with other colors.

To install dichroic glass, complete the following procedure:

1. Remove power from the fixture and place it upright on a flat surface.

2. Remove the bezel by releasing the two latches located in the middle of the fixture head. Refer to Figure B.1.

3. Remove the safety cable from its latch and set the bezel aside.

4. Locate the color wheels. Refer to Figure B-4.
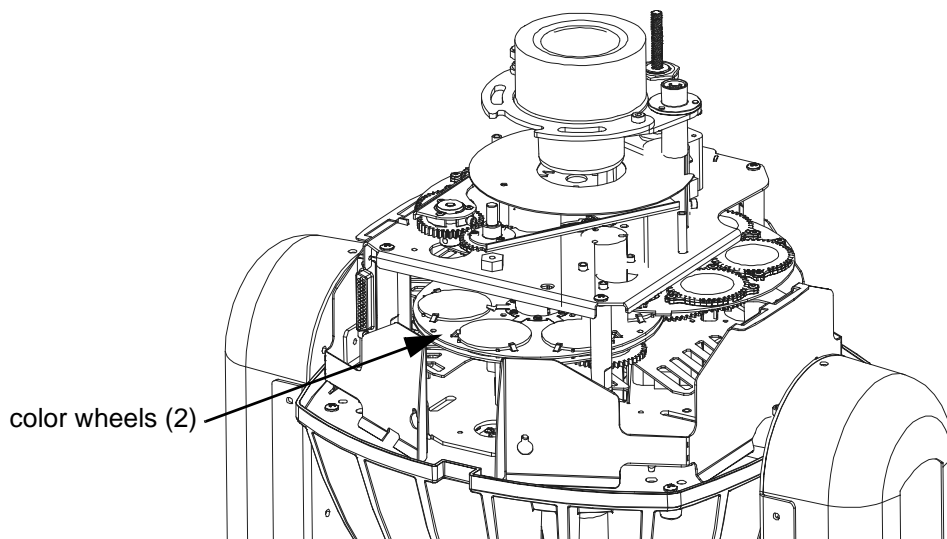
Figure B-4. Locating the Color Wheels

5. Rotate the desired color wheel so that the color you wish to replace is accessible from the edge and rotate the opposing color wheel so that its open position is at the edge. Take special note of the index positions on the color wheel. Refer to Figure B-5.

color wheel 1 (lower)

2
yellow

3
CTO

1
open

4
aqua

6
magenta

5
pink

color wheel 2 (upper)

2
cyan

3
l. cyan

1
open

4
indigo

6
magenta

5
pink
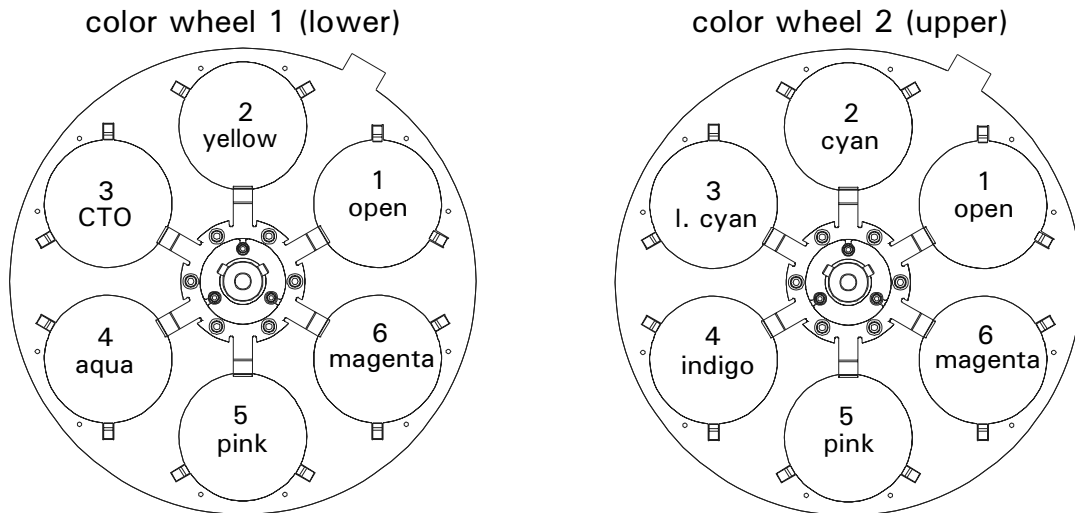
Figure B-5. Factory Color Wheels and Index Positions

Note: *color wheel 1 is inversely oriented in the optical module.*

6. Gently push the dichroic glass towards the spindle in the center of the color wheel (A), lift the edge away from the wheel (B), and remove the glass. Refer to Figure B-6.

A.

B.
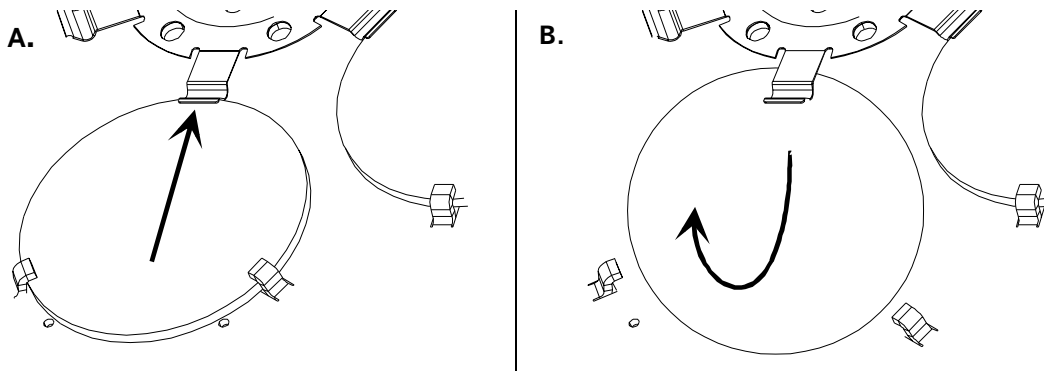
Figure B-6. Removing the Dichroic Glass

⚠ **Caution: do not bend or lift the inner tabs up, as you could damage them.**

7. Install the new dichroic into the color wheel with the coated side towards the wheel. Refer to Figure B-7. To determine the coated side, refer to Figure B-8.

coated side down
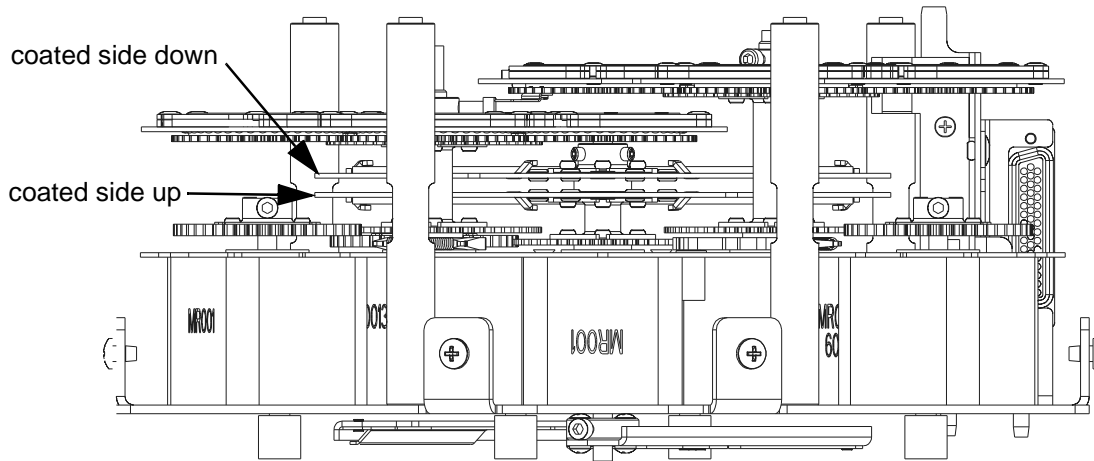
coated side up

Figure B-7. Dichroic Glass Orientation

⚠ **Caution: improper installation can cause color shifts around the edge of the beam.**
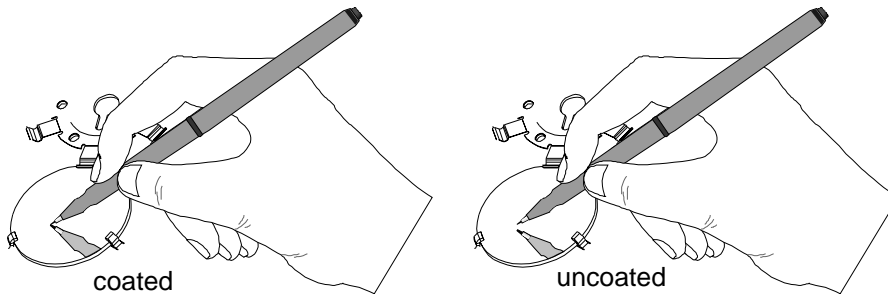
coated

uncoated

Place an object near the surface, the reflection will appear to touch the object on the <u>coated</u> side.

Figure B-8. Determining The Coated Side of Dichroic Glass

8. Replace the bezel, secure the safety cable to its clamp, and relatch the bezel.

Note: *the bezel can only be replaced one way to ensure the safety cable can connect to its bracket.*

LithoPattern, Gobo, and Effect Installation

To install LithoPatterns, gobos, or effects, complete the following procedure:

1. Remove power from the fixture and place it upright on a flat surface.

2. Remove the bezel by releasing the two latches located in the middle of the fixture head. Refer to Figure B.1.

3. Remove the safety cable from its latch and set the bezel aside.

4. Locate the litho wheels. Refer to Figure B-9.
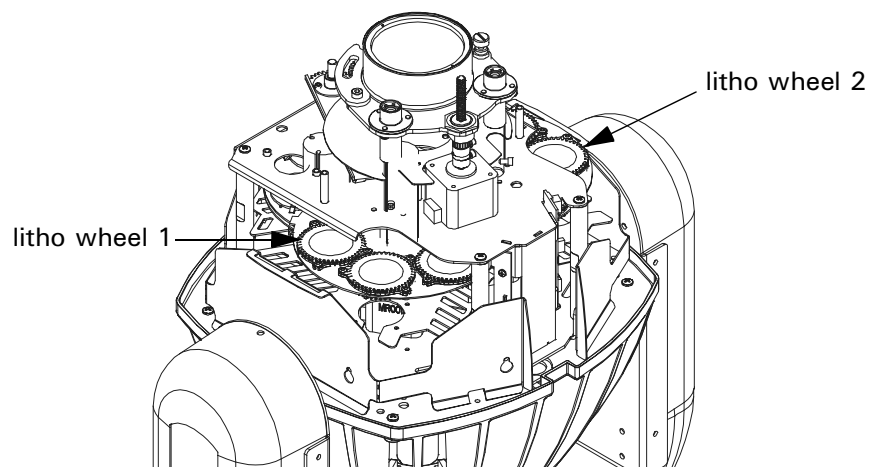
Figure B-9. Locating the Litho/Effect Wheels

5. Rotate the desired wheel to the litho or effect you want to replace. Take note of the positions in relation to the tabs. Refer to Figure B-10.
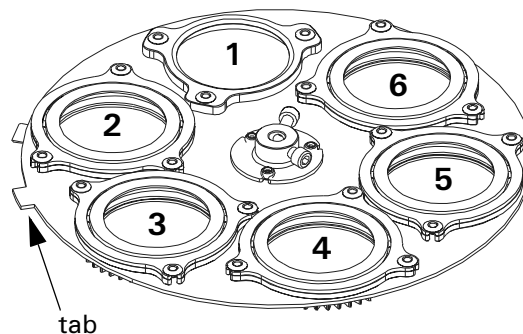
Figure B-10. Factory Litho Wheel Positions

6. Locate the spring securing the litho or effect to the wheel. Pull the spring tip towards the center of the aperture. Refer to Figure B-11. The spring will release from its groove inside the aperture.
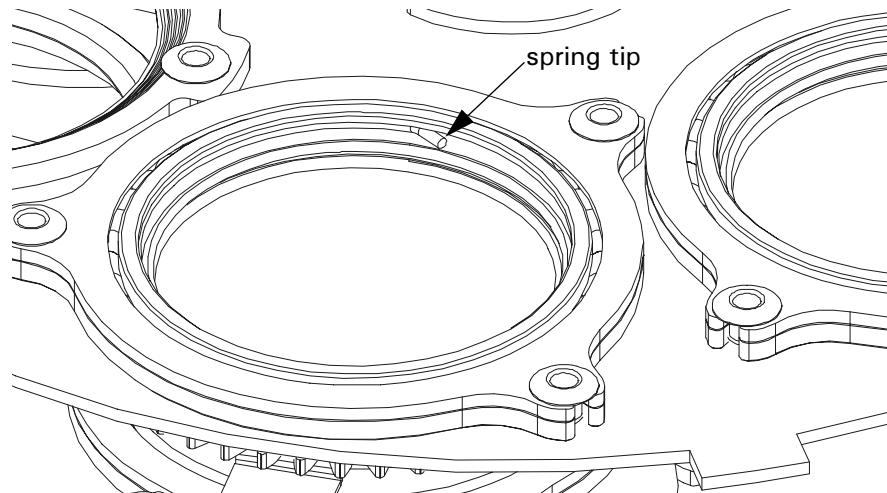
spring tip

Figure B-11. Removing the Securing Spring

7. Remove the spring and litho/effect from the aperture.

8. Place the new litho, effect, or gobo into the aperture and replace the spring. If you are installing a litho, insert it with the <u>coated side away from the lamp</u>. To determine the coated side, refer to Figure B-8. However, if you are installing an effect, insert it with the smooth side towards the wheel.

⚠ **Caution: improper installation is likely to cause lithos to fail.**

9. Replace the bezel, secure the safety cable to its clamp, and relatch the bezel.

Note: *the bezel can only be replaced one way to ensure the safety cable can connect to its bracket*.

Appendix C
Supplemental Information

In this appendix you will:

❑ *convert MSpeed values to percentages and seconds (C-1)*
❑ *learn the possible color combinations (C-5)*
❑ *learn the beam diameter for each lens at various distances (C-6)*
❑ *learn what each factory macro does (C-7)*

Overview

Use this appendix to determine Studio Spot's MSpeed times, beam diameters, color combinations, and macro actions. Decimal values have been rounded to the nearest tenth.

Converting DMX Values to MSpeed Times

Use the following table to convert DMX values and fader percentages to the desired MSpeed time.

Note: *Studio Color and Studio Spot MSpeed times are identical.*

Table C.1: DMX Values to MSpeed Times

DMX Value	Fader %	MSpeed Time in Seconds	DMX Value	Fader %	MSpeed Time in Seconds	DMX Value	Fader %	MSpeed Time in Seconds
1	0.4	disable	12	4.7	236.8	23	9	215.9
2	0.8	disable	13	5.1	234.9	24	9.4	214
3	1.2	disable	14	5.5	233	25	9.8	212.2
4	1.6	252.7	15	5.9	231	26	10.2	210.4
5	2	250.7	16	6.3	229.1	27	10.6	208.5
6	2.4	248.7	17	6.7	227.2	28	11	206.7
7	2.7	246.7	18	7.1	225.3	29	11.4	204.9
8	3.1	244.7	19	7.5	223.4	30	11.8	203.1
9	3.5	242.7	20	7.8	221.5	31	12.2	201.3
10	3.9	240.8	21	8.2	219.6	32	12.5	199.5
11	4.3	238.8	22	8.6	217.8	33	12.9	197.7

DMX Value	Fader %	MSpeed Time in Seconds	DMX Value	Fader %	MSpeed Time in Seconds	DMX Value	Fader %	MSpeed Time in Seconds
34	13.3	195.9	61	23.9	151	88	34.5	111.9
35	13.7	194.2	62	24.3	149.5	89	34.9	110.6
36	14.1	192.4	63	24.7	147.9	90	35.3	109.3
37	14.5	190.6	64	25.1	146.4	91	35.7	108
38	14.9	188.9	65	25.5	144.9	92	36.1	106.6
39	15.3	187.2	66	25.9	143.3	93	36.5	105.3
40	15.7	185.4	67	26.3	141.8	94	36.9	104.1
41	16.1	183.7	68	26.7	140.3	95	37.3	102.8
42	16.5	182	69	27.1	138.8	96	37.6	101.5
43	16.9	180.3	70	27.5	137.3	97	38	100.2
44	17.3	178.6	71	27.8	135.9	98	38.4	99
45	17.6	176.9	72	28.2	134.4	99	38.8	97.5
46	18	175.2	73	28.6	132.9	100	39.2	96.5
47	18.4	173.6	74	29	131.5	101	39.6	95.2
48	18.8	171.9	75	29.4	130	102	40	94
49	19.2	170.4	76	29.8	128.6	103	40.4	92.8
50	19.6	168.6	77	30.2	127.2	104	40.8	91.5
51	20	167	78	30.6	125.7	105	41.2	90.3
52	20.4	165.3	79	31	124.3	106	41.6	89.1
53	20.8	163.7	80	31.4	122.9	107	42	88
54	21.2	162.1	81	31.8	121.5	108	42.4	86.8
55	21.6	160.5	82	32.2	120.1	109	42.7	85.6
56	22	159.9	83	32.5	118.7	110	43.1	84.4
57	22.4	157.5	84	32.9	117.4	111	43.5	83.3
58	22.7	155.7	85	33.3	116	112	43.9	82.1
59	23.1	154.1	86	33.7	114.6	113	44.3	81
60	23.5	152.6	87	34.1	113.3	114	44.7	79.8

Table C.1: DMX Values to MSpeed Times (Continued)

DMX Value	Fader %	MSpeed Time in Seconds	DMX Value	Fader %	MSpeed Time in Seconds	DMX Value	Fader %	MSpeed Time in Seconds
115	45.1	78.7	142	55.7	51.3	169	66.3	29.8
116	45.5	77.6	143	56.1	50.4	170	66.7	29.1
117	45.9	76.5	144	56.5	49.5	171	67.1	28.2
118	46.3	75.4	145	56.9	48.7	172	67.5	27.8
119	46.7	74.3	146	57.3	47.8	173	67.8	27.1
120	47.1	73.2	147	57.6	46.9	174	68.2	26.4
121	47.5	72.1	148	58	46	170	66.7	29.1
122	47.8	71.1	149	58.4	45.2	171	67.1	28.2
123	48.2	70	150	58.8	44.3	172	67.5	27.8
124	48.6	68.9	151	59.2	43.5	173	67.8	27.1
125	49	67.9	152	59.6	42.7	174	68.2	26.4
126	49.4	66.9	153	60	41.9	175	68.6	25.8
127	49.8	65.8	154	60.4	41	176	69	25.2
128	50.2	64.8	155	60.8	40.2	177	69.4	24.5
129	50.6	63.8	156	61.2	39.4	178	69.8	23.9
130	51	62.8	157	61.6	38.6	179	70.2	23.3
131	51.4	61.8	158	62	37.9	180	70.6	22.7
132	51.8	60.8	159	62.4	37.1	181	71	22.1
133	52.2	59.8	160	62.7	36.3	182	71.4	21.5
134	52.5	58.8	161	63.1	35.6	183	71.8	20.9
135	52.9	57.9	162	63.5	34.8	184	72.2	20.4
136	53.3	56.9	163	63.9	34.1	185	72.5	19.8
137	53.7	56	164	64.3	33.3	186	72.9	19.2
138	54.1	55	165	64.7	32.6	187	73.3	18.7
139	54.5	54.1	166	65.1	31.9	188	73.7	18.1
140	54.9	53.2	167	65.5	31.2	189	74.1	17.6
141	55.3	52.2	168	65.9	30.5	190	74.5	17.1

DMX Value	Fader %	MSpeed Time in Seconds	DMX Value	Fader %	MSpeed Time in Seconds	DMX Value	Fader %	MSpeed Time in Seconds
191	74.9	16.6	217	85.1	5.9	244	95.7	0.63
192	75.3	16.1	218	85.5	5.6	245	96.1	0.55
193	75.7	15.6	219	85.9	5.3	246	96.5	0.47
194	76.1	15.1	220	86.3	5.1	247	96.9	0.41
195	76.5	14.6	221	86.7	4.8	248	97.3	0.35
196	76.9	14.1	222	87.1	4.5	249	97.6	0.29
197	77.3	13.6	223	87.5	4.3	250	98	0.25
198	77.6	13.2	224	87.8	4	251	98.4	0.21
199	78	12.7	225	88.2	3.8	252	98.8	0.19
200	78.4	12.3	226	88.6	3.5	253	99.2	0.17
201	78.8	11.8	227	89	3.3	254	99.6	0.15
202	79.2	11.4	228	89.4	3.1	255	100	0.15
203	79.6	11	229	89.8	2.9			
204	80	10.6	230	90.2	2.7			
201	78.8	11.8	231	90.6	2.5			
205	80.4	10.2	232	91	2.3			
206	80.8	9.8	233	91.4	2.1			
207	81.2	9.4	234	91.8	1.9			
208	81.6	9	235	92.2	1.8			
209	82	8.6	236	92.5	1.6			
210	82.4	8.3	237	92.9	1.4			
211	82.7	7.9	238	93.3	1.3			
212	83.1	7.6	239	93.7	1.2			
213	83.5	7.2	240	94.1	1.1			
214	83.9	6.9	241	94.5	0.94			
215	84.3	6.6	242	94.9	0.83			
216	84.7	6.2	243	95.3	0.73			

Color Combinations

Use the following table to determine the color combinations from the factory color wheels.

Table C.2: Color Combinations

Wheel 1	Wheel 2	Combination Color
2. yellow	2. cyan	dark green
2. yellow	3. light cyan	dark yellow green
2. yellow	4. indigo	does not mix
2. yellow	5. pink	orange
2. yellow	6. magenta	red
3. CTO	2. cyan	moonlight blue
3. CTO	3. light cyan	blue green
3. CTO	4. indigo	dark indigo
3. CTO	5. pink	cherry rose
3. CTO	6. magenta	red rose
4. aqua	2. cyan	primary green
4. aqua	3. light cyan	indigo
4. aqua	4. indigo	does not mix
4. aqua	5. pink	does not mix
4. aqua	6. magenta	does not mix
5. pink	2. cyan	medium blue
5. pink	3. light cyan	congo blue
5. pink	4. indigo	indigo
5. pink	5. pink	pink
5. pink	6. magenta	broadway pink
6. magenta	2. cyan	indigo
6. magenta	3. light cyan	rose indigo
6. magenta	4. indigo	indigo
6. magenta	5. pink	broadway pink
6. magenta	6. magenta	magenta

Calculating Beam Diameters

Use the following table to calculate the beam diameter with each type of lens. Calculations can be used for feet or meters.

Table C.3: Calculating Beam Diameters

Distance From Fixture	13° Lens Diameter	18° Lens Diameter	30° Lens Diameter
5	1.1	1.6	2.7
10	2.3	3.2	5.4
15	3.4	4.8	8
20	4.5	6.3	10.7
25	5.7	7.9	13.4
30	6.8	9.5	16.1
35	8	11.1	18.8
40	9.1	12.7	21.4
45	10.3	14.3	24.1
50	11.4	15.8	26.8
55	12.5	17.4	29.5
60	13.7	19	32.2
65	14.8	20.6	34.8
70	16	22.2	37.5
75	17.1	23.8	40.2
80	18.2	25.3	42.9
85	19.4	26.9	45.6
90	20.5	28.5	48.2
95	21.6	30.1	50.9
100	22.8	31.7	53.6

Determining Macro Functions

Use the following table to determine what each factory macro does. Macros 9-26 are undetermined for software version 6.

Table C.4: Macro Functions

Macro	*Description*	*Constructs Used*
1	Odd addressed fixtures perform a 'lazy 8' movement followed by even addressed fixtures.	• pan • tilt
2	Sequentially addressed fixtures in groups of two perform 'ballyhoo' movements.	• pan • tilt
3	Sequentially addressed fixtures in groups of four perform a tilt 'wave.' This moves tilt from back to front with the shutter open and then moves tilt from front to back with the shutter closed.	• tilt • shutter
4	Odd addressed fixtures perform a pan 'lighthouse' movement followed by even addressed fixtures. This moves pan from left to right for 360° with the shutter open and then moves pan from right to left for 360° with the shutter closed.	• pan • shutter
5	Odd addressed fixtures perform 'swoop' movement followed by even addressed fixtures.	• pan • tilt • dim
6	Sequentially addressed fixtures in groups of four perform 'swoop' movements.	• pan • tilt • dim
7	Odd addressed fixtures perform a slow dim ramp up and ramp down followed by even addressed fixtures.	• dim
8	Sequentially addressed fixtures in groups of four perform a slow dim ramp up and ramp down.	• dim
9		
10		
11		
12		
13		
14		
15		
16		

Table C.4: Macro Functions

Macro	Description	Constructs Used
17		
18		
19		
20		
21		
22		
23		
24		
25		
26		

Appendix D
Important Safety Information

Warning: For Continued Protection Against Fire

1. This equipment is designed for use with Phillips Type MSR 575/2 or MSD 575 lamp only. Use of any other type lamp may be hazardous and will void the warranty.
2. Do not mount on a flammable surface.
3. Maintain minimum distance of 1.0 meter (3.28 feet) from combustible materials.
4. Replace fuses only with the specified type and rating.
5. Observe minimum distance to lighted objects of 1.0 meter (3.28 feet).
6. This equipment for connection to branch circuit having a maximum overload protection of 20 A.

Warning: For Continued Protection Against Electric Shock

If this equipment was received without a line cord plug, attach the appropriate line cord plug according to the following code:

- brown–live
- blue–neutral
- green/yellow–earth

As the colours of the cores in the mains lead of this equipment may not correspond with the coloured markings identifying the terminals in your plug, proceed as follows:

- the core which is coloured green and yellow must be connected to the terminal in the plug which is marked with the letter E or by the earth symbol ⏚, or coloured green or green and yellow.
- the core which is coloured blue must be connected to the terminal which is marked with the letter N or coloured black.
- the core which is coloured brown must be connected to the terminal which is marked with the letter L or coloured red.
1. This equipment must be earthed.
2. Disconnect power before re-lamping or servicing.
3. Equipment suitable for dry locations only. Do not expose this equipment to rain or moisture.
4. Refer servicing to qualified personnel; no user serviceable parts inside.
5. Class I equipment - this fixture employs a grounded type receptacle and is not intended for connection to a two wire, ungrounded source of supply.

Warning: For Continued Protection Against Exposure To Excessive Ultraviolet (UV) Radiation

1. Do not operate this equipment without complete lamp enclosure in place or if shields, lenses, or ultraviolet screens are damaged.
2. Change shields, lenses, or ultraviolet screens if they have become visibly damaged to such an extent that their effectiveness is impaired, for example by cracks or deep scratches.
3. Never look directly at the lamp while lamp is on.

Warning: For Continued Protection Against Injury To Persons

1. Use secondary safety cable when mounting this fixture.
2. Caution: hot lamp may be an explosion hazard. Do not open for 5 minutes after switching off. Wear eye and hand protection when re-lamping.
3. Equipment surfaces may reach temperatures up to 200 degrees C (284 degrees F). Allow 5 minutes for cooling before handling.
4. Change the lamp if it becomes damaged or thermally deformed.

Appendice D
Importantes Informations Sur La Sécurité

Mise en garde: pour une protection permanente contre les incendies

1. Cet appareil est conçu pour être exclusivement utilisé avec des lampes de 575 watts MSR 575/2-MSD 575. L'usage d'autres lampes peut être risqué et annulera la garantie.
2. Ne pas monter les lampes sur une surface inflammable.
3. Maintenir à une distance minimum de 1.0 mètre de matières inflammables.
4. Ne remplacer les fusibles qu'avec des modèles et valeurs assignées recommandés.
5. Respecter une distance minimum de 1.0 mètre par rapport aux objets éclairés.
6. Cet appareil de connection au circuit de dérivation comporte une protection contre les surcharges de 20 A.

Mise en garde: pour une protection permanente contre les chocs électriques

1. Assembler le câble électrique conformément aux instructions du manuel.
2. Débrancher le courant avant de changer les lampes ou d'effectuer des réparations.
3. Cet équipement doit être uniquement utilisé dans des endroits secs. Ne pas l'exposer à la pluie ou l'humidité.
4. À l'intérieur de l'équipement il n'y a pas de pièces remplaçables par l' utilisateur. Confiez l'entretien à un personnel qualifié.
5. Equipement de Classe I - Cette pièce fixe utilise une prise de courant branché à la terre et elle ne doit pas être branché à une source électrique, non reliée à la terre, à double fil.

Mise en garde: pour une protection permanente contre des expositions excessives aux rayons ultra violets (UV)

1. Ne pas utiliser cet appareil si le boîtier de la lampe n'est pas complètement fixé ou si les blindages, lentilles, ou écrans ultraviolets sont endommagés.
2. Changer les blindages ou les écrans ultraviolets s'ils sont visiblement endommagés au point que leur efficacité aient été altérée, par exemple par des fissures ou de profondes égratignures.
3. Ne jamais regarder directement la lampe quand celle ci est allumée.

Mise en garde: pour une protection permanente contre les blessures corporelles

1. Lors de l'assemblage, utiliser un câble de sécurité secondaire.
2. AVERTISSEMENT: les lampes chaudes comportent un risque d'explosion. Après l'avoir éteinte, attendre 5 minutes avant de la dégager. Lors du remplacement de la lampe, une protection des yeux et des mains est requise.
3. Les surfaces de l'appareil peuvent atteindre des températures de 200 C. Laisser refroidir pendant 5 minutes avant la manipulation.
4. Changer la lampe si elle est endommagée ou thermiquement déformée.

Anhang D
Wichtige Hinweise Für Ihre Sicherheit

WARNUNG: ZUM SCHUTZ VOR BRANDGEFAHR

1. Dieses Gerät darf nur mit 575 Watt Lampen vom Typ MSR 575/2-MSD 575 von Philips verwendet werden. Die Verwendung von Lampen eines anderen Typs kann gefährlich sein und ein Erlöschen der Garantieansprüche zur Folge haben.
2. Das Gerät nie auf einer feuergefährlichen Fläche montieren.
3. Stets einen Mindestabstand von 1 Meter zu brennbaren Materialien einhalten.
4. Zum Ersatz nur Sicherungen verwenden, die dem vorgeschriebenen Typ und Nennwert entsprechen.
5. Einen Mindestabstand von 1 Meter zu den angestrahlten Objekten einhalten.
6. Dieses Gerät darf nur an eine Zweigleitung mit einem Überlastungsschutz von höchstens 20 A angeschlossen werden.

WARNUNG: ZUM SCHUTZ GEGEN GEFÄHRLICHE KÖRPERSTRÖME

1. Bei der Installation des Netzkabels am Lampensockel folgen Sie bitte Anweisungen in diesem Handbuch.
2. Vor dem Austauschen von Lampen oder vor Wartungsarbeiten stets den Netzstecker ziehen.
3. Diese Geräte sind nur zum Einbau in trockenen Lagen bestimmt und müssen vor Regen und Feuchtigkeit geschützt werden.
4. Servicearbeiten sollten nur von Fachpersonal ausgeführt werden. Das Gerät enthält keine wartungsbedürftigen Teile.

5. Dieses Gerät gehört zur Klasse 1 - Dieser Beleuchtungskörper verwendet eine geerdete Fassung und sollte nicht an eine zweipolige, ungeerdete Stromversorgung angeschlossen werden.

WARNUNG: ZUM SCHUTZ GEGEN ÜBERMÄSSIGE ULTRAVIOLETT (UV)-BESTRAHLUNG

1. Benutzen Sie dieses Gerät nur, wenn das komplette Lampengehäuse fest eingebaut ist; ebenfalls dürfen keine der Schutzabdeckungen, Linsen oder der UV-Schutz Beschädigungen aufweisen.
2. Die Schutzabdeckungen, Linsen und der UV-Schutz müssen ausgewechselt werden, wenn sie sichtlich dermaßen beschädigt sind, daß sie ihre Wirksamkeit einbüßen, z.B. infolge von Rissen oder tiefen Kratzern.
3. Nie direkt in die eingeschaltete Lampe schauen.

WARNUNG: ZUM SCHUTZ VOR VERLETZUNGEN

1. Verwenden Sie bei der Installation des Beleuchtungskörpers ein zusätzliches Sicherheitskabel.
2. VORSICHT: Bei einer heiße Lampe besteht Explosionsgefahr. Nach dem Abschalten der Netzspannung sollten Sie etwa 6 Minuten warten, bevor Sie das Lampengehäuse öffnen. Schützen Sie beim Auswechseln der Lampen Ihre Hände und tragen Sie eine Schutzbrille.
3. Die Oberflächen des Gerätes können Temperaturen bis zu 200 C erreichen. Vor dem Anfassen stets 5 Minuten lang abkühlen lassen.
4. Falls die Lampe beschädigt oder durch Wärmeeinwirkung verformt ist, muß sie ausgewechselt werden.

Apéndice D
Información Importante De Seguridad

ADVERTENCIA: PARA PROTECCIÓN CONTINUA CONTRA INCENDIOS:

1. Se ha diseñado este equipo para usarse con lámpara tipo Philips MSR 575/2-MSD 575, 575 vatios. El uso de otro tipo de lámpara puede resultar peligroso e invalidará la garantía.
2. No monte el equipo sobre una superficie inflamable.
3. Mantenga una distancia mínima de materiales combustibles de 1.0 metro.
4. Cambie los fusibles únicamente por otros que sean del tipo y la clasificación especificadas.
5. Observe una distancia mínima a objetos iluminados de 1.0 metro.
6. Este equipo debe conectarse a un circuito derivado que tenga una protección máxima contra las sobrecargas de 20 A.

ADVERTENCIA: PARA LA PROTECCIÓN CONTINUA CONTRA ELECTROCU-CIONES

1. Ensamble la tapa del cordón de alimentación según las instrucciones del manual.
2. Desconecte el suministro de energía antes de recambiar lámparas o prestar servicio de reparación.
3. Este equipo se adecua a lugares secos solamente. no lo exponga a la lluvia o humedad.
4. Derive el servicio de reparación de este equipo al personal calificado. el interior no contiene repuestos que puedan ser reparados por el usuario.
5. Equipo de clase 1. Este aparato emplea un enchufe hembra del tipo unido a tierra, y no tiene por finalidad conectarse a una fuente de alimentación bifilar y sin puesta a tierra.

ADVERTENCIA: PARA PROTECCIÓN CONTINUA CONTRA LA EXPOSICIÓN A RADIACIÓN ULTRAVIOLETA (UV) EXCESIVA

1. No opere este equipo sin tener colocada en su lugar la caja protectora completa de la lámpara o bien, si el blindaje , los lentes o las pantallas ultravioletas están dañadas.
2. Cambie el blindaje, los lentes o las pantallas ultravioleta si nota una avería visible, a tal grado que su eficacia se vea comprometida. Por ejemplo, en el caso de grietas o rayaduras profundas.
3. Jamás mire directamente a la lámpara en tanto ésta esté encendida.

ADVERTENCIA: PARA PROTECCIÓN CONTINUA CONTRA LESIONES CORPO-RALES

1. Use cable secundario de seguridad al montar este aparato.
2. Precaución: una lámpara caliente puede constituir un peligro de explosión. No la abra por 5 minutos luego de haberla apagado. lleve puestos un protector ocular y guantes al recambiar lámparas.
3. Las superficies del equipo pueden alcanzar temperaturas máximas de 200 grados centígrados. Deje que se enfríen por 5 minutos antes de tocarlas.
4. Cambie la lámpara si ésta se avería o deforma por acción térmica.

Appendice D
Importanti Informazioni Di Sicurezza

AVVERTENZA: PER PREVENIRE INCENDI:

1. Questa apparecchiatura e' stata disegnata per usarsi soltanto con le lampa-dine tipo MSR 575/2-MSD 575 di 575 watt. Se si usa qualsiasi altro tipo di lampadina potrebbe essere pericoloso e causa l' annullamento della garanzia.
2. Da non montare sopra una superficie infiammabile.
3. Mantenere l' apparecchio a un minimo di 1.0 metri (3.28 piedi) di distanza dai materiali combustibili.
4. Rimpiazare i fusibili usando soltanto quelli del tipo e della taratura adatta.
5. Mantenere una distanza minima di 1.0 metri (3.28 piedi) dagli oggetti accesi.
6. Questa apparecchiatura e' da collegarsi ad un circuito derivato con una pro-tezzione da sovraccarico massima di 20 amperes.

AVVERTENZA: PER PREVENIRE LE SCOSSE ELETTRICHE:

1. Montare la cappa del cavo seguendo le istruzioni del manuale.
2. Disinnestare la corrente prima di cambiare la lampadina o prima di eseguire qualsiasi riparazione.
3. Questa apparecchiatura e' da usarsi in ambienti secchi. non e' da essere esposta ne alla pioggia ne all' umidita'.
4. Per qualsiasi riparazione rivolgersi al personale specializzato. L' utente non deve riparare nessuna parte dentro l' unita'.
5. Aparecchio di classe i - questa apparecchiatura usa un una presa a terra, e non e' da collegarsi a una alimentazione di corrente a due cavi che non sia a terra.

AVVERTENZA: PER PROTEGGERSI CONTRO LE RADIAZIONI DEI RAGGI ULTRAVIOLETTI:

1. Non usare questa apparecchiatura se il sistema di chiusura della lampadina non e' completo o se gli scudetti, le lenti, o gli schermi ultravioletti si sono visibilmente danneggiati di maniera tale che la loro efficacia sia stata ridotta --- ad esempio, se vi sono visibili spaccature o graffi profondi. Mai guardare direttamente verso la lampadina quando sia accesa.

AVVERTENZA: PER NON FERIRE AD ALTRE PERSONE:

1. Al montare questa apparechiatura, usare un secondo cavo di sicurezza.
2. Avvertenza: la lampadina calda potrebbe esplodere. spegnerla per 5 minuti prima di aprirla. usare protezzioni per le mani e per gli occhi prima di cambi-are la lampadina.
3. Le superfici della apparecchiatura possono arrivare a temperature di 200 gradi centrigradi (302 gradi f). aspettare 5 minuti prima di maneggiare.
4. Cambiare la lampadina se si danneggia o se si e' deformata dovuto alle alte temperature.

Appendiks D
Vigtig Sikkerhedsinformation

Advarsel: Beskyttelse mod elektrisk chock.

VIGTIGT! LEDEREN MED GUL/GROEN ISOLATION MAA KUN TILSLUTTES

KLEMME MAERKET ⏚ ELLER ⏛ .

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