**CHRISTIE**®

## Solaria™ Series

# CP4230

USER MANUAL

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## USER MANUAL

020-100621-01

# NOTICES

## COPYRIGHT AND TRADEMARKS

## REGULATORY

The product 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 product is operated in a commercial environment. The product 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 the product in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at the user's own expense.

This Class A digital apparatus complies with Canadian ICES-003.
Cet appareil numérique de la classe A est conforme à la norme NMB-003 du Canada.

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## GENERAL

Every effort has been made to ensure accuracy, however in some cases changes in the products or availability could occur which may not be reflected in this document. Christie reserves the right to make changes to specifications at any time without notice. Performance specifications are typical, but may vary depending on conditions beyond Christie's control such as maintenance of the product in proper working conditions. Performance specifications are based on information available at the time of printing. Christie makes no warranty of any kind with regard to this material, including, but not limited to, implied warranties of fitness for a particular purpose. Christie will not be liable for errors contained herein or for incidental or consequential damages in connection with the performance or use of this material.

The product is designed and manufactured with high-quality materials and components that can be recycled and reused.  This symbol means that electrical and electronic equipment, at their end-of-life, should be disposed of separately from regular waste. Please dispose of the product appropriately and according to local regulations.  In the European Union, there are separate collection systems for used electrical and electronic products.  Please help us to conserve the environment we live in!

Canadian manufacturing facility is ISO 9001 and 14001 certified.

## WARRANTY

For complete information about Christie's limited warranty, please contact your Christie dealer.  In addition to the other limitations that may be specified in Christie's limited warranty, the warranty does not cover:

a. Damage occurring during shipment, in either direction.
b. Projector lamps (See Christie's separate lamp program policy).
c. Damage caused by use of a projector lamp beyond the recommended lamp life, or use of a lamp supplied by a supplier other than Christie.
d. Problems caused by combination of the product with non-Christie equipment, such as distribution systems, cameras, video tape recorders, etc., or use of the product with any non-Christie interface device.
e. Damage caused by misuse, improper power source, accident, fire, flood, lightening, earthquake or other natural disaster.
f. Damage caused by improper installation/alignment, or by product modification, if by other than a Christie authorized repair service provider.
g. For LCD projectors, the warranty period specified applies only where the LCD projector is in "normal use." "Normal use" means the LCD projector is not used more than 8 hours a day, 5 days a week. For any LCD projector where "normal use" is exceeded, warranty coverage under this warranty terminates after 6000 hours of operation.
h. Failure due to normal wear and tear.

## PREVENTATIVE MAINTENANCE

Preventative maintenance is an important part of the continued and proper operation of your product. Please see the Maintenance section for specific maintenance items as they relate to your product.  Failure to perform maintenance as required, and in accordance with the maintenance schedule specified by Christie, will void the warranty.

# 1: Introduction

## 3: Operation

## 5: Troubleshooting

## 6: Specifications

# 1 Introduction

## 1.1 Using this Manual

**USERS/OPERATORS:** This manual is intended for trained users authorized to operate professional high-brightness projection systems, located in restricted areas, such as projection rooms in theatres. Such users may also be trained to replace the lamp and air filter, but cannot install the projector or perform any other functions inside the projector. **NOTE:** *Only personnel trained specifically by Christie on lamp replacement and lamp safety may handle the lamp.*

**SERVICE:** Only qualified Christie trained service technicians knowledgeable about all potential hazards associated with high voltage, ultraviolet exposure and high temperatures generated by the lamp and associated circuits are authorized to 1) assemble/install the projector and 2) perform service functions inside the projector.

This manual contains the following sections:

- *Section 1 Introduction*
- *Section 2 Installation and Setup*
- *Section 3 Operation*
- *Section 4 Maintenance*
- *Section 5 Troubleshooting*
- *Section 6 Specifications*
- *Appendix A: Intelligent Lens System*
- *Appendix B: Serial API*
- *Appendix C: SCCI Port*
- *Appendix D: GPIO Port*
- *Appendix E: 3D Connector*

Disclaimer: *Every effort has been made to ensure the information in this document is accurate and reliable. However, due to constant research, the information in this document is subject to change without notice. Christie Digital Systems assumes no responsibility for omissions or inaccuracies. Updates to this document are published regularly, as required. Please contact Christie Digital Systems for availability.*

### 1.1.1 Typographical Notations

The following notations are used throughout this manual:

- Keypad commands and PC keystrokes appear in bold small caps, such as POWER, INPUT, ENTER etc.
- References to specific areas of the document appear italicized and underlined. When viewed online the text appears in blue indicating a direct link to that section. For example, *Section 2 Installation and Setup*.
- References to other documents appear italicized and bold, such as *Service Manual*.
- References to software menus and available options appear bold, such as Main panel, Preferences.
- User input or messages that appear on screen, in status display units or other control modules appear in Courier font. For example. "No Signal Present", Login: christiedigital.
- Error codes, LED status appear in bold, e.g. LP, A1 etc.
- Operational states of modules appear capitalized, such as power ON/OFF.

## 1.1.2 List of Abbreviations

The following list of abbreviations are used throughout this manual.

| | |
|---|---|
| API | Application Programming Interface |
| DMD | Digital Micromirror Device |
| DVI | Digital Visual Interface |
| CFM | Cubic Feet per Minute |
| GPIO | General Purpose Input/Output |
| IMCB | Integrated Motor Control Board |
| IOS | Illumination Optics System |
| IR | Infrared |
| LED | Light Emitting Diode |
| LPS | Lamp Power Supply |
| LVPS | Low Voltage Power Supply |
| MALM | Motorized Auxilary Lens Mount |
| RGB | Red, Green, Blue |
| SCCI | Simple Contact Closure Interface |
| TPC | Touch Panel Controller |
| UV | Ultraviolet |

# 1.2 Safety Warnings and Guidelines

## 1.2.1 Labels and Markings

Observe and follow any warnings and instructions marked on the projector.

**⚠ DANGER** **Danger symbols indicate a hazardous situation which, if not avoided, will result in death or serious injury. This signal word is to be limited to the most extreme situations.**

**⚠ WARNING** **Warning symbols indicate a hazardous situation which, if not avoided, could result in death or serious injury.**

**⚠ CAUTION** **Caution symbols indicate a hazardous situation which, if not avoided, could result in minor or moderate injury.**

**NOTICE!** *Addresses practices not related to personal injury.*

### 1.2.2 General Precautions

**⚠ WARNING** Never look directly into the projector lens or at the lamp. The extremely high brightness can cause permanent eye damage. For protection from ultraviolet radiation, keep all projector housings intact during operation. Protective safety gear and safety goggles are recommended when servicing.

**⚠ WARNING** FIRE HAZARD! Keep hands, clothes, and all combustible material away from the concentrated light beam of the lamp.

**⚠ CAUTION** Position all cables where they cannot contact hot surfaces or be pulled or tripped over.

**⚠ CAUTION** 1) The American Conference of Governmental Industrial Hygienists (ACGIH) recommends occupational UV exposure for an 8-hour day to be less than 0.1 microwatts per square centimeters of effective UV radiation. An evaluation of your workplace is advised to assure employees are not exposed to cumulative radiation levels exceeding the government guidelines for your area. 2) Be aware that some medications are known to increase sensitivity to UV radiation.

This projector must be operated in an environment that meets the operating range specification, as listed in *Section 6 Specifications*.

### 1.2.3 AC / Power Precautions

Installation of this projector requires that an electrician hard-wire (permanent-wire) a single-phase feed from the projector to the AC supply at the building site. Operate the projector at the specified voltage.

**⚠ WARNING**

Disconnect projector from AC before opening any enclosure.

**⚠ CAUTION**

1) DO NOT allow anything to rest on the power cord. Locate the projector where the cord cannot be abused by persons walking on it or objects rolling over it. Never operate the projector if the power cable appears damaged in any way.

2) DO NOT overload power outlets and extension cords as this can result in fire or shock hazards.

3) Note that only qualified service technicians are permitted to open any enclosure on the product and only if the AC has been fully disconnected from the product.

#### Power Cords and Attachments

**⚠ WARNING** 1) The North American rated line cord is provided with each projector. Ensure that you are using a line cord, socket and power plug that meets the appropriate local rating standards. 2) Use only an AC power cord recommended by Christie. Do not attempt operation if the AC supply and cord are not within the specified voltage and power range.

Use only the attachments and/or accessories recommended by Christie. Use of others may result in the risk of fire, shock or personal injury.

## 1.2.4 Lamp Precautions

Any lamp used in the CP4230 is under high pressure and must be handled with great care at all times. Lamps may explode if dropped or mishandled.

⚠ **DANGER** EXPLOSION HAZARD! Wear authorized protective safety gear whenever the lamp door is open!

### Wear Protective Clothing

Never open the lamp door unless you are wearing authorized protective clothing such as that included in a Christie Protective Clothing Safety Kit #598900-095.

Recommended protective clothing includes, but may not be limited to a polycarbonate face shield, protective gloves, and a quilted ballistic nylon jacket or a welder's jacket.

**NOTE:** *Christie's protective clothing recommendations are subject to change. Any local or federal specifications take precedence over Christie recommendations.*

### Cool the Lamp Completely

⚠ **DANGER** Lamp may explode causing bodily harm or death. 1) Always wear protective clothing whenever lamp door is open or while handling lamp. 2) Ensure those within the vicinity of the projector are also suited with protective clothing. 3) Never attempt to access the lamp while the lamp is on. Wait at least 10 minutes after the lamp turns OFF before powering down, disconnecting from AC and opening the lamp door.

The arc lamp operates at a high pressure that increases with temperature. Failure to allow the lamp to sufficiently cool prior to handling increases the potential for an explosion causing personal injury and/or property damage. After turning the lamp OFF, it is crucial that you *wait at least 10 minutes* before disconnecting AC and opening the lamp door. This provides enough time for the cooling fans to properly cool the lamp. Ensure the lamp is completely cooled before handling and <u>always</u> wear protective clothing!

For all other precautions critical for safe removal and replacement of the lamp, refer to *4.2.6 Lamp Replacement, on page 4-6*.

## 1.3   Purchase Record and Service Contacts

Whether the projector is under warranty or the warranty has expired, Christie's highly trained and extensive factory and dealer service network is always available to quickly diagnose and correct projector malfunctions. Complete service manuals and updates are available for all projectors. Should a problem be encountered with any part of the projector, contact your dealer. In most cases, servicing is performed on site. If you have purchased the projector, fill out the information below and keep with your records.

**Table 1.1 Purchase Record**

| |
|---|
| **Dealer:** |
| **Dealer or Christie Sales/Service Contact Phone Number:** |
| **Projector Serial Number*:** |
| **Purchase Date:** |
| **Installation Date:** |

*\* The serial number can be found on the license label located on the front panel.*

**Table 1.2 Ethernet Settings**

| | |
|---|---|
| **Default Gateway** | |
| **Projector IP Address** | |
| **Subnet Mask** | |

## 1.4    Projector Overview

The CP4230 is a professional quality, easy-to-use split-body DMD™ projector utilizing Digital Light Processing (DLP™) Cinema technology from Texas Instruments. It's unique separation of projector and lamp power supply means both parts can be installed with greater ease, providing the ideal solution for tight spaces and challenging installations. Integrating smoothly into traditional projection environments such as theatres and other wide screen exhibitor venues, the CP4230 offers stunning wide screen, high-resolution 2D or 3D cinema images that remain flawless from first release to final show. CP4230 interfaces with local networks typical in theatres throughout the world, and can be expanded even further by connecting non-cinema DVI source material for multimedia presentations from a variety of formats.
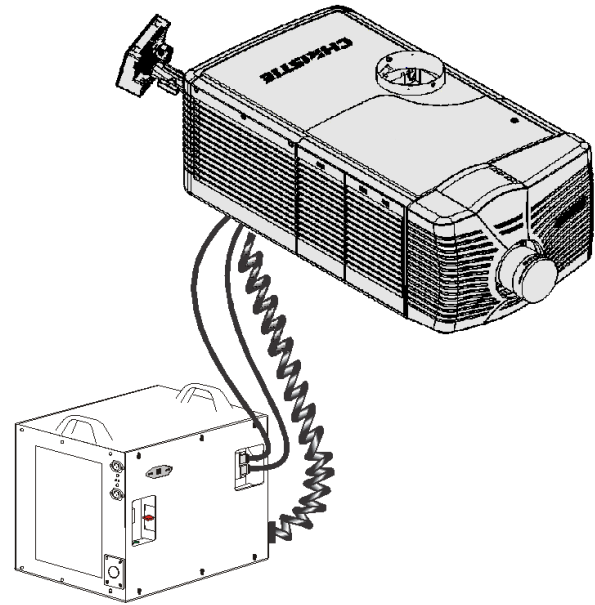
**Figure 1-1 CP4230 Projector (shown with 7kW external lamp power supply)**

### 1.4.1    Key Features

- Three-chip 4K DLP Cinema™ light engine
- 4096 x 2160 native pixel format
- CineBlack™ and CinePalette™ for deep film-like blacks and superior colorimetry
- 2.0, 3.0, 4.5, and 6.0kW Xenon lamps available
- Supports theatre screens up to approximately 100 feet in width
- Touch Panel Controller (TPC) running Windows XPe for main projector interface. Ensure you have the latest software by visiting *http://www.christiedigital.com*.
- Seamless switching between 292 and DVI inputs
- Capable of supporting an internal Image Media Block (IMB)
- One 10/100BaseT Ethernet port for connection to in-theatre Ethernet hub
- Two RS-232 ports for communication: one for Christie-supported peripherals (except Cine-IPM) and one for TI
- One GPIO port for control of automation
- One Simple Contact Closure Input (SCCI) for automated Lamp Start and Dowser operation, as well as a Health Status output signal
- Two DVI-D inputs for display of copy protected alternate content
- Two USB ports on the back of the TPC for direct laptop connection, useful during setup and local software downloads
- One 3D port for interfacing to third-party 3D systems
- LiteLOC™ feature for constant image brightness
- LampLOC™ feature for motorized three-axis lamp alignment
- Electronically operated "quick" douser
- Motorized lens mount

- LED indicators on the rear corners of the projector for easy-to-read status indication
- Secure, encrypted communication protocol with multi-level password access
- High-security lock on SPB2 boundary for front electronics and content protection
- Low and medium-security locks or captive fasteners on access doors for internal maintenance
- Replaceable air filters (no tools required)
- Capability to split power supply for use of Uninterruptible Power Supply (UPS) to power head electronics
- Optional Rack Mount Stand
- Choice of field-interchangeable zoom lenses and anamorphic lenses
- Optional Motorized Auxiliary Lens Mount (MALM) for anamorphic or auxiliary lenses

### 1.4.2 How the Projector Works

The CP4230 accepts a variety of cinema or DVI-compatible "non-cinema" signals for projection on front screens typical in commercial theatre or other large screen applications. High-brightness light is generated by a short arc Xenon lamp, then modulated by three Digital Micromirror Device (DMD) panels responding to incoming data streams of digitized red, green and blue color information. As these digital streams flow from the source, light from the responding "on" pixels of each panel is reflected, converged and then projected to the screen through one or more front lenses, where all pixel reflections are superimposed in sharp full-color images.

### 1.4.3 Projector Components - Overview
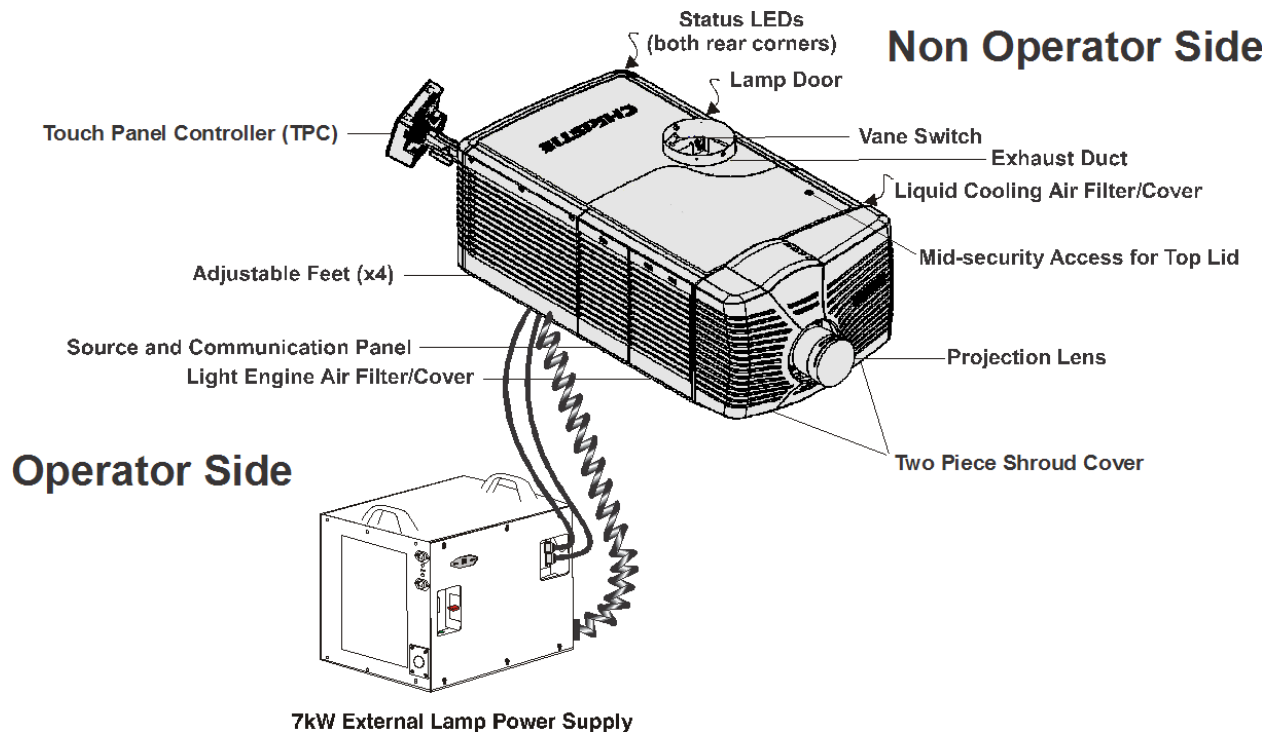


**Figure 1-2 Projector Overview**

### Air Filter Cover and Air Filter

Located directly behind the air filter cover is a field replaceable air filter. The air filter is responsible for filtering the intake air before it begins circulating in the front compartment to cool the main electronics. Replace the air filter whenever the lamp is replaced or sooner in dusty/dirty environments. Check the condition monthly. Refer to *4.2.8 Air Filter Replacement, on page 4-9* for complete instructions.

### Manual Douser Override

For most instances, use the douser control buttons on the TPC to blank the display for instant picture muting. Closing the douser rotates a shutter blade in front of the illumination system and reduces lamp power to 2kW to conserve lamp life. Using the switch at the back of the projector has the same affect, however it is not reflected in the TPC. The switch is meant for emergency use only.

### Exhaust Duct and Vane Switch

Located at the top of the projector is a 8" diameter exit port where heated air from cooling the lamp is extracted by an external heat extraction system provided by the installation site. Inside the rigid port is a vane switch which detects and monitors the amount of airflow at the opening. Refer to *2.1 Site Requirements, on page 2-1* for airflow requirements of the external heat extraction system.

### Adjustable Feet

For most cinema installations, the projector is inclined slightly forward to match screen tilt and to minimize the amount of vertical offset required. Turn the adjustable feet to increase or decrease the projector height as needed for proper leveling and/or slight tilt. A pair of extension rods are also provided with the projector if extra offset is required. Refer to *Adjusting Feet/Leveling, on page 2-5* for details. **NOTE:** *Before adjusting the projector's feet, ensure the projector is secured to its mounting surface with the supplied mandatory safety strap or if using the optional rack stand, the lock down foot bracket.*

### Lamp Door and Lamps

Located on the non-operator's side of the projector (right side when facing the front of the projector) is the lamp access door designed with a mid-security lock. The lamp door must remain closed and locked for all normal operation. Lamp replacement should only be performed by qualified technicians.

Any CP4230 lamp — 2.0kW, 3.0kW, 4.5kW or 6.0kW— can be used with the universal 7kW ballast. For more information on the available lamp types refer to *Section 6 Specifications*.

### LED Status Indicators

Located in the rear corners of the projector are two sets of LEDs, which illuminate to provide continuous feedback of the projector's status. Refer to *Section 3 Operation* for details on the various LED states.

### Motorized Auxiliary Lens Mount (MALM)

The MALM assembly is an optional hardware component, which is used to switch from flat to "scope" formats. This assembly is secured to the projector base and supports either a 1.25x anamorphic lens or a 1.26x wide converter lens (WCL). The drive and control electronics package for this motorized lens mount communicates with and is controlled by the projector over a 9-pin subminiature D cable that connects to the User I/O panel.

 **NOTE**: *Remove the shroud to install the MALM to the front plate of projector.*

## Projection Lens

A variety of lenses can be used with the CP4230. Refer to the *Section 6 Specifications* for a list of available lenses.

## RS-422 Connector

The RS-422 connector located on the front bezel is dedicated for the electrical connection of the Motorized Lens Mount.

## Security Locks

Critical internal components and/or connections are protected by various security locks on projector covers. The projector's covers cannot be removed with standard tools unless the key locks are open. This safeguard enables only authorized personnel to access and service components in these restricted areas.

Panels with high-security lock: Inside Security Boundary Lid on light engine (also called the SPB2)

Panels with mid-security lock: Top Lid, Lamp Door

No locks: Air Filter Access Panel (x2), Source and Communication Panel, and the shroud.

## Shroud

The CP4230 has a two piece shroud that covers the motorized lens mount assembly. The shroud is to be removed for installing a lens, MALM or when using some 3D equipment.

## Source and Communication Panel

Located on the operator's side of the projector (left side) is a communication panel that provides connection of external devices such as servers and a controller.

### PIB(Projector Intelligence Board) Faceplate Connections:

Ethernet: Use the 10Base-T/100Base-TX Ethernet port for network connection to the projector.

GPIO: Connect external I/O devices, such as the Christie ACT, for remote control of a limited number of projector functions. Refer to *Appendix D: GPIO Port* for GPIO pinouts.

DVI-A / DVI-B: Connect a variety of non-cinema video and graphics sources to either of these identical single-link DVI ports. These are single-link ports for single-link cables/connectors only. The connectors can be used together as a twin-link DVI port.

HD-SDI A/HD-SDI-B: Connect a variety of high-definition cinema sources to these SMPTE 292M bit-serial standard interface BNCs. The connectors can be used together to deliver Dual Link HD-SDI following the SMPTE 372M standard.

SCCI: A Simple Contact Closure Interface (SCCI) port that provides the following functions upon a simple dry contact closure: Lamp On/Off and Douser Open/Closed. Refer to *Appendix C: SCCI Port* for SCCI pinouts.

RS232 ICP: Connect a PC or laptop for direct DLP communication. Trained users required.

RS232 PIB: Utilizes Christie-proprietary protocol and is intended for Christie accessories or third-party automation equipment.

Marriage: Marriage must be established to allow the projector to play encrypted content. This means the security boundaries SPB1 and SPB2 are physically and electrically connected and that marriage is monitored 24/7. Marriage is initiated from a Wizard application on the TPC. A user with the appropriate

credentials is prompted to press the marriage button to establish marriage. If the button is pressed any other time it is ignored. Marriage cannot be established remotely.

Emergency Start: This button is recessed into the faceplate to prevent accidental activation. It should only be used when the TPC has failed or is disconnected. When pressed, the projector is powered on, the lamp is turned on and the douser is opened. When you press and hold this button, the douser is closed and the lamp is turned off, but power is still on.

Reset: This button is slightly recessed into the faceplate to prevent accidental activation. It's main purpose is to reset the electronics of the projector. After re-booting, the projector returns to the Standby power mode, therefore the lamp will require manual striking.

3D: Connect a variety of 3D products to this connector, such as MasterImage or Real D for polarizing and de-ghosting 3D content during projection.

### ICP Faceplate Connections

The ICP board provides the image processing electronics for the projector. The ICP faceplate includes a number of LEDs that are only functional when the projector is in full power mode.

- REGEN: (Regulators Enabled) This LED indicates the presence of the internal regulator enable signal. When illuminated BLUE the internal regulators are enabled. When OFF, not enabled.
- SOFTST: (Software State) This LED indicates the state of the software application. When OFF, in a Fail state (0). When RED, in a Fail state (1). When YELLOW, in a Fail state (2). When GREEN, status OK.
- OSST: (Operating System State) This LED indicates the state of the operating system. When OFF, in a Fail state (0). When RED, in a Fail state (1), When YELLOW, in a Fail state (2). When GREEN, status OK.
- FMTST: (FMT FPGA State) This LED indicates the configured state of the FMT FPGA. When RED, unable to configure FPGA with Main or Boot application. When YELLOW, in Boot application. When Green, in Main application.
- ICPST: (ICP FPGA State) This LED indicates the configured state of the ICP FPGA. When RED, unable to configure FPGA with Main or Boot application. When YELLOW, in Boot application. When Green, in Main application.
- Port A / Port B: Indicates the status of the ICP input port A or B. When OFF, no source is present. When GREEN, active source present.
- IMB: Remove the faceplate and install third party IMB device.

### Touch Panel Controller (TPC)

The TPC is a portable, touch-sensitive screen used to control the projector. It is mounted to the rear of the projector and can be adjusted at any angle using the flexible double ball joint mount for convenient viewing and flexible operation in various installation configurations. In general, the TPC provides users with a means for monitoring operation and status of the projector. In general, users can turn the lamp on/off, select a specific source/input, and obtain basic status information.

Depending on the installation, the TPC can remain mounted to the projector or wall mounted anywhere else at the site. An optional extension cable is also available, which can be purchased separately to provide TPC access up to 100 feet away.

**Lamp Power Supply (LPS)**

The CP4230 Lamp Power Supply (LPS) (P/N 127-101103-XX) is a remote power supply accessory for the CP4230 projector. It connects to the projector via four cables; two high-current lamp leads, RS232 control signal cable and an Interlock (Lamp Enable) cable. It can easily be integrated into the optional Rack Stand which can be used to mount the CP4230 projector.

The LPS provides DC power for supporting the 2.0, 3.0, 4.5 and 6.0kW lamps that are available for use with the projector. A breaker is located on the side of the LPS, which serves as a power switch, as well as protection against over-current conditions of 50A or more. To enable normal projector operation, the breaker must be ON. If faulty or major excessive AC is detected, the breaker will trip to OFF in order to prevent damage. **NOTE:** *This switch does not ignite the lamp. Use the TPC lamp ON button.*

Two AC power connectors are also provided on the LPS to allow the option to power the CP4230 Projector (its electronics, not the lamp) and/or an approved Extraction Unit directly from the LPS. **NOTE:** *These power connectors are intended for use ONLY with the CP4230 Projector and Extraction Unit, as indicated by the label beside each. DO NOT use these to provide power to any other devices.*

## 1.4.4 List of Components

Ensure the following components were received with the projector:

- ❒ Projector with Touch Panel Controller
- ❒ Lens plug *(required for shipping when lens is not installed to prevent contamination of critical optical components)*
- ❒ Nylon safety strap with clip *(required to secure projector to tabletop or optional rack mount)*
- ❒ Warranty Card
- ❒ Shroud
- ❒ Web Registration Form
- ❒ Zoom Motor Kit

Ensure the following components were received with the Lamp Power Supply (P/N 127-101103-01):

- ❒ 10' line cord (250V/10A)
- ❒ Harness package (includes 4 cables)

# 2  Installation and Setup

This section explains how to install, connect and optimize the projector for delivery of superior image quality. **NOTE**: *Illustrations are graphical representations only and are provided to enhance the understanding of the written material.*

## 2.1  Site Requirements

The following site requirements are required for safe installation and operation of the CP4230:

### Physical Operating Environment

• Maximum Ambient Temperature (operating)          35°C
• Minimum Ambient Temperature (operating)          10°C

### External Exhaust Ducting

• Based on the lamp type used, the installation site must provide a minimum of 450 or 600 CFM (ft $^3$/min) external exhaust airflow to ensure adequate cooling of the projector's Xenon arc lamp. For detailed instructions on how to measure CFM *refer to  STEP 5 - Connect External Exhaust Ducting, on page 2-7*. **NOTE:** *The measurement of site heat extraction CFM is done without the projector connected to the 8" diameter extraction duct.*

**\* 600 CFM is required in projection rooms with ambient temperature above 25°C or elevation (above sea level) greater than 3000 feet.**

### Permanent Power Connection

• Single-phase projector unit: Maximum 15A circuit breaker protection provided as part of the building installation

• Three-phase Lamp Power Supply (LPS): Minimum 50A breaker protection must be provided and must disconnect all phases simultaneously for the stationary permanently connected equipment.

• Protection from overcurrents, short circuits and earth faults must be part of the building installation.

• 4-wire to Terminal Block in Lamp Power Supply (certified electrician required).

• The disconnect device (double pole switch or circuit breaker with minimum 3mm contact gap) must be readily accessible within the projection room.

## 2.2  Tools Required for Installation

Before you begin installation, it is important to fully understand all site requirements and characteristics, and that you have the following tools and components on hand.

☐  12" screwdrivers: Phillips #2 (magnetic) and flat
☐  19mm and 7/8" wrenches
☐  Assorted Allen keys (metric)
☐  Heat extractor

❐     Protective clothing/safety gear (required when handling the lamp)
❐     Lamp
❐     Lens cleaning tissue and solution

## 2.3 General Installation Safety and Warning Guidelines

⚠ **WARNING** **QUALIFIED TECHNICIAN REQUIRED for all installations. This product must be installed in a restricted access location.**

⚠ **WARNING** **Never operate the projector without all of it's covers in place.**

⚠ **WARNING** **Projector uses a high-pressure lamp that may explode if improperly handled. Always wear manufacturer approved protective safety clothing (gloves, jacket, face shield) whenever the lamp door is open or while handling the lamp. Lamp installation/replacement requires a qualified technician.**

⚠ **WARNING** **Use of the projector's rear safety strap is MANDATORY to prevent it from tipping.**

⚠ **WARNING** **Four or more people are required to safely lift and hand-carry one projection head a short distance. Recommend removing the lamp before transporting the projector.**

⚠ **CAUTION** **Keep the projector as level as possible when lifting or transporting. Avoid tilting the projector on the right side. This can introduce an air bubble within the coolant hoses that can lead to an air lock.**

⚠ **CAUTION** **Perform Auto LampLOC™ whenever the projector is physically moved or leveled or whenever a new lamp is installed.**

## 2.4 Installation Instructions

### STEP 1 - Position the Projector and Lamp Power Supply

1. Position the projector at an appropriate throw distance (projector-to-screen distance) and vertical position. Ideally, center the projector with the theatre screen. If competing for space with an already present film projector, aim the projector slightly off-center as shown in Figure 2-1. This will slightly increase side keystoning, but will minimize the horizontal lens offset required.
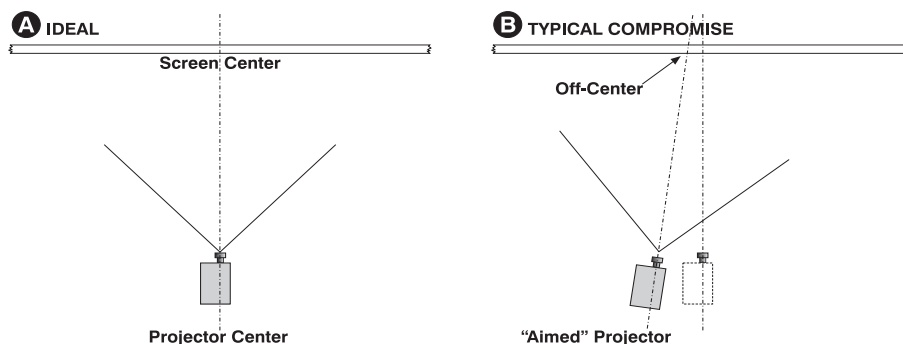


**Figure 2-1 Position the Projector**

**NOTE**: *Unlike film projectors, it is best to keep the projector lens surface as parallel to the screen as possible, even if significantly above the screen center. When a particularly short throw distance combines with a very wide screen, you may have to forfeit some aim and stay more parallel to the screen. In such cases, some lens offset can reduce the keystone distortion.*

2. Locate the lamp power supply so that its cables can reach the left side of the projector.

## If Using an Optional Rack Stand:

1. An optional rack stand and hold down clamp (P/N 116-100101-01) are available for use with the projector. If you are using the optional Rack Stand (P/N 108-282101-02) as part of your installation, refer to the instructions provided in the kit to assemble the Rack Stand. **NOTES: 1)** *For better access, wire the LPS before installing it into the rack stand.* **2)** *Use the hold down clamp (P/N 116-100101-01) when securing the projector to the rack stand.*

2. Install and secure the lamp power supply (LPS) in the optional rack stand:

   a. Remove rack stand's right side panel (operator's side).

   b. Remove cross bar. See Figure 2-2.
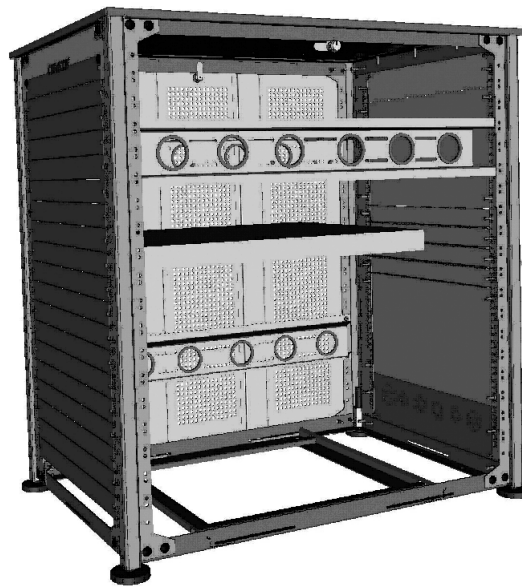


**Figure 2-2 Side View of Rack Stand**

**Snap 3 piece airflow duct together using stand out pins**

3.

2. *Lift LPS into frame*

1. *Insert support frame*
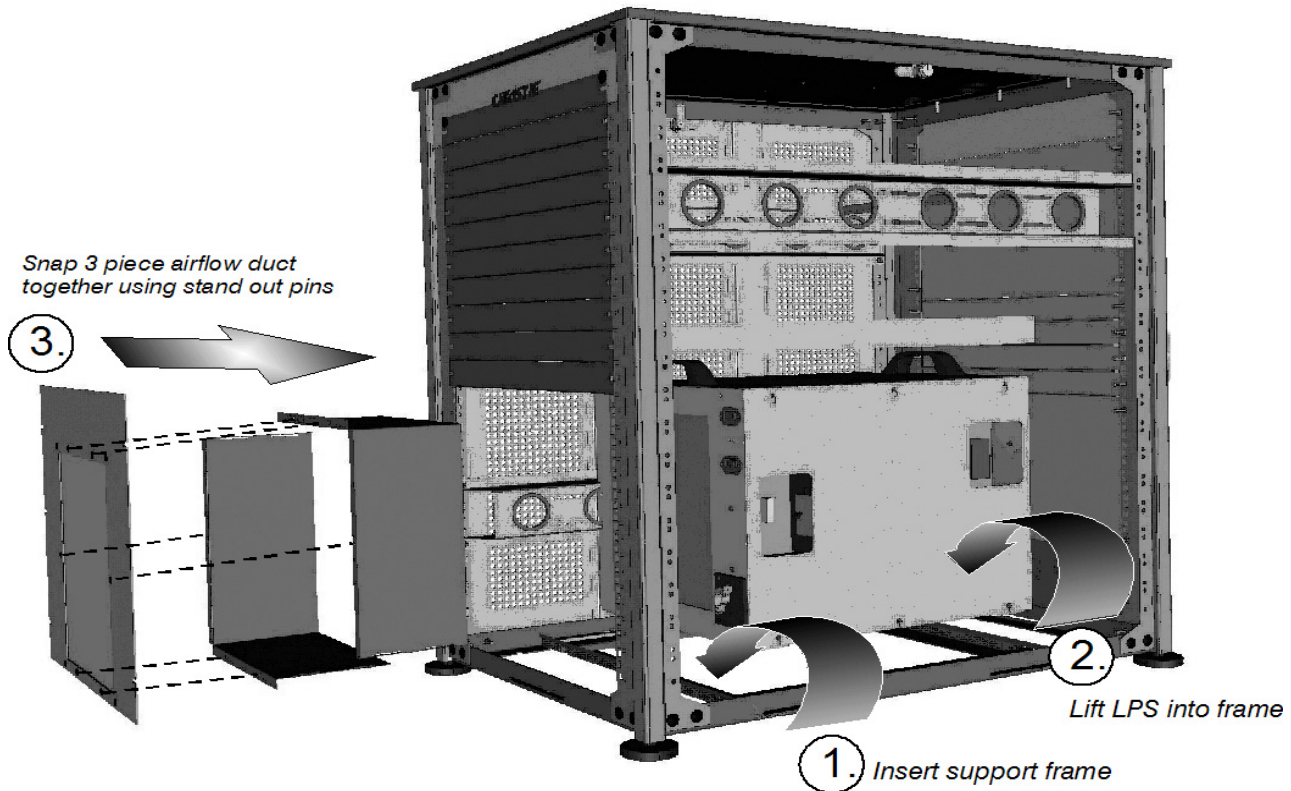
**Figure 2-3 Steps to Installing LPS**

c.  Insert support frame from LPS (align pins to holes). See Step 1 in Figure 2-3.

d.  Lift LPS into frame. See Step 2 in Figure 2-3.

e.  To facilitate LPS exhaust, remove the bottom 10 panels from the back of the rack stand.

f.  Assemble the three piece airflow duct (supplied with LPS). See Step 3 in Figure 2-3. First snap the 2 "L" shaped parts together, then snap this into the 6 stand out pins of the third piece (flat panel).

g.  Position the airflow duct directly behind the LPS to direct air outside the rack stand. **CAUTION!** *Do not install any components in front of the lamp power supply to prevent airflow from circulating. See Figure 2-4.*

h.  Insert airflow duct into rack stand from the outside. Step 3 in Figure 2-3.

i.  Secure airflow duct to rack stand using screws from the rack stand panels.

j.  When installing other components in the rack stand allow at least 2" clearance above the LPS handles for ease of servicing. See Figure 2-4.

k.  Wire all components within the rack stand and replace the side panel.

l.  Twist LPS cable 12 twist/meter.



2"

Keep Clear
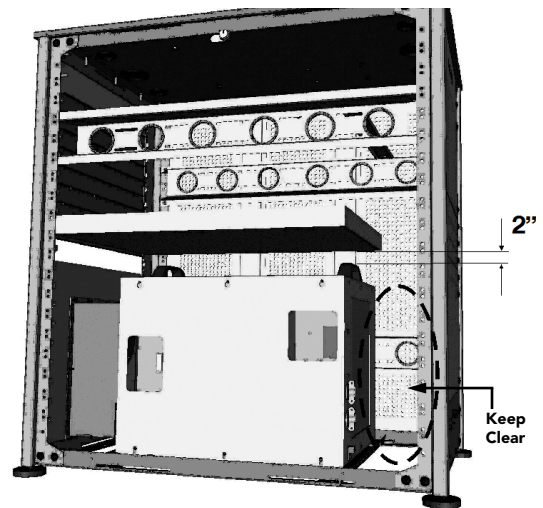
**Figure 2-4  Steps to Installing LPS**

## STEP 2 - Secure the Projector

**⚠ WARNING** Use of the projector's rear safety strap is MANDATORY to prevent it from tipping. Secure the strap between the projector and the optional rack stand or any other surface it is mounted to.

Attach the supplied safety strap to the back of the projector and fasten it to its mounting surface. Use of the strap is mandatory to prevent the projector from tipping when a lens or auxiliary lens mount is installed.
**NOTE:** *If you are using the optional rack stand, it is strongly recommended you use the hold down clamp (116-100101-01) in addition to the rear safety strap to firmly secure the projector's rear feet.*

## STEP 3 - Adjust Tilt/Leveling

For an ideal installation, the CP4230 lens surface should be centered and parallel to the theatre screen. This orientation helps to ensure optimized lens performance with minimal offset. Choose a sturdy mounting surface that allows for this.

Check with theatre personnel for the degree of screen tilt or measure this incline with a protractor at the screen. Tilt the projector to match the screen tilt angle by extending or retracting the projector's four adjustable feet.

**NOTES: 1)** *For best optical performance, tilt the projector as required* **2)** *The front-to-back tilt of the projector must not exceed 15°. This limit ensures safe lamp operation and proper position of the liquid cooling reservoir in the projector.*

## Adjusting Feet/Leveling

**⚠ WARNING** Ensure the projector's rear safety strap or hold down clamp is in place before adjusting the feet.

To adjust the height or level of the projector, extend or retract the adjustable feet located on the bottom of the projector by rotating them. Once the required adjustment is made, tighten the lock nut. (Figure 2-5)

## Foot Extension Rods

If greater projector tilt is required than what can be achieved by the standard feet, there are two 6" extension rods located inside the projector (at the rear) that can be threaded onto the existing feet for that extra length.

To install the extension rods safely,



**Figure 2-5 Adjust Feet**

a. Prop the rear of the projector up to access and remove the two rear feet. This can be done by one person holding the back end of the projector up slightly so another person can unthread the feet OR by propping up the back of the projector with a sturdy base (such as a phone book).

b. Add the extension rods to the standard feet.

c. Thread the newly extended feet back into the projector's baseplate. Adjust the feet until the desired tilt is achieved.

d. Lock feet in place by turning each lock nut until snug against the projector.

**WARNING!** *Do not over-extend feet when adjusting. Make sure several threads are engaged into the projector's baseplate.*
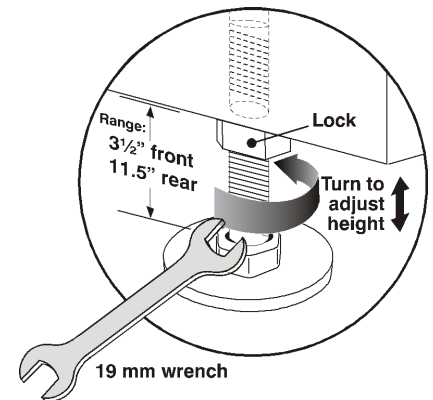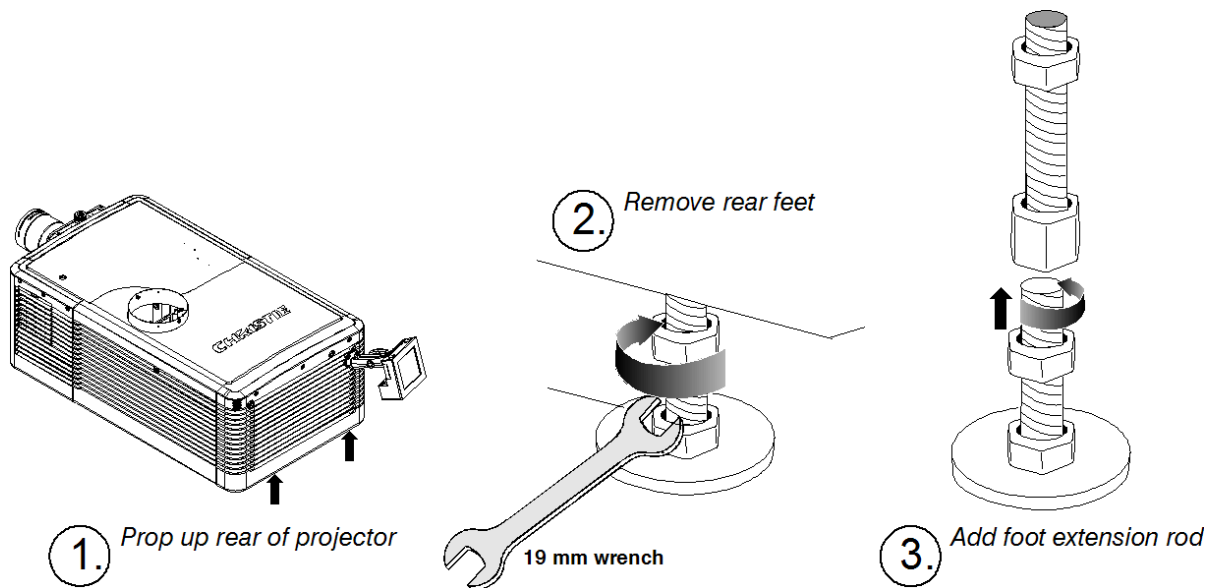
**Figure 2-6 Using the Foot Extension Rods**

## STEP 4 - Mount Touch Panel Controller (TPC)

Attach the *Touch Panel Controller*, pre-assembled with its base and mounting arm, to the matching ball joint base secured at the rear of the projector. Plug the TPC into the TPC port on the projector's rear connector panel using the standard 3-ft. cable provided.

Alternatively, mount the TPC in a remote location up to 50 feet away and attach to the rear of the projector using the optional long-distance cable.

To install the TPC:

1. Loosen the mounting arm just enough for the end to fit over the ball joint located on the rear panel of the projector. Figure 2-7
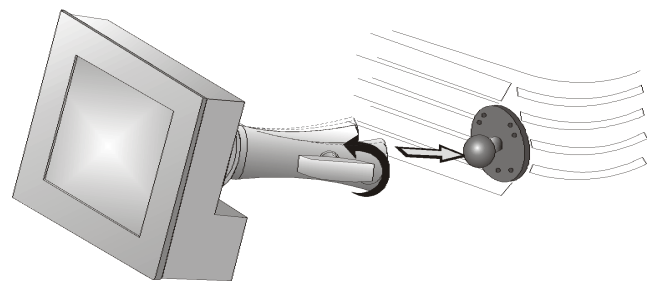


**Figure 2-7**

2. Tighten the mounting arm until it fits snug on the ball joint. Figure 2-8.

3. Connect the cable from the TPC to the connector located on the projector's rear panel.

4. Adjust the angle of the TPC as desired.
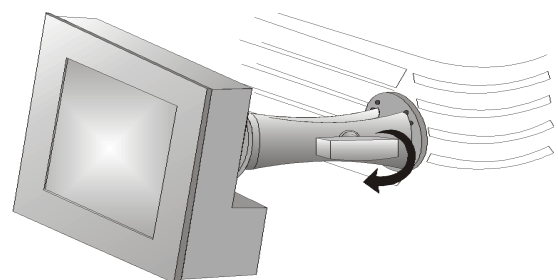


**Figure 2-8**

## STEP 5 - Connect External Exhaust Ducting

The projector emits a constant stream of warm exhaust air, which must be vented to the outside of the building. Connect the site's pre-installed, outside-venting ductwork via the 8" diameter exhaust port at the top of the projector. Confirm that 1) there are no obstructions or 'kinks' within the ducting, 2) all air intake areas of the projector are clear and exposed, 3) the vane switch at the exit duct is moving freely.

The site's pre-installed outside-venting duct should be rigid for a 10" length at the projector and must also include a heat extractor/blower that maintains at least 450 to 600 CFM when measured at the projector exhaust opening, depending on the lamp. See Table 2.1.

**Table 2.1 Airflow Requirement**

| Lamp Type | Min. Airflow (CFM) Required |
|-----------|------------------------------|
| 2.0 kW | 450 CFM* |
| 3.0 kW | 450 CFM* |
| 4.5 kW | 600 CFM |
| 6.0 kW | 600 CFM |

**\* 600 CFM is required in projection rooms with ambient temperature above 25°C or elevation (above sea level) greater than 3000 feet.**

⚠ **WARNING** **At minimum, a 10" long, strong metal duct must be in place at the projector to prevent glass shards from exiting the duct in the event of a lamp explosion.**
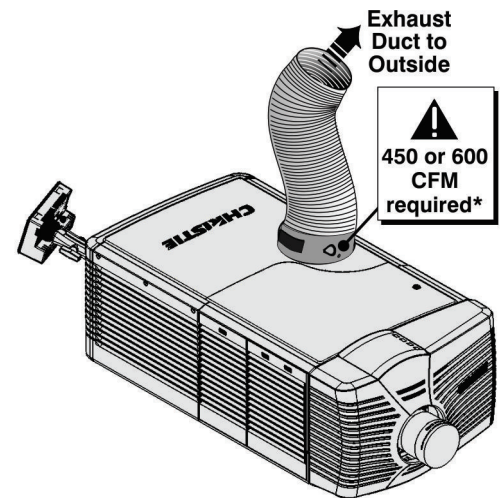


**Figure 2-9 Connect Exhaust Ducting**

## How to Calculate CFM in the 8" diameter external exhaust duct:

Use an airflow meter to measure the ft/min or ft/sec at the rigid end of the open exhaust duct that will connect to the projector. Make sure the measurement is taken right at the very end without the projector connected. Then multiply the reading by the cross-sectional area of the 8" duct to calculate the cubic feet/min airflow. The formula is:

$$\text{Measured linear ft/min x } 0.35 = \text{CFM}$$

Ensure the position of the weight on the exhaust duct vane switch is correct for the lamp installed. See Figure 2-10. Add extractor/boosters as needed for your site, as the vane switch will prevent the projector from operating if there is insufficient airflow. Do not mount the extractor on the projector as this may introduce some vibration into the image. **NOTE:** *If the duct becomes significantly blocked - or if a fan fails - the projector should trigger an alarm before becoming overheated or unsafe. Regardless, check airflow regularly. For instructions refer to Section 4 Maintenance.*

⚠ **CAUTION** Never disable the vane switch. Attempting to operate the projector with inadequate airflow can result in dangerous overheating of the projector.

## STEP 6 Shroud Removal

NOTES: 1)One section only must be removed in order to access the MLM and install lens. 2) Removal of the other shroud is required if using MALM or Real D Z screen.

**Remove the shroud as follows:**

1. Using finger pressure, push down on the locations specified (Red Arrows). See Figure 2-11.

2. Carefully slide the shroud sideways and forward away from the MLM and lens.

3. Place shroud cover on a clean surface to prevent scratches.

**Figure 2-10 Exhaust Duct Vane Switch**
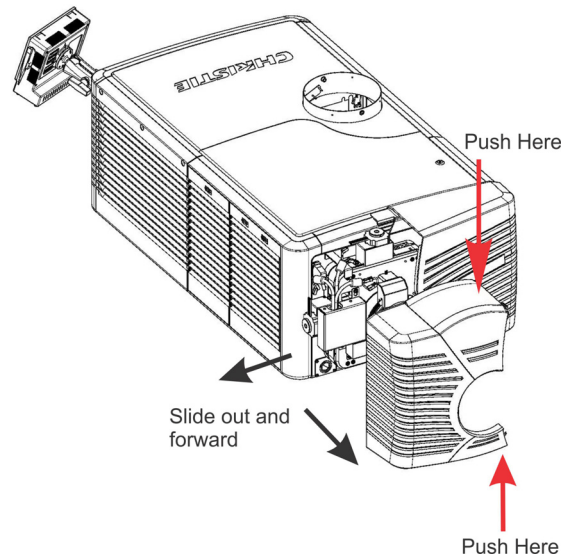
**Figure 2-11 Shroud Removal**

## STEP 7 - Install Lens

The lens seals the projector preventing contaminants from entering the area of the main front electronics.

⚠ **CAUTION** Never operate a projector without a lens installed.

⚠ **WARNING** 1) If installed, move the Motorized Auxiliary Lens Mount (MALM) to the OUT position before performing any lens calibrate or reset functions on the Motorized Primary Lens Mount to prevent collision between the projection lens and the MALM. 2) Hazardous moving parts. Keep fingers and other body parts away. Remotely operated motors may start to spin without warning. Keep clear of rotating parts and avoid long hair, jewelry, and loose clothing exposure to the knobs during manual adjustment.

**Installing a Primary Lens:**

Before installation of the primary lens assembly the zoom motor mount must be installed onto the lens.

**NOTE: 1)** *Make sure the zoom ring is against the front of motor mount for lenses: 1.6-2.4:1, 1.8-3.0:1, 2.15-3.6:1.* **2)** *Make sure the zoom ring is against the back of motor mount for lenses: 1.45-2.05:1, 1.25-1.83:1.* **3)** *All other lenses: Leave a gap between the rotating zoom section of lens and motor mount.*

1. Unpack the zoom motor kit.

2. Use a flathead screwdriver to install the zoom motor mount onto the lens with screw clamp.
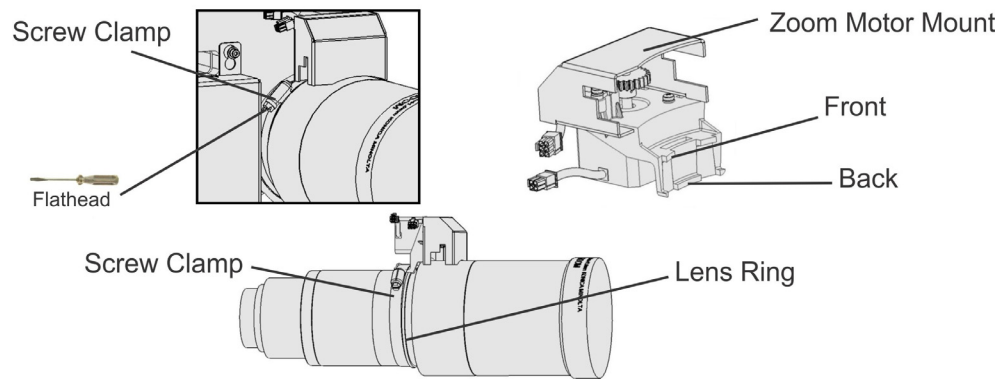


**Figure 2-12**

3. Remove the cover from the zoom motor mount with phillips screwdriver. Keep the hardware and cover.
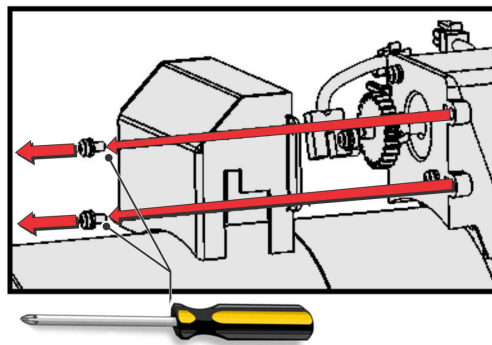


**#2 Philips™**
**Figure 2-13**

4.  Install zoom gear ring and adapter onto lens.

    **NOTE:** *1) Use small adapter for lens 1.8-3.0. **2)** Use large adapter for lens 1.45-2.05, 2.15-3.6, 1.25-1.83:1 **3)** All other lenses do not need an adapter.*
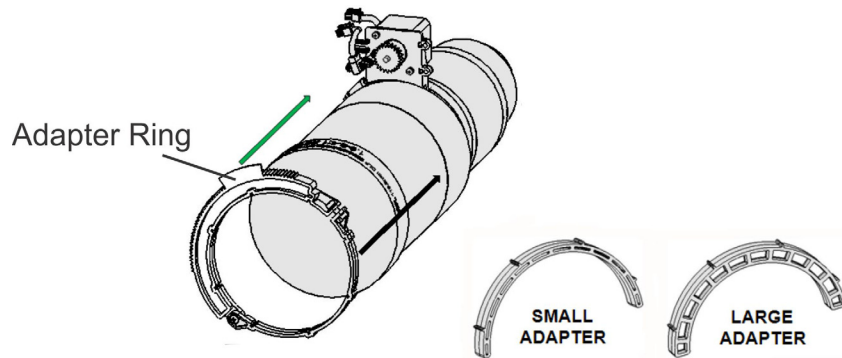


**Figure 2-14**

5.  Make sure that there is full travel of the gear ring, and the alignment of the sensor is correct.

    **NOTE:** *There must be a small gap between the gears to prevent binding. To ensure there is a gap, loosen the screws and readjust the gap. Tighten the screws.*
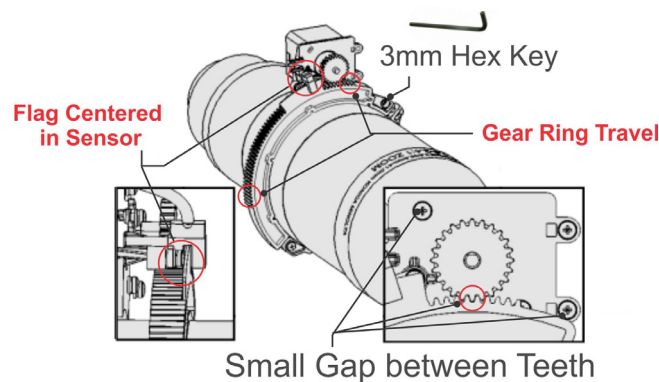


**Figure 2-15**

6.  Turn the lens clamp to the OPEN position on the MLM and fully insert the assembly straight into the lens mount opening without turning. When the lens is fully inserted it will seat properly within the lens mount and the aperture will be installed correctly.
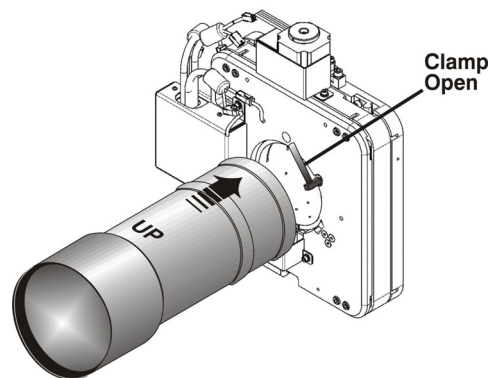


**Figure 2-16**

7.  Install the cover with the screws.

    **NOTE:** *Make sure the cover is between the mounting tabs.*
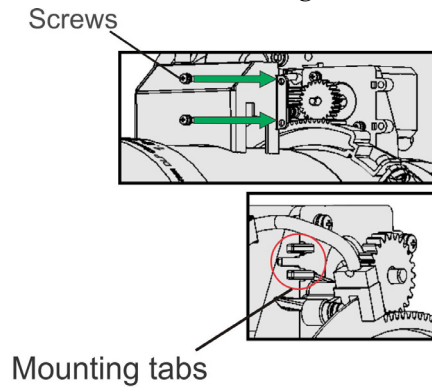


**Figure 2-17**

8.  Connect the harness wires.
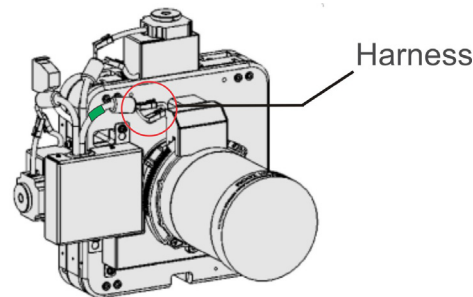


**Figure 2-18**

9.  Position the lens clamp DOWN to lock the lens assembly in place.
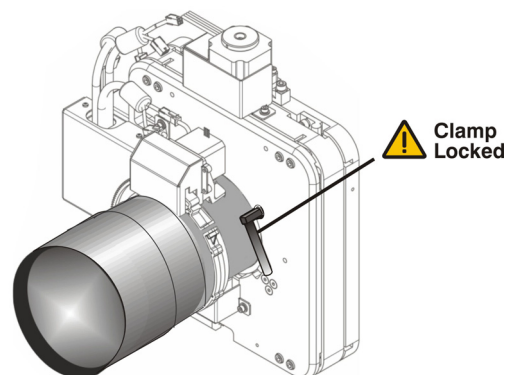


**Figure 2-19**

10. Calibrate the lens. Refer to *2.8 Basic Image Alignment, on page 2-22* for details.

**For Auxiliary Lens Installation (Optional):**

To install a 1.26x Anamorphic lens or a 1.26x Wide Converter Lens (WCL) producing 2.39:1 "scope" images for large screens, install the auxiliary lens mount and lens to the projector using the hardware and instructions provided in the Motorized Auxiliary Lens Mount Kit (P/N 108-111101-xx, P/N 108-111102-xx).

11. Install the shroud.

## STEP 8 - Install First Lamp

⚠ **DANGER** Qualified technician required! High-pressure lamp may explode if improperly handled. Always wear approved protective safety gear whenever lamp door is open or while handling the lamp.

1.  Open lamp door. Using the security key provided, open the lamp door and inspect the empty lamp cooling compartment. **CAUTION!** *Do not place heavy objects on the open lamp door.*

2.  Position anode yoke assembly according to lamp type. Check the position of the anode yoke assembly for the lamp type that will be used in the projector. Table 2.2 lists all available lamp types for the CP4230 and the position of the anode yoke assembly. (Figure 2-20)

**Table 2.2 Lamp Types Available for CP4230 and Anode Yoke Position**

| LAMP | TYPE | ANODE YOKE POSITION |
|---|---|---|
| 2.0 kW and 3.0kW | CDXL-20<br>CDXL-30<br>CXL-20*<br>CXL-30 | Move the lamp cradle to the rear position, which is approximately 1" closer to the reflector.<br>***NOTE**: A lamp adapter kit must be used with the CXL-20 lamp. |
| 4.5 and 6.0kW | CDXL-45<br>CDXL-60 | Move the lamp cradle as far forward as possible (position closest to igniter) |

3.  Install the lamp. Refer to *4.2.6 Lamp Replacement, on page 4-6* for lamp replacement instructions. Observe all warnings, and wear protective safety gear.



Reflector

Anode
Yoke
Assembly

2.0 & 3.0 kW
CDXL-20
CDXL-30
CXL-20

4.5 & 6.0 kW
CDXL-45
CDXL-60

5mm hex key
required
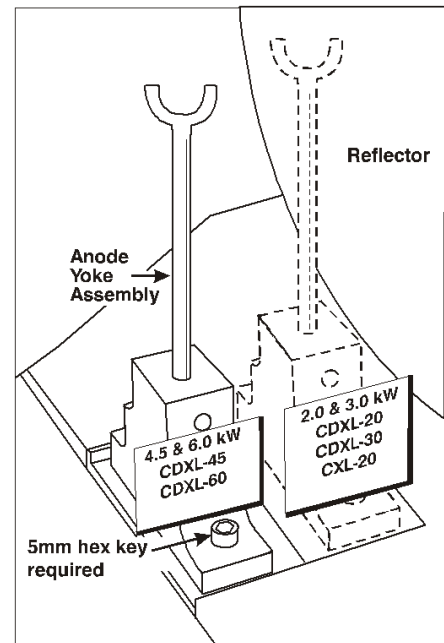
**Figure 2-20  Anode Clamp Location**

## STEP 9 - Connect Lamp Power Supply (LPS)

**⚠ CAUTION** When connecting the high current lamp leads between the LPS and the Igniter <u>DO NOT reverse the connections</u>, or damage will occur. Make sure the black (-) power cable is connected to the cathode lead and the red (+) power cable is connected to the anode lead.

**⚠ WARNING** Do not connect the Lamp Power Supply to AC until it is first connected to the projector.

**⚠ WARNING** 1) Certified electrician required. 2) Ground (earth) connection is necessary for safety. Never compromise safety by returning the current through the ground. 3) Connect ground <u>FIRST</u> to reduce shock hazard from high leakage.

**⚠ WARNING** Use an appropriate strain relief connector on the AC supply cable to prevent the cable from rubbing against the LPS knockout plate and becoming damaged.
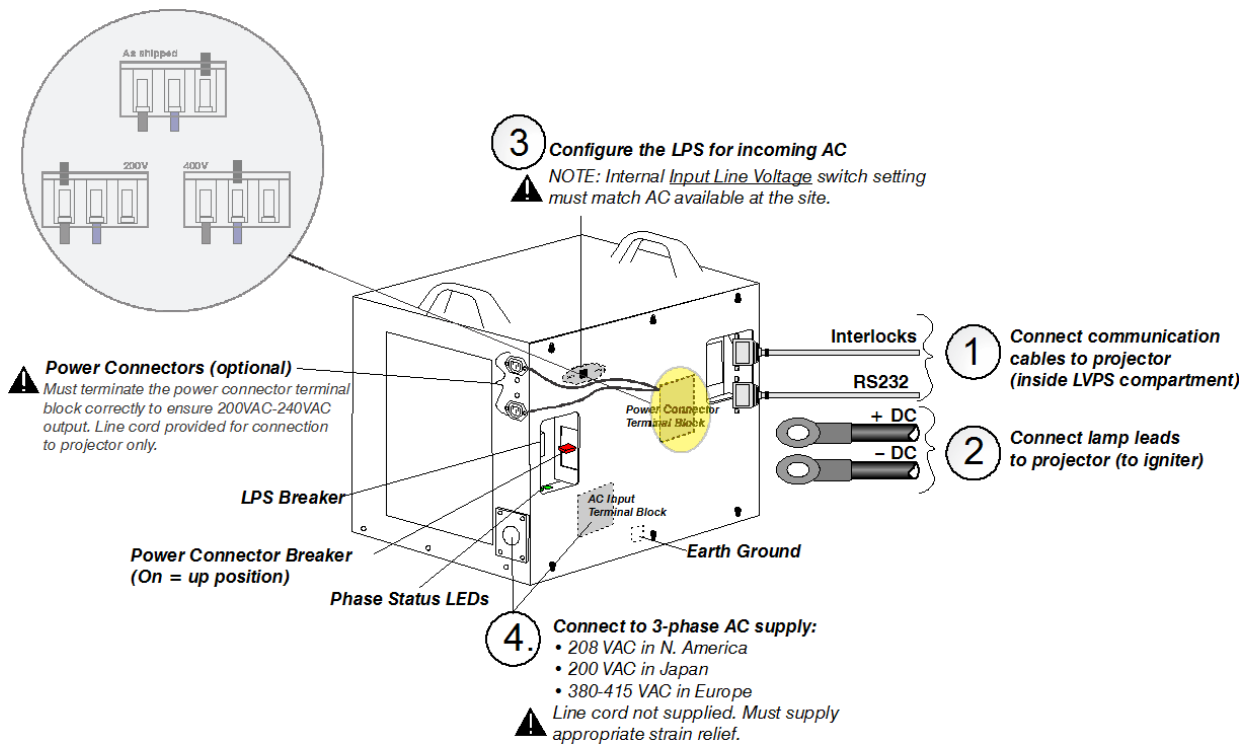


**Figure 2-21 Connect LPS**

1.  Connect LPS Communication Cables:

    a.  Remove the cover plate (2 thumbscrews) from the projector's baseplate in the LVPS compartment.

    b.  Connect RS232 cable from LPS to Projector: Connect one end of the RS232 cable to the LPS port labeled "RS232", then route the cable up through the opening in the projector's baseplate leading into the LVPS compartment. Connect the other end to the labeled RS232 port within the LVPS compartment.

    c.  Connect Interlock cable from LPS to Projector: Connect one end of the Interlock cable to the LPS port labeled "Interlocks", then route the cable up through the same opening in the projector's baseplate as the RS232 cable. Connect the other end to the labeled Interlocks port within the LVPS compartment.

2.  Connect Lamp Leads:

    a.  Open LVPS access door and remove safety cage front panel over the igniter - four M4 hex head screws (3 mm driver required).

    b.  Remove the LPS side panel - loosen 6 screws.

    c.  Route the cables through the strain reliefs in the LPS cover.

    d.  Connect the two lamp leads (supplied with LPS) to the positive (+) and negative (-) connectors.

    e.  Tighten the strain reliefs.

    f.  Route the positive and negative leads from the LPS through the two strain reliefs in the projector's baseplate.

⚠ **CAUTION** **When connecting the high current lamp leads between the LPS and the Igniter make sure the black (-) power cable (cathode lead) is securely connected with the washers and lock washers properly in place and tighten to 175 inch-lbs, 14 ft-lbs or 20Nm at both ends as to prevent them from coming loose.**

    g.  Connect the negative (-) black lamp lead to the negative (-) igniter terminal, left terminal. Connect the positive (+) red lamp lead to the positive (+) igniter terminal, right terminal. **CAUTION!** *When tightening the positive and negative leads, do not tighten to the point that the brackets start to bend. Use a an adjustable wrench or suitable tool to support the brackets when tightening. Doing this ensures they are not bent when applying the proper torque setting to the washer and lock washer.*

    h.  Tighten the strain reliefs.

    i.  Replace the igniter safety cage.

3.   Configure the LPS for Incoming AC: **NOTE:** *Three-phase AC power levels vary from region to region throughout the world, with 400 VAC (380VAC-415VAC) common in some countries (such as those in Europe and Asia), and 200 VAC (190VAC-208VAC) common elsewhere (such as in North America and Japan). To accommodate both possibilities, the ballast includes an internal AC Input Line Voltage Switch for toggling to the level of AC available at the installation site, i.e. either 200 or 400 VAC.*

    a.  Located in the upper-left corner is the AC Input Line Voltage switch, toggle the switch *left* for use with 200 VAC supplies, or *right* for 400 VAC supplies.

4.   Connect AC directly from your site to the LPS wiring the AC Input Terminal Block correctly for your region. **CAUTION!** *Use an appropriately sized strain relief connector with the knockout plate provided to ensure adequate environmental sealing and to prevent the cable from accidentally being torn out.*

   • For N. America, Japan and most of Central/South America (190-208 VAC):

    Wire Phase 1, 2, 3 and Ground

   • For Europe, etc. (380-415 VAC):

    Wire Phase 1, 2, 3, Neutral and Ground

5. Using the line cord provided with the LPS, connect one end into the power connector labeled "CP2230/4230 Projector ONLY" and the other end into the plug on the projector's front bezel (Figure 2-22).

   ⚠ **WARNING** **DO NOT access power for the projector directly from the building electrical source.**

   **WARNING!** *If you choose to use the power connectors to power the CP4230 Projector and/or the Extraction Unit, you must terminate the power connector terminal block correctly to ensure 200VAC-240VAC output. These connectors are controlled with the power connector breaker. For details, refer to the Interconnect Drawing provided with your projector and to Figure 2-21 Connect LPS, on page 2-13.*
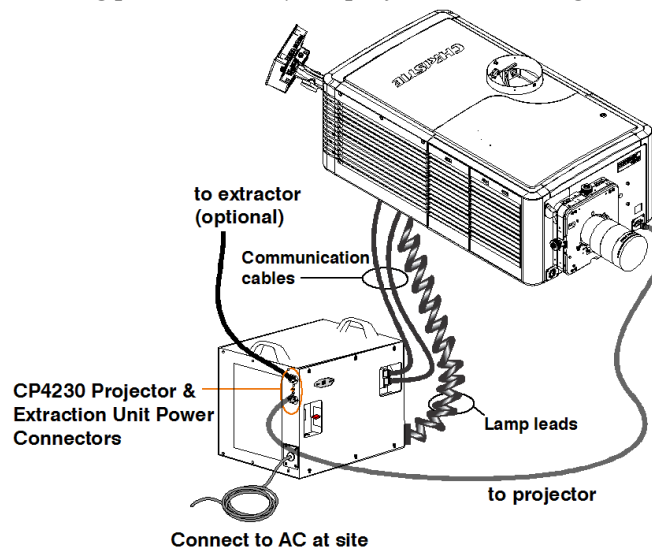


**Figure 2-22 LPS Connection**

6. Turn LPS Breaker ON.

7. Turn the Extraction Unit and CP4230 Projector power connectors ON, only if using these connectors.
   **NOTE:** *These power connectors are intended for use with the Extraction Unit and CP4230 Projector only.*

   OR

8. Connect AC from the site to the projector (plug located on front bezel, bottom-right corner).(Figure 2-23)
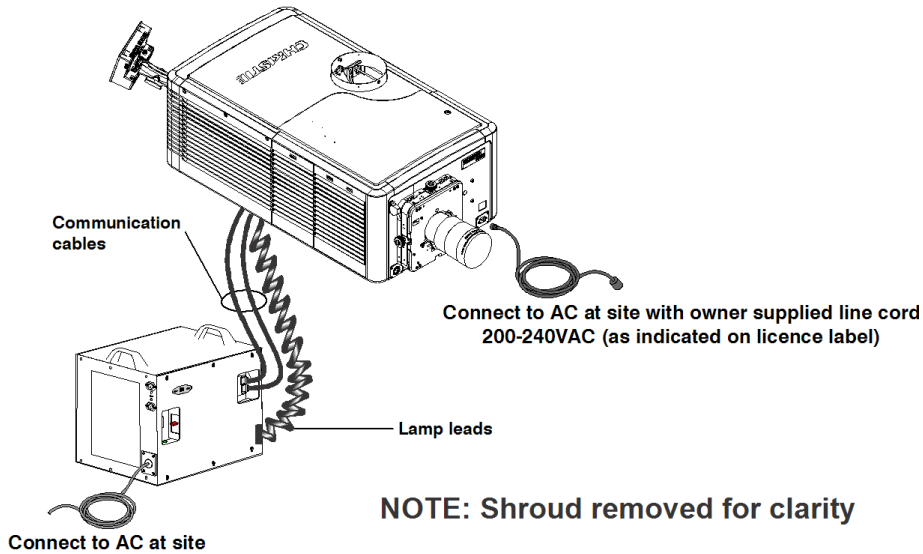


**Figure 2-23 Connection to AC**

## Configuring the Projector for Uninterrupted Power Supply (Optional)

Located in the LVPS compartment of the projector is an IEC 320 outlet where a UPS can be connected. This allows the projection head electronics to remain operable during a power failure reducing the recovery period of the projector. Once power returns, all that is required is for the operator to turn the lamp on using the TPC.

To configure the projector for UPS, simply unplug the LVPS input connection from Main Power and connect it to the loose UPS input plug. Re-use the dummy plug from the UPS connection with the unused Main Power plug.

**NOTE:** If a UPS is required, use a 200-240VAC UPS in-line between the LPS and the projector.

⚠ **WARNING** **Do not connect a UPS directly to the UPS input of the projector.(**Figure 2-1)
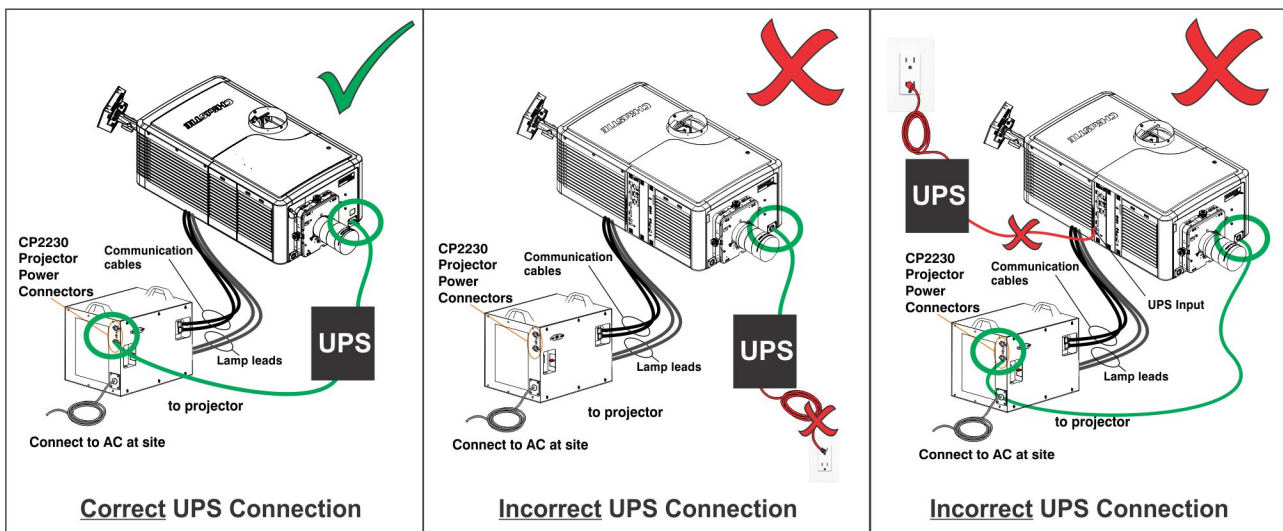


**Figure 2-1 UPS Connection**

### STEP 10 - Connect Sources and Initial Power Up

Once the lamp is installed, the projector is essentially ready for operation. Although an image is not required at this time, it is recommended that external cinema servers and sources be connected.

Before igniting the lamp for the first time, it is essential the following steps be completed to ensure successful operation and communication.

1.  Assign the projector a unique IP address. Each projector is given a default IP address, however if you are connecting the projector to an existing network you must give it a new IP address. For first time installations, assign the IP address in Administrator Setup: Communications Configuration window using the Touch Panel Controller.

2.  Set Baud Rate. Set the baud rate to match the external device connected (such as a server). The projector's default baud rate is 9600 Kbps.

3.  Set Lamp Type. From the Advanced Setup: Lamp History window define the type of lamp installed, serial number and the number of hours currently logged on the lamp (if any).

4.  Power-up the projector, as described in *3.1 Powering Up/Powering Down the Projector, on page 3-1*.

5.  Perform LampLOC™ alignment immediately on the newly installed lamp. This will ensure the lamp is positioned correctly to achieve maximum light output. Access LampLOC™ features in Advanced Setup: LampLOC™ Setup window.

6.  Perform initial optical alignment in order to optimize images displayed on screen. These adjustments must be done before boresight adjustments. Refer to *2.8 Basic Image Alignment, on page 2-22.*

7.  Adjust optical components when needed. In rare instances, the installer may have to adjust one or more optical components.

## 2.5 Connecting Sources

Cinema servers, such as digital media storage devices or non-cinema sources such as PCs reside outside the projector and are connected to one of the ports on the Projector Intelligence Board (PIB) located on the left (operator's) side of the projector.

These communication ports are accessible by first removing the side source and communication access panel. When connecting sources or servers, route all cables along the channel ways located on the bottom of the projector and up through the opening in the frame to the communication connection port.

Replace the access panel to ensure server and source connections remain secure.

**NOTE:** For 4K content see third party IMB manual for connection.
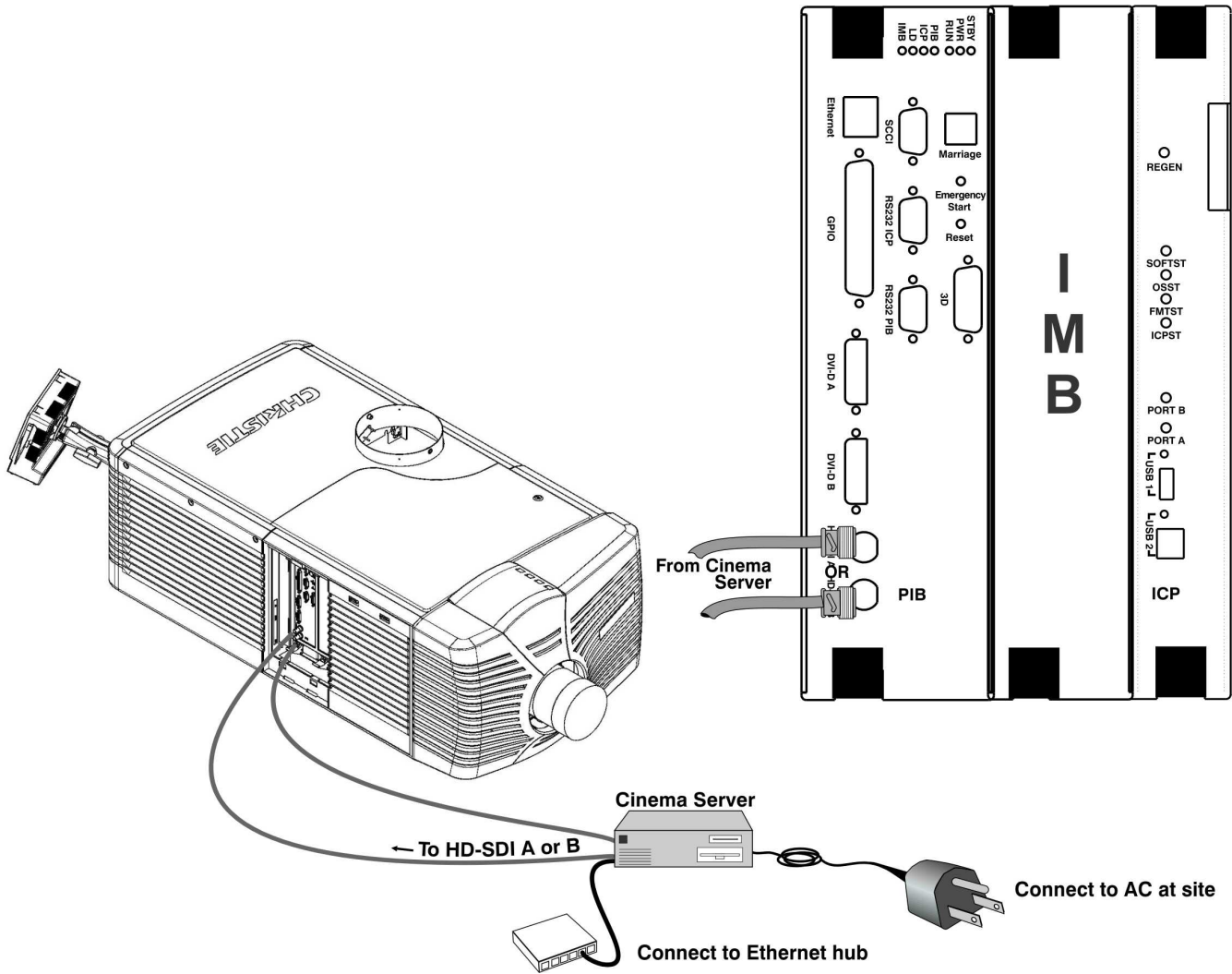
**Figure 2-24  Connecting Cinema Sources**
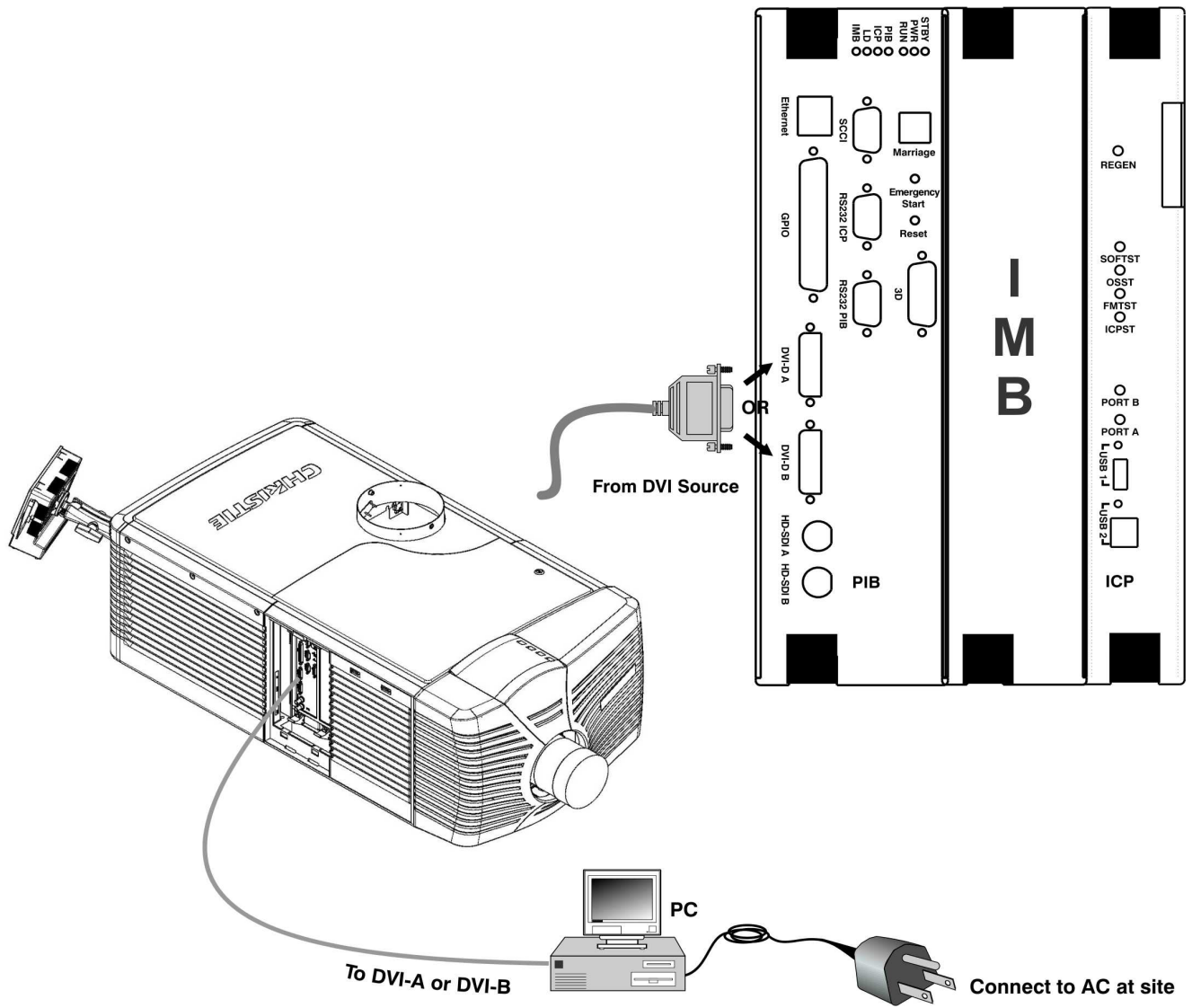
**Figure 2-25 Connecting Non-Cinema Sources**

## 2.5.1 Connecting for Communications

Many communications with the projector are initiated on the Touch Panel Controller (TPC), which is mounted at the rear of the projector. Depending on the installation, you may also need certain other serial and/or Ethernet links to the CP4230, such as from a server or PC functioning as a controller, or from an existing on-site network including other equipment. For applications or equipment utilizing serial communications, use the Christie-proprietary serial protocol to connect to the RS232 PIB port on the PIB. When using Christie serial protocol over Ethernet connect to port 5000. **NOTICE:** *The RS232 PIB port located on the PIB faceplate utilizes Christie-proprietary protocol and is intended for Christie accessories or automation controllers only. DO NOT connect other devices here.*

### PC/Laptop, Server or Network

To communicate with the projector from a computer, server or an existing network, connect the equipment to the Ethernet hub or switch at your site.
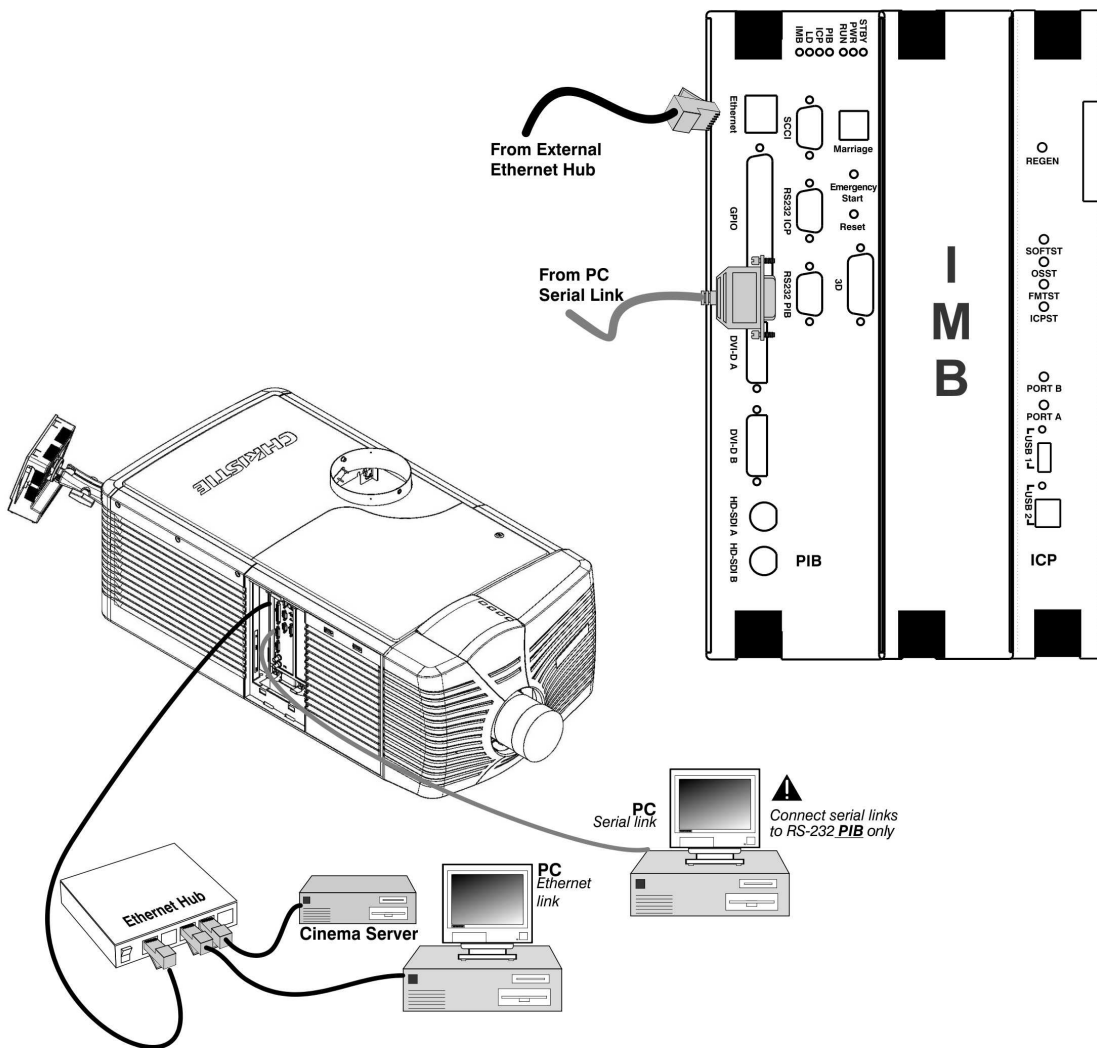


**Figure 2-26 Connecting Communications**

## 2.6 Maximizing Light Output

To ensure optimal operation and peak screen brightness, activate LampLOC™ to adjust the lamp position whenever a new lamp is installed in the projector. Once LampLOC™ adjustment is complete, the lamp will be well-centered and distanced correctly from the remainder of the illumination system.

Before adjusting LampLOC™, ensure the following criteria are met:

❐ The lamp is installed with the anode yoke in the correct location for the lamp type.

❐ The lamp is on and the douser (shutter) is open during adjustment.

Display a white test pattern. This is recommended to allow you to view LampLOC™ progress on screen. To automatically adjust LampLOC™, do the following:

1. Using the TPC, select Advanced Setup: LampLOC™ Setup.

2. Click the Do Auto button to begin the auto LampLOC™ process.

3. LampLOC™ requires a few minutes to establish the best lamp position and optimize the light output. You will see 100% displayed on the screen when the operation is complete. **NOTE:** *LampLOC™ can also be adjusted manually using the directional arrows in the same window. For more information on the features of the LampLOC™ window refer to Section Advanced Setup: LampLOC™ Setup Window.*
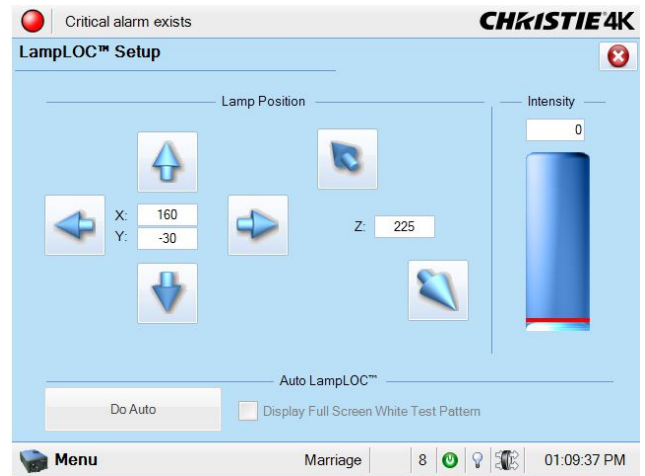


**Figure 2-27 LampLOC™ Setup Window**

## 2.7 Calibrating Screen Brightness (ft-L)

The projector software uses a Wizard application to calibrate screen brightness in footlamberts.

The process involves measuring the screen brightness at both extremes of the lamp power (minimum and maximum) for a given lamp type. These measurements establish a range (stored in memory) from which the projector can interpolate all other lamp power settings by converting them to approximate footlamberts for display in the menus. Repeat the calibration if you switch to a different lamp type/size.

1. To access the screen brightness application wizard go to the Administrator Setup: Foot Lamberts Calibration window. Follow the steps outlined to complete the calibration. Refer to *Administrator Setup: Foot Lamberts Calibration Window, on page 3-59* for more information on this process.
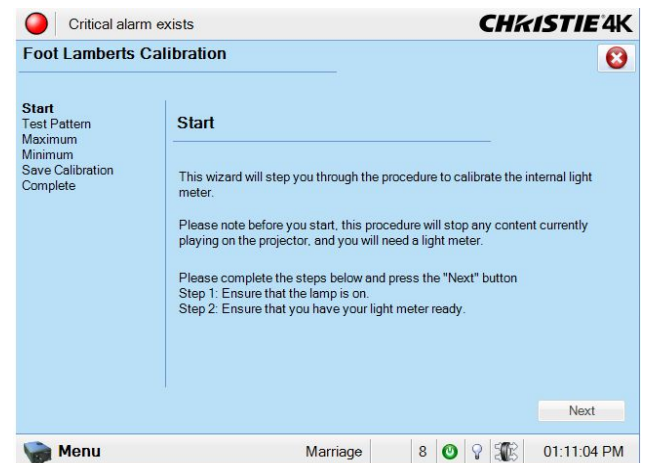


**Figure 2-28 Footlamberts Calibration Wizard**

## 2.8 Basic Image Alignment

**NOTES:** *Assumes projector is fully assembled and powered up in its final location.*

This procedure ensures that the image reflected from the DMDs is parallel to and well-centered with the lens and screen. This initial optical alignment is the foundation for optimizing images on the screen and must be completed before final boresight adjustments.

Ensure the CP4230 is properly positioned relative to the screen before you begin. Refer to *2.4 Installation Instructions, on page 2-2.*

### 2.8.1 Basic Optical Alignment Procedure

1.  Display a good test pattern appropriate for analyzing image focus and geometry, such as the "framing" test pattern showing the crosshair centered across the image.

2.  Course focus: Perform a quick preliminary focus and (if available) zoom adjustment with the primary lens only (Refer to *3.7 Working with the Lenses, on page 3-84*). Focus the center of the image first, consistency across the image is not required at this point.

3.  Center the image in the lens: Holding a piece of paper at the lens surface, adjust the offsets as necessary until the image is centered within the lens perimeter. A full white field works best for this.

4.  Re-check side-to-side leveling: With the framing test pattern on screen, re-check projector leveling (refer to *2.4 Installation Instructions, on page 2-2*) so the <u>top edge</u> of the image is parallel to the top edge of the screen.

## 2.9 Offset and Boresight Alignment

The following instructions explain how to adjust the offset and boresight alignment using the ILS. To ensure proper offset for your site and consistently good focus in all areas of the screen, a primary lens must be installed and its lens mount precisely adjusted in relation to internal optics as described below. If desired, an auxiliary lens can then be added to widen images for scope cinema displays. **Warning! 1)** *Make sure to move the MALM to the OUT position before performing any lens calibrate or reset functions on the Motorized Primary Lens Mount to prevent collision between the projection lens and the MALM.* **2)** *Hazardous moving parts. Keep fingers and other body parts away.* **NOTES: 1)** *Projector must be fully assembled and powered up in its final location.* **2)** *Keep clear of rotating parts. Remotely operated motors may start to spin without warning.* **3)** *Avoid long hair, jewelry, and loose clothing exposure to the knobs during manual adjustment.* **4)** *In case of emergency, unplug the line cord to immediately halt movement of the lens mount. This will apply if the shroud is removed.*

### 2.9.1 Adjust Offset

Project an image with the primary lens only. Always adjust offset before boresight. **Important!** *Ensure the correct lens is selected in the Advanced Setup: Lens Adjust window before calibration to ensure you will remain within the applicable boundary of the installed lens.*

1.  From the Advanced Setup window, select Lens Setup.

2. In the Lens Setup window, ensure **Enable Automatic ILS** is selected. **NOTE**: *Enabling Automatic ILS will over-write the pre-defined settings for this channel. To change the ILS settings and NOT over-write the pre-defined settings, clear the* **Enable Automatic ILS** *check box. When Enable Automatic ILS is not selected, changing the channel does not change the position of the ILS. In this case, all adjustments will be lost when the* **Enable Automatic ILS** *check box is selected again.*

3. From the Advanced Setup window, select ILS File Setup.

4. Using the framing test pattern, adjust the Offset by clicking the **up/down/left/right** buttons on the ILS Adjust window (see Figure 2-30) as necessary to display a proper image on the screen. **NOTES: 1)** *You can also hold the buttons down for continuous movement.* **2)** *For best optical performance, make sure to minimize keystone error by using offset more than aiming to center the image in off axis installations.* **3)** *Corner vignettes on a white test pattern indicates extreme offset that should be avoided using mechanical alignment.*

## 2.9.2 Adjust Left/Right Boresight

The goal for left/right boresight alignment is to adjust the lens mount until both sides of the image focus on the screen simultaneously. Projectors are aligned properly at the factory, but due to mechanical tolerances in the alignment between the projector and the screen, the left and right sides of the image come into focus at different times. By focusing on the left side of the screen, we need to determine if the right side of the image focuses in front or behind the screen relative to the left side. **NOTE**: *Use a test pattern with a single pixel vertical and horizontal line and perimeter frame such as DC4K Framing or RGB Alignment.*

1. The Horizontal Hold Screw (Horizontal Locking Screw) acts as counter-resistance to hold the lens mount in place once set. Before adjusting the boresight, loosen the Horizontal Locking Screw. See Figure 2-29.

2. Extend the lens focus completely.

3. Adjust the Focus to retract the lens using the **counter-clockwise** button on the ILS Adjust window (Figure 2-30). Watch the image at the left edge of the screen until it comes into focus. If the image appears well-focused on the left edge but not on the right, we need to determine if the right side focuses in front of or behind the screen. If the entire screen come into focus, skip to step 7.
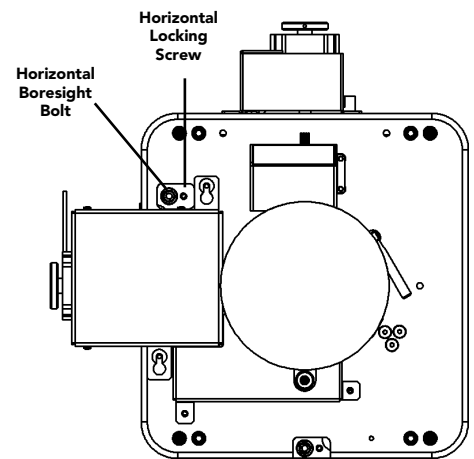


**Figure 2-29 Horizontal Boresight**
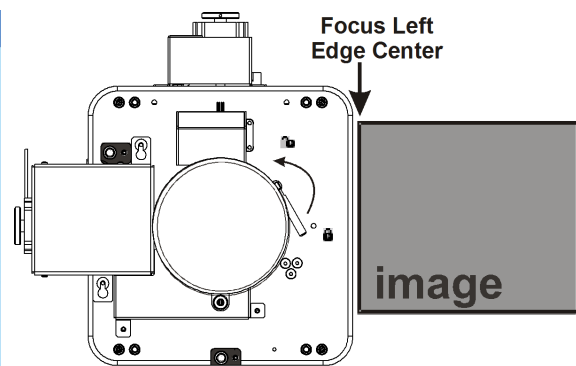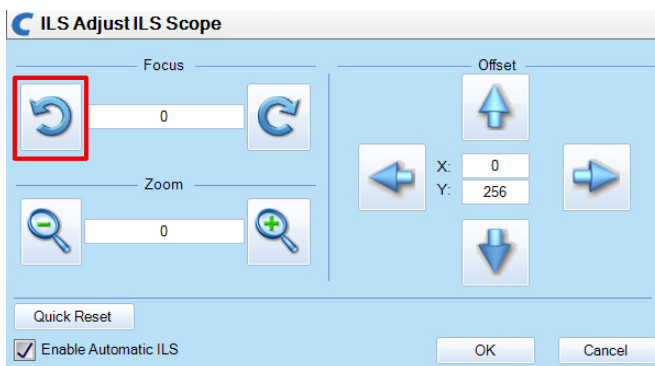


**Figure 2-30 Adjust Focus**

4. Continue retracting the lens.

   a. If the right side of the image comes into focus before the lens is completely retracted, then the image focuses in front of the screen. See Figure 2-31. To correct this problem, adjust the Horizontal Boresight Bolt to direct or aim the lens mount towards the RIGHT to balance out the left/right edges. See Figure 2-29.

   b. If the right side of the image fails to come into focus then the image focuses behind the screen. To correct this problem, direct the lens mount to the LEFT by adjusting the Horizontal Boresight Bolt accordingly.

5. When both sides appear equally blurry, adjust the Offset by clicking the **up/down/left/right** buttons on the ILS Adjust window to re-center the image on the screen.

6. Repeat Steps 1 - 5 until both sides of the image are well focused.

7. Adjust the Horizontal Locking Screw to lock adjustments in place. Check boresight again. See Figure 2-29.
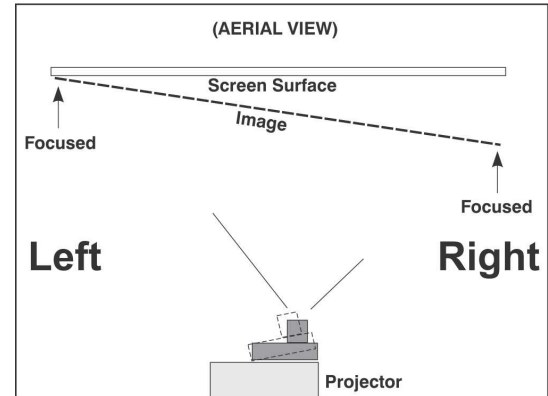


**Figure 2-31 Aerial View Illustrating Misaligned Boresight**

### 2.9.3 Adjust Top/Bottom Boresight

When the horizontal boresight is complete, focus the image at the top edge of the screen.

1. Loosen the Vertical Locking Screw. See Figure 2-32.

2. Extend the lens focus completely.

3. Adjust the Focus to retract the lens using the **counter-clockwise** button on the ILS Adjust window.Watch the image at the top edge of the screen until it comes into focus. If the image appears well-focused on the top edge but not on the bottom, we need to determine if the bottom edge focuses in front of or behind the screen. If the entire screen come into focus, skip to step 8.

4. Continue retracting the lens.

   a. If the bottom edge of the image comes into focus before the lens is completely retracted, then the image focuses in front of the screen. To correct this problem, adjust the Vertical Boresight Bolt to direct or aim the lens mount DOWN towards the top of the screen to balance out the top/bottom edges.
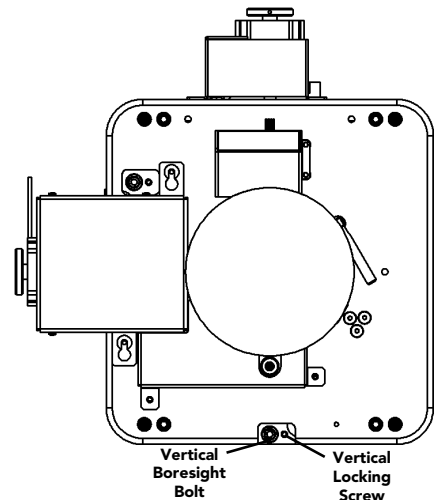


**Figure 2-32 Vertical Boresight**

    b. If the top edge of the image fails to come into focus then the image focuses behind the screen.To correct this problem, adjust the Vertical Boresight Bolt to direct or aim the lens mount UP towards the bottom of the screen.

5. When the top and bottom appear equally blurry, adjust the Offset by clicking the **up/down/left/right** buttons on the ILS Adjust window to re-center the image on the screen.

6. Repeat Steps 2 - 5 until the top and bottom of the screen are both well-focused.



**Figure 2-33 Adjust Vertical Boresight**

7. Refocus: Although all sides of the image should now be in focus, the center of the image may be slightly blurry at this point. Re-focus the center of the image. The goal is for good focus at the center and on all sides.

8. Adjust the Vertical Locking Screw to lock the lens mount in place and check boresight again (Figure 2-32).

For more information on the TPC ILS File Setup options, refer to *Advanced Setup: ILS File Setup Window*.

The ILS can also be adjusted using serial commands. See *Appendix B: Serial API* for the more information on these commands.

## 2.9.4 Add Anamorphic Lens

1. Install the Auxiliary Lens Mount according to instructions provided in the kit. Make sure to optimize your primary lens first for best optical alignment, offset and boresight.

2. Image geometry distortion: Loosen the holding clamp on the auxiliary lens mount. Adjust the rotation of the anamorphic lens so the image remains perfectly square with anamorphic in and out.

3. Image shift: Adjust the location of the anamorphic lens so that the image does not shift left or right with the anamorphic lens in and out.

4. Vignetting: Adjust the location of the anamorphic lens so the image passes through the center as much as possible without vignetting, reducing side or corner brightness, especially in wide angle projection.

5. Focus primary lens: With the anamorphic lens not in place, re-focus the primary lens using the Focus knob. The goal is for good focus at the center and on all sides. Now add the anamorphic lens and check focus again.

6. Focus anamorphic lens: If center-to-edge horizontal focus in the image needs improvement, focus the anamorphic lens by rotating its focus barrel as needed.

## 2.9.5 Wide Converter Lens

1. Install the Auxiliary Lens Mount and Wide Converter Lens (WCL) according to instructions provided in the kit. Make sure to optimize your primary lens first for best optical alignment, offset and boresight.

2. Image shift: Adjust the vertical and horizontal position of the WCL to align it with the already adjusted prime lens.

3. Pitch Adjustment: Adjust pitch, either up or down to equalize the top and bottom clearance to the prime lens barrel.

4. Yaw Adjustment: Adjust yaw to make the clearance between both lens barrels equal from side-to-side.

## 2.10 Fold Mirror and Convergence Adjustments

In rare instances, shipping and handling may affect the precise factory alignments of one or more optical components. As a final step of installation, the installer may have to adjust the fold mirror and/or convergence of the DMDs.

### 2.10.1 DMD Convergence

A convergence problem is evident when one or more projected colors (red/green/blue) appears mis-aligned when examined with a proper convergence test pattern. Normally, the three colors should overlap precisely to form pure white lines throughout the image. One or more poorly converged individual colors may appear adjacent to some of the lines. Qualified service technicians can correct the problem by following the instructions on the color label provided on the inside of the front top lid.

### 2.10.2 Fold Mirror Adjustment

If a corner or edge of the image is missing (after prime lens offset is ruled out), this may indicate the fold mirror has become misaligned with the rest of the optical system, resulting in cropping of data. To correct this issue, use the two adjustment screws that are accessible through the base of the projector. See Figure 2-34.

- To raise or lower the image, adjust the screw closest to the operator's side (right side, when facing screen).
- To move the image left or right, adjust the screw on the left side.
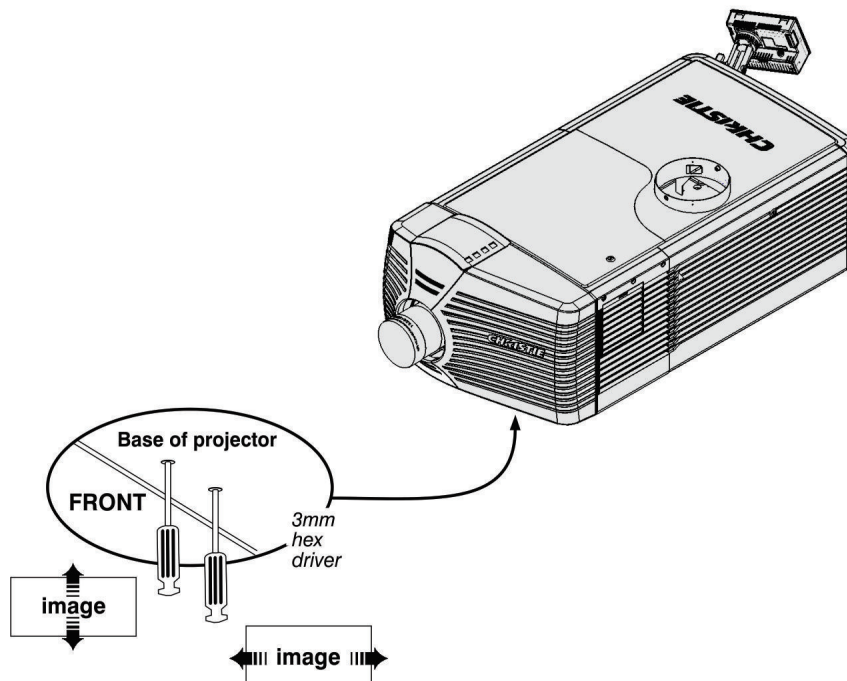


**Figure 2-34 Fold Mirror Adjustment**

## 2.11 Calibrating the System

Use the TPC interface for calibrating the image color performance and defining electronic screen masking. This is required in your particular installation for the creation of Source, Screen, MCGD and TCGD files necessary for proper display of incoming material. You can also define the system/network configuration for communication links to the projector and transmit information to and from the CP4230 via an Ethernet or RS-232 connection.

### 2.11.1 Color Calibration

After the CP4230 is installed and all components are mechanically aligned for optimized light output and geometry, its electronic system processing must be *calibrated* to ensure accurate color display in the new environment. In this one-time global calibration, the installer measures initial colors at the screen from the center of the viewing audience location, also called SMPTE seats, and enters this data—called Measured Color Gamut Data (MCGD)—into the TPC interface. The software then calculates precise corrections needed for regaining the desired color performance—called Target Color Gamut Data (TCGD)—and essentially compensates for the type of port window (if present), screen, lens, light output, ambient light and other current environmental factors that affect color performance. Results are defined in a file, activated, and downloaded to the projector memory to be used as a basis for all future displays.

If there are changes to the environment in the future (for example, a new screen is installed), the CP4230 should be re-calibrated. Also note that correction for proper color balance sometimes reduces overall light output. **NOTE:** *Onsite MCGD files are not provided with the projector and must be created by the installer in the Advanced Setup: MCGD File Setup Window on page 3-46. Multiple gamut files can be saved for use in different situations, such as when an auxiliary lens is swapped on and off the projector. These saved gamut files are accessible for each channel in the Channel Setup: Config 2 Window on page 3-24.*

### 2.11.2 Electronic Screen Masking

Image edge blanking can be corrected using the masking tool for precision cropping in the *Advanced Setup: Screen File Setup Window on page 3-43*. The effect is similar to aperture plate filing typically done for correcting images from film projectors. **NOTE:** The Flat and Scope *Screen files are not provided with the projector and must be created by the installer. Once created, these files can be used for multiple channels, which are accessible in the Channel Setup: Config 1 Window for each channel.*

# 3 Operation

This section describes the software controls used for basic projector operation once it is properly installed, aligned and configured by a qualified service technician. Software controls are performed on the Touch Panel Controller (TPC) which is a portable, touch-sensitive screen mounted to the rear of the projector. For more information on the TPC, refer to *3.2 Using the Touch Panel Controller (TPC), on page 3-2*. All primary controls are on the **Main** panel of the TPC. For more information on the **Main** panel, refer to *3.3 Main Panel, on page 3-3*.

## 3.1 Powering Up/Powering Down the Projector

### 3.1.1 Powering Up the Projector

Powering up the projector is a manual power-up procedure. Some cinema installations may include an automation system that controls lamp ignition in conjunction with other theatre variables such as house lights, audio and the start of the feature from a digital media storage device/server. **Warning!** *Do not attempt operation if the AC supply is not within the specified voltage range.* **NOTE**: *All primary controls on the* **Main** *panel of the TPC require a positive and deliberate hold time of approx. 1/4 second to activate. A short tap will be ignored.*

1. Ensure the projector's wall circuit breaker is ON.

2. On the TPC, click and hold the **Power ON** button for 1/4 second to fully power up the projector. This takes just under a minute to power ON the projector. **NOTE**: *If the* **Lamp ON** *button is selected while the projector is still in Standby mode, the power will be turned ON before the lamp.*

3. On the TPC, click and hold the **Lamp ON** button for 1/4 second to ignite the lamp.

**If the lamp fails to ignite:**

- If a safety interlock switch is open (i.e., lamp door is open), the status LED located in the top, left corner of the TPC will illuminate solid red, and the red LEDs on the rear of the projector will illuminate. In this state, the lamp cannot be struck until the interlock problem is resolved.

- If the lamp fails to ignite even though the interlock system is ok, the projector will automatically re-try ignition using 100% of the maximum power acceptable for the installed lamp. If this re-try fails, the lamp file may be incorrect or missing. Verify the lamp file type in the **Advanced Setup: Lamp History** window. Finally, if the lamp type is correct and the re-try still fails, a new lamp is likely required. The power reverts back to what was originally defined in the **Advanced Setup: Lamp Power/LiteLOC™ Setup** window.

- Check the Ballast Voltage switch.

**If there is a power failure:**

If your projector has been configured with a Uninterruptable Power Supply (UPS) and there is a power failure, simply click the **Lamp ON** button using the TPC once the power is restored to continue operation. For more information, see *Section 2 Installation and Setup*.

## 3.1.2 Powering Down the Projector

1. On the TPC, click and hold the **Lamp OFF** button for 1/4 second. **NOTES**: **1)** *The projector is still in "power on" mode, which allows for a fast lamp on response, if needed.* **2)** *If you are turning off the power (going to Stand-by mode), there is no need to click the* **Lamp OFF** *button first. You can simply click the* **Power OFF** *button for the projector to turn the lamp OFF and go into cool down mode.*

2. On the TPC, click and hold the **Power OFF** button for 1/4 second. The lamp will power off first and then the projector automatically enters a cool down mode where the fans and electronics stay on for 10 minutes. After this cool down period, the projector enters standby mode where all fans and most electronics will power down.

3. If you will be servicing or removing any projector cover, disconnect AC and turn the breaker OFF.

## 3.1.3 Projector Power States

The following table identifies what occurs when the TPC's Power and Lamp buttons are clicked during any of the projector's four main power states. Refer to **Table 3.1**.

**Table 3.1 Projector Status when any TPC Lamp or Power Buttons Selected**

| | | Projector's Current State: | | | |
|---|---|---|---|---|---|
| | | **Standby Power Mode (Solid Yellow)** | **Power ON/ Lamp OFF (Green Blip)** | **Power ON / Lamp ON (Solid Green)** | **Cooling Down Mode (Yellow Blip/ Green Blip)** |
| **TPC Buttons Clicked:** | **Power ON** | To full power ON (boot delay) | No action | No action | Cancels cool down, goes into full power |
| | **Power OFF** | No action | Power OFF immediately | LampOFF(immediately), enters cool down mode | No action |
| | **Lamp ON** | To power ON and lamp ON (boot delay) | To lamp ON (immediately) | No action | Cancels cool down, goes to Lamp ON (immediately) |
| | **Lamp OFF** | No action | No action | Lamp OFF (immediately) | No action |

# 3.2 Using the Touch Panel Controller (TPC)

The Touch Panel Controller (TPC) is a portable, touch-sensitive screen used to control the projector. At the TPC, users can turn the projector and lamp ON/OFF, select a specific channel defining the source/input as created by the installer, obtain status information, etc. The TPC is mounted to the rear of the projector in a simple, robust protective case which features an adjustable ball RAM mount to tilt it at different angles on the projector. Tilt/turn the TPC as desired for the best viewing angle. Two USB ports are located inside a flap on the rear, bottom region of the TPC to download log files and install software upgrades. A single black connection cord allows the TPC to be mounted elsewhere from the projector, which is extendable via an accessory cable. The TPC can also be manually held while looking through the port window.

This section of the manual details the CP4230 user interface. For more information on controlling the projector via serial API, refer to *Appendix B: Serial API*. **NOTES: 1)** *Sample windows are shown throughout this section - text and/or icons may vary according to settings recorded in the password-protected windows.* **2)** *In the rare event that the TPC fails or is disconnected, press the Emergency Start button that is recessed on the faceplate. When pressed, the projector is powered on, the lamp is turned on and the douser is opened.*

## 3.3 Main Panel

The main panel gives you easy access to the frequently used functionality when interacting with the projector. This includes the ability to select from nine user selected channels, Power, Lamp, Douser, Aux Lens, Lens Adjust, and Test Pattern Control. **NOTE**: *Status LED in the context of the TPC window refers to a circular indicator that mimics a physical Light Emitting Diode (LED).*
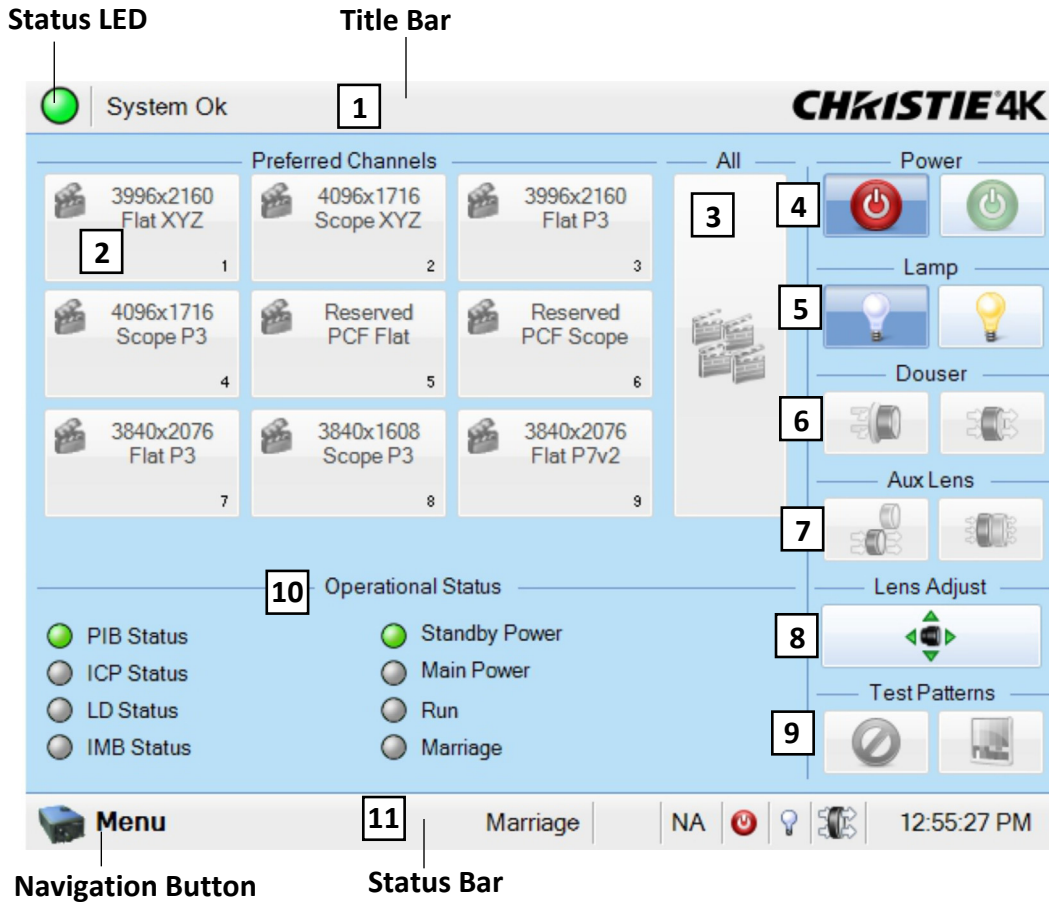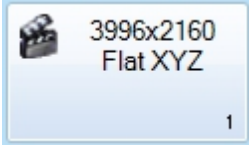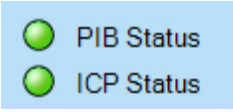
**Figure 3-1 Main Panel**

### Table 3.2 Main Panel

| Control | Description |
|---------|-------------|
| **1: Title Bar ***<br><br>Status LED<br><br>Status Error Message<br> Critical alarm exists | The title bar includes the current status of the projector in the form of a green, yellow, or red LED. The default is a green LED indicating that the projector is operating properly. If any of the monitored status items are less than normal, the LED turns to either yellow (indicating a warning) or red (indicating an error that must be attended to). Click the Status LED to open the **Status** window to determine the components that are failing. For more information, refer to *3.5.1 Status Window, on page 3-9*. |

| Control | Description |
|---|---|
| **2: Channels Buttons**  | Nine of the most commonly used channels display on the **Main** panel for easy access. Select these channels in the **Administrator Setup: Preferred Channel Setup** window. To start a feature or presentation, click the corresponding display Channel button to activate the channel. **NOTE:** *Clicking a Channel button automatically turns Test Patterns OFF to present show content.* |
| **3: All Channels Button** | Click to choose a channel from all 64 channels. |
| **4: Power** <br> Power OFF   Power ON  | Turn the projector ON or OFF. This changes the projector from stand-by to full power. The **Power ON/OFF** buttons require a hold-down period of a 1/4 second to prevent accidental activation. A message displays in the title bar indicating when the projector is turning on/off. |
| **5: Lamp** <br> Lamp OFF   Lamp ON  | Turn the lamp ON or OFF. The **Lamp ON/OFF** buttons require a hold-down period of a 1/4 second to prevent accidental activation. If the **Lamp ON** button is selected before the **Power ON** button, a boot delay occurs for the projector to power ON and turn the lamp ON. |
| **6: Douser** <br> Douser Closed   Douser Opened  | Close or open the douser. |
| **7: Aux Lens** <br> Aux Lens OUT   Aux Lens IN  | (Optional) Engage or disengage the auxiliary lens. To widen images for scope cinema display, engage the auxiliary lens on the projector. If the auxiliary lens mount is not installed, the Aux Lens buttons are disabled (greyed). |
| **8: Lens Adjust**  | Controls for the Intelligent Lens System (ILS) which are lens motors that automate the process of optimizing the projected image. Click to open the **ILS Adjust** window. See *Lens Adjust Notes* below. If the Intelligent Lens System is not installed, the Lens Adjust button is not visible. |
| **9: Test Patterns** <br> Disable   Select Test Pattern  | Select or disable test patterns. Clicking the **Select Test Pattern** button launches the **Preferred Test Patterns** window for you to choose a test pattern to display. |

| Control | Description |
|---|---|
| **10: Operational Status**<br><br>⬤ PIB Status<br>⬤ ICP Status | Shows the status of top-level functionality in LED-like format to mirror the face-plate LEDs. Functionality includes Projector Intelligence Board (PIB), TI Electronics Integrated Cinema Processor Board(s) (ICP), Link Decryptor (LD), Internal Media Block (IMB), Standby Power, Main Power, Run, and Marriage. Green LEDs mean the system is running properly. Red LEDs require attention. If an LED is red, click the **Status LED** button at the top, left corner of this panel to open the **Status** window. |
| **11: Status Bar  ***<br><br>Menu Button<br><br>📷 **Menu**<br><br>Status<br><br>Service 🎬64 ⏻ ᵠ ⊠⑩ ⚙ | The **Menu** button is the starting point to the user windows. Clicking this button opens a two layer menu system populated with available windows based on your permission level. Refer to *Menu Button, on page 3-7* and **Table 3.4**. The bottom right corner of every window shows the logged in user, the active channel, as well as the status of the Power, Lamp, Douser, and Aux Lens. These icons change as these elements update from changes on the projector. The current time also displays. |

**\*** - Every window in the user interface has the same title bar (top of the window) and status bar (bottom of the window).

## Aux Lens

The auxiliary lens mount widens the image for scope cinema display. Click the **Aux Lens IN** button to engage the auxiliary lens in front of the projector. **NOTES**: **1)** *The **Aux Lens** button is used to temporarily override the Auxiliary lens position that was defined in the **Channel Setup: Config 1** window for that channel.* **2)** The Auxiliary Lens Mount is an option that may or may not be installed.

## Lens Adjust

The Motorized Intelligent Lens System (ILS) adjusts the Focus, Horizontal (X) and Vertical (Y) Offset, and Zoom settings automatically. (**Figure 3-2**). **NOTE:** *The Intelligent Lens System can be removed. When reinstalling the ILS, ensure the **ILS Installed** check box in the **Advanced Setup: Lens Setup** window is selected.*
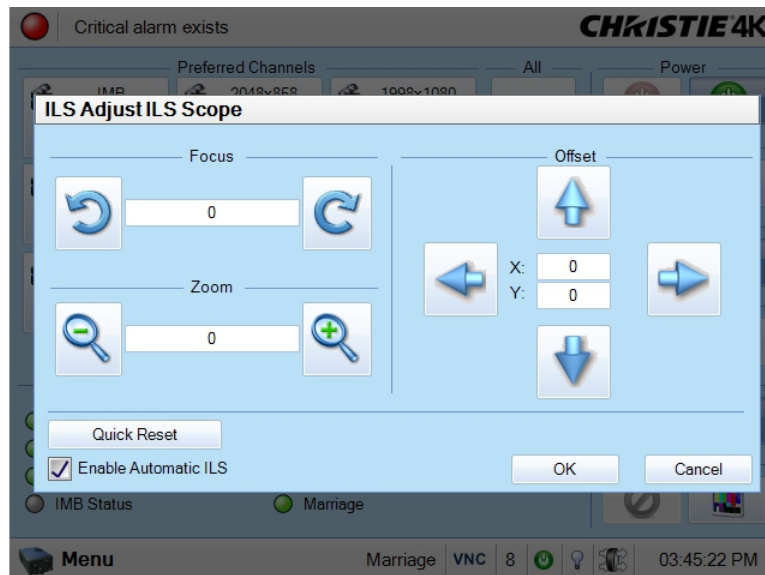


**Figure 3-2 Quick Launch Intelligent Lens System**

All settings on the **ILS Adjust** window are in real-time. ILS settings are saved in a file called **ILS Flat**, **ILS Scope**, or a user-defined file where each channel specifies the ILS file to use. For more information on channel settings, refer to the *Channel Setup: Config 1 Window, on page 3-22*.

**Enable Automatic ILS Selected**

When the **Enable Automatic ILS** check box is selected, the lens automatically moves to the position indicated in the ILS file associated with the current channel. Changing channels will change the position of the lens, assuming the new channel uses a different ILS file. When the **Enable Automatic ILS** check box is selected, any changes made to the focus, offset and zoom will overwrite the current values in the ILS file, therefore these changes will affect every channel that uses this ILS file.

Enable Automatic ILS NOT Selected

When the **Enable Automatic ILS** check box is NOT selected, the lens does not move unless you make adjustments to the focus, offset and zoom in the **Lens Adjust** window. These settings will NOT overwrite the ILS values and changing channels will not affect the position of the lens.

For more information, refer to *Appendix A: Intelligent Lens System.*

**Test Patterns**

Test patterns are used when setting up a projector to ensure proper image positioning and light on the screen. The **Test Patterns** button launches a collection of test patterns predefined in the **Administrator Setup: Preferred Test Pattern Setup** window, along with other options to turn the test pattern off, display all test patterns, and show the projected image on the full screen (this ignores the screen file settings). See **Figure 3-3**. For more information, refer to the *Administrator Setup: Preferred Test Pattern Setup Window, on page 3-50.*
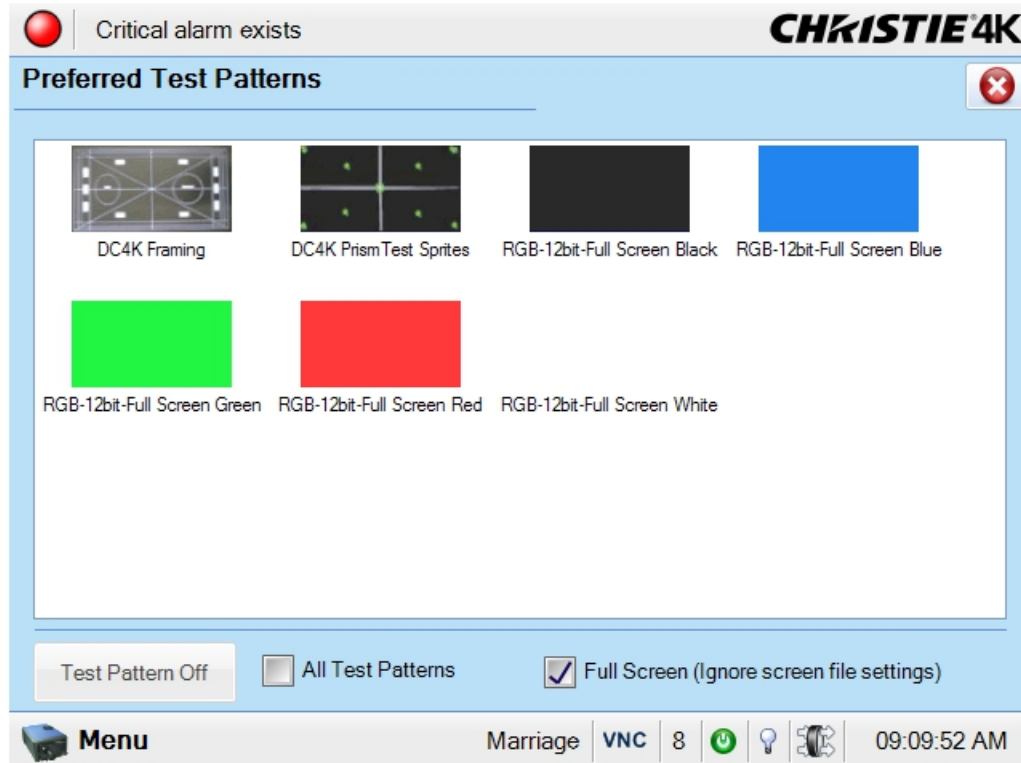


**Figure 3-3 Quick Launch Preferred Test Patterns Window**

### 3.3.1 Navigating the User Interface

Every window in the user interface has the same title bar (top of the window) and status bar (bottom of the window).

### Title Bar

The title bar shows the current status of the system where the color of the LED indicates the state of the projector. (**Figure 3-1**). A green LED indicates that all systems are operating properly (default), a yellow LED indicates a warning and a red LED indicates an error which must be attended to. Clicking the LED launches the **Status** window to determine the components that are failing. For more information, see *3.5.1 Status Window, on page 3-9*.

### Menu Button

Accessing the various windows in the TPC software is done using the **Menu** button. Select the desired menu item (or submenu item) for interaction. (**Figure 3-4**). Once finished, navigate to another window using the

**Menu** button or click the [X] button in the top, right corner of the window to return to the **Main** panel.

**Close Button**



**Navigation Button**
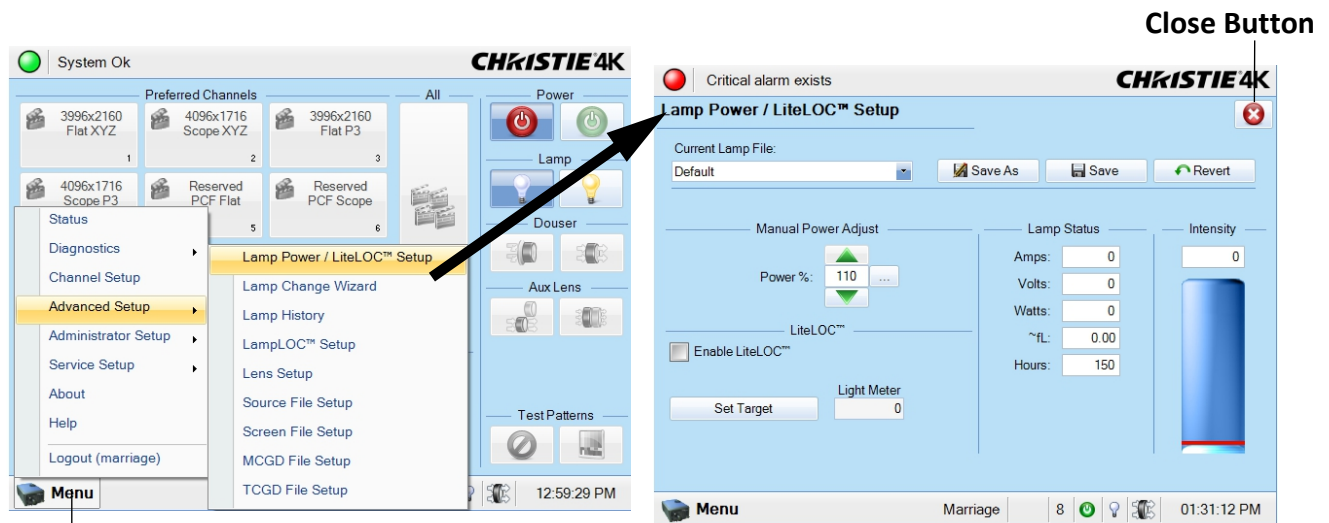
**Figure 3-4 Menu Options**

### On Screen Keyboard

Some options require a user input. When present, click the **Launch Dialog** button ( [...] ) to launch the **On Screen Keyboard** (**Figure 3-5**) or **On Screen Keypad**. The **On Screen Keypad** will launch when entries require numerical values only.
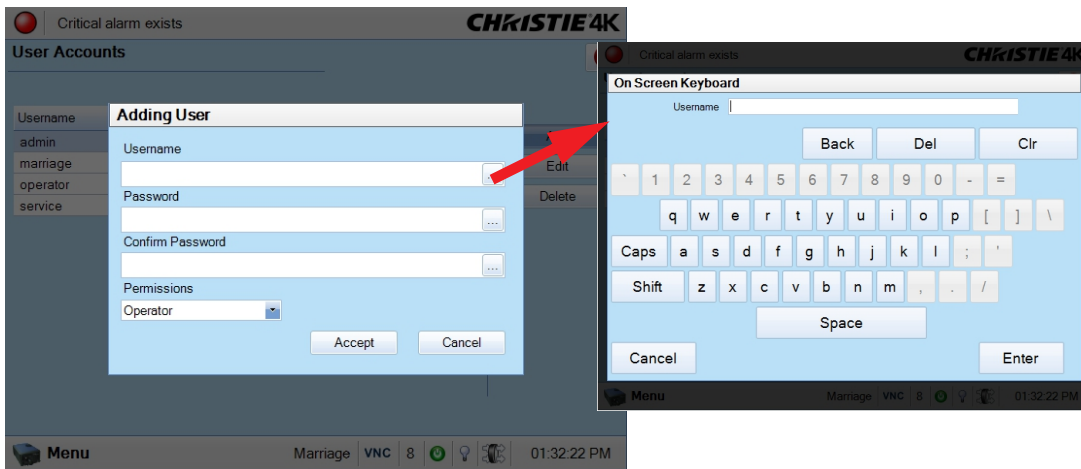
**Figure 3-5 On Screen Keyboard**

## 3.4    User Access and Rights

Accessing the different windows depends on login credentials. There are five distinct password-protected levels of use. (**Table 3.3**). Each level has the rights of lower levels, plus additional rights as described.

**Table 3.3 User Levels**

| Permission Level | Description |
|---|---|
| **Status** | Any user can view basic projector status, diagnostic information and software version information. This is the default level for Serial Communication sessions. |
| **Operator** | This level of user can view detailed diagnostic logs for in-depth troubleshooting and view server errors. This is the default level at the TPC. |
| **Advanced** | This level of user can define all display setups such as source resolution, aspect ratio, image cropping, and color gamut information, optimize light output, record lamp changes, and define setup files as selectable choices for processing a variety of incoming signals. |
| **Administrator** | This level of user can activate channel and test patterns, perform screen Foot Lambert calibration, define Ethernet settings (IP network address), restore backup files, and upgrade the system software. **NOTE**: *Administrators can add users and set user access rights from its own level and below only.* |
| **Service** | Installers and other service personnel can access all windows on the TPC, yet cannot perform Marriage. |
| **Marriage** | Installers and other service personnel can access all windows on the TPC, which includes performing Marriage. |

**Table 3.4 Accessible Windows Per User Level**

| Menu | Status | Operator | Advanced | Administrator | Service | Marriage |
|---|---|---|---|---|---|---|
| **Main** | X | X | X | X | X | X |
| **Status** | X | X | X | X | X | X |
| **Diagnostics** <br> - Interrogator <br> - SMPTE Errors <br> - System Logs <br> - Server Test <br> - DLP Management | | X <br> **(except DLP Management)** | X <br> **(except DLP Management)** | X | X | X |
| **Network Devices** | X | X | X | X | X | X |

| Menu | Status | Operator | Advanced | Administrator | Service | Marriage |
|---|---|---|---|---|---|---|
| **Channel Setup**<br>- Config 1<br>- Config 2<br>- 3D Control | | | X | X | X | X |
| **Advanced Setup**<br>- Lamp Power / LiteLOC™ Setup<br>- Lamp Change Wizard<br>- Lamp History<br>- LampLOC™ Setup<br>- ILS File Setup<br>- Lens Setup<br>- Source File Setup<br>- Screen File Setup<br>- MCGD File Setup<br>- TCGD File Setup | | | X | X | X | X |
| **Administrator Setup**<br>- Preferred Channel Setup<br>- Preferred Test Pattern Setup<br>- Preferences<br>- Content Devices Configuration<br>- Time Setup<br>- Communications Configuration<br>- Network Devices Setup<br>- GPIO Setup<br>- Foot Lamberts Calibration<br>- User Accounts<br>- Upgrade | | | | X | X | X |
| **Service Setup**<br>- File Management<br>- LD Marriage<br>- System Access<br>- IMB Marriage<br>- Lamp Power Supply Setup | | | X | X<br>(except Marriage) | X<br>(except Marriage) | X |
| **About** | X | X | X | X | X | X |
| **Help** | X | X | X | X | X | X |

## 3.5 TPC Windows

### 3.5.1 Status Window

The **Status** window allows you to view read-only status information organized in groups of items where each item displays in a row of the form: LED, name, and value. The LED can be one of three colors: green, yellow, or red.

A *green* indicator signifies normal operation.

A *yellow* indicator signifies an unusual environmental condition, such as the lamp reaching a set limit of hours in use. It can also indicate a temperature having reached a higher than normal (but not critical) level. This is a warning state.

A *red* indicator can signify that **1)** the environment has a serious problem or **2)** a specific electrical component is not detected or does not appear to be functioning properly. These errors require immediate attention.

If the **Item** or **Value** are too long for the cell, click a row to display the full item entries at the bottom of the window. To adjust the width of the cells, move the mouse pointer to the end of the **Item** heading and watch for the cursor to change. Click and drag the cell to widen or shorten the width. Repeat this action at the end of the **Value** heading. This resizing propagates to all categories while the **Status** window remains open. Closing the **Status** window returns the cell spacing to the original width.
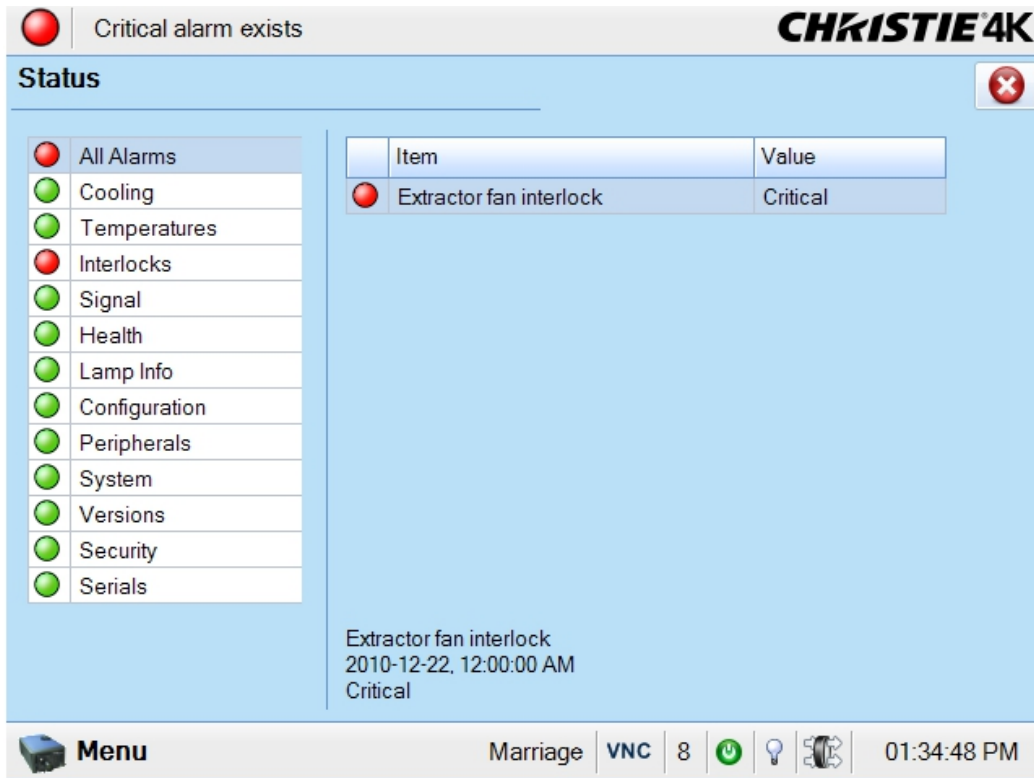
**Figure 3-6 Status Window**

**Table 3.5 Summary of Status: System Components**

| All | |
|---|---|
| Displays all the status items that are in alarm state. | |
| **Cooling** | |
| Cooling Pump | |
| Card Cage Fanpack (bottom right) | |
| Card Cage Fanpack (top right) | |
| Intake Fanpack (bottom right) | |
| Intake Fanpack (bottom left) | |
| Intake Fanpack (top right) | |
| Intake Fanpack (top left) | |
| LAD Fan | |
| Radiator | |
| Card Cage Exhaust (Operator side) | |
| Card Cage Exhaust (Non-Operator side) | |
| Ballast Fan | |
| **Temperatures (degrees Celsius)** | |
| Card Cage Exhaust | |
| Local | local temperature |
| Lamp Exhaust | 65 °C = warning, $\geq$ 75 °C = critical |
| Filtered Air Intake | |
| Integrator | 90 °C = warning, $\geq$ 100 °C = critical |
| Prism | 60 °C = warning, $\geq$ 70 °C = critical |
| Blue DMD | 63 °C = warning, $\geq$ 68 °C = critical |
| Green DMD | 63 °C = warning, $\geq$ 68 °C = critical |
| Red DMD | 63 °C = warning, $\geq$ 68 °C = critical |
| ILS Board Temperature | |
| LampLOC™ Board Temperature | |
| EVB Board Temperature | |
| Ballast Temperature | |
| FMT FPGA | |

| | |
|---|---|
| ICP FPGA | |
| ICP Board (MAX6656) | |
| PIB Temperature | |
| Backplane Temperature | |
| Red SFB Board Temperature | |
| Red SFB FPGA Temperature | |
| Blue SFB Board Temperature | |
| Blue SFB FPGA Temperature | |
| Green SFB Board Temperature | |
| Green SFB FPGA Temperature | |
| **Interlocks** | |
| Extractor fan intake | OK/Failed |
| AC Blower interlock | OK/Failed |
| Lamp door interlock | OK/Failed |
| Fire Alarm interlock | OK/Failed |
| **Signal** | |
| Input Frequency | |
| Input Port | |
| Data Format | |
| LD Link0 State | |
| LD Link1 State | |
| LD Link2 State | |
| LD Link3 State | |
| **Health** | |
| 292-A Total SMPTE Error Count | |
| 292-A Recent SMPTE Error Count | |
| 292-B Total SMPTE Error Count | |
| 292-B Recent SMPTE Error Count | |
| CPLD Self Test | |
| PI Board Seated Properly | |
| RAM Self Test | |
| Flash Self Test | |
| LVDS Self Test | |
| LampLOC™ Main Code - CRC | |
| LampLOC™ State | |
| LampLOC™ X Sensor | |
| LampLOC™ Y Sensor | |
| LampLOC™ Z Sensor | |
| EVB Main Code - CRC | |
| EVB State | |
| LVPS AC OK | |
| LVPS DC OK | |
| **Lamp Info** | |
| Lamp ID | |
| Lamp Serial Number | |
| Lamp Power | Lamp power in watts |
| Lamp Current | Lamp current in amps |
| Lamp Voltage | Lamp voltage in volts |
| Luminance | Luminance in Foot Lamberts or Candela |
| Lamp Intensity | Current light intensity reading |
| Lamp Expired Status | Yes/No |
| Lamp Needs Rotation | Yes/No |
| Total Hours on Installed Lamp | Total number of hours on current lamp |
| Lamp State | On/Off |
| **Configuration** | |
| Projector model | Displays projector model |
| Projector serial number | Displays projector serial number |
| Date of manufacture | Displays manufacture date |
| Projector subtype | |
| Projector subtype ID | |
| Light engine native resolution | 4096 x 2160 |
| Ballast ID | |
| IP Address | Displays IP address |
| Subnet mask | Displays subnet mask address |
| Gateway | Displays gateway address |

| MAC Address | Dplays MAC Address of projector |
|---|---|
| DMD Type | |
| ICP Board Type | |
| Red Satellite board type | |
| Green Satellite board type | |
| Blue Satellite board type | |
| TPC Model ID | |
| **Peripherals** | |
| Auxiliary Lens Install Status | Yes/No |
| Auxiliary Lens Type | Type of auxiliary lens installed |
| ILS Install Status | Yes/No |
| ILS Main Code - CRC | |
| ILS Temperature | Displays ILS temperature in celsius/fahrenheit when ILS is installed |
| ILS Board ID | |
| ILS Boot Version | |
| ILS Software Version | |
| ILS Hardware Version | |
| ILS X Sensor | |
| ILS Y Sensor | |
| ILS Focus Sensor | |
| ILS Zoom Sensor | |
| ILS State | |
| Primary Lens Type | Generic zoom |
| **System** | |
| Hours on projector | |
| ICP State | |
| LD State | |
| Lamp Hours on projector | |
| Ballast State | |
| Available Disk Space (MB) | |
| Disk space used (MB) | |
| Available Memory (KB) | |
| ICP 3.3v rail | |
| ICP 2.5v rail | |
| ICP 1.8v rail | |
| ICP 1.2v rail | |
| PowerGood VID | |
| PowerGood 1v2 2v5 | |
| PowerGood 1v8 3v3 | |
| PowerGood 24V EXT | |
| PowerGood 24V STBY | |
| ICP Free Disk Space (KB) | |
| ICP Total Disk Space (KB) | |
| **Versions** | |
| Package Version | |
| TPC Software | |
| TPC OS | |
| EVB Main | |
| EVB Boot | |
| EVB Hardware | |
| IMCB Lamp Boot | |
| IMCB Lamp Main | |
| IMCB Lamp Hardware | |
| IMCB ILS Boot | |
| IMCB ILS Main | |
| IMCB ILS Hardware | |
| PIB LVDS FPGA | |
| PIB FPGA Production | |
| PIB FPGA Factory | |
| PIB Main Production | |
| PIB Main Factory | |
| PIB Bootloader | |
| PIB CPLD | |
| PIB FPGA Active | |
| Router Bootloader | |
| Router Kernel | |
| Router Sysfs | |
| LD Security List | |
| LD Software | |
| LD Login List | |

| | |
|---|---|
| ICP Software | |
| ICP OS | |
| ICP Kernel | |
| ICP RAM Disk | |
| ICP Software Boot | |
| ICP Firmware Boot | |
| ICP Software Main | |
| ICP Firmware Main | |
| ICP Firmware FPGA Config | |
| ICP Secure Processor | |
| Formatter Software Boot | |
| Formatter Firmware Boot | |
| Formatter Software Main | |
| Formatter Firmware Main | |
| Formatter Satellite | |
| Formatter FPGA Config | |
| Formatter Sequence Data | |
| Formatter DMD Data | |
| PIB Mod ID.Rev.Level | Value displayed as PIB model ID. Revision Number. Level |
| Backplane Mod ID.Rev.Level | Value displayed as Backplane model ID. Revision Number. Level |
| Faceplate Mod ID.Rev.Level | Value displayed as Faceplate model ID. Revision Number. Level |
| SFB-Red Level.MOD ID.Board | |
| SFB-Blue Level.MOD ID.Board | |
| SFB-Green Level.MOD ID.Board | |
| **Security** | |
| Security enclosure armed | |
| Security enclosure tamper | |
| Security enclosure battery low | |
| Bottom Enclosure Open | |
| Top Enclosure Open | |
| Log Error | |
| Log Warning | |
| Logical Marriage Tamper | |
| Physical Marriage Tamper | |
| Low Battery | |
| Marriage Active | |
| Projector Security Lid Tamper | |
| The certificates on the LD have been zeroized | |
| ICP-LD Communication Error | |
| **Serials** | |
| LD | |
| ICP | |
| Projector | |
| Backplane | |
| PIB | |
| EVB | |
| LampLOC™ | |
| ILS | |
| Primary Lens | |
| Auxiliary Lens | |
| Current Lamp | |
| Ballast | |

### 3.5.2 Alarm Window

When an alarm condition is encountered, a full-screen red alarm window appears with a description of the alarm condition, state, and time the alarm occurred. (**Figure 3-7**). The list will not include alarms that the user has previously acknowledged even if they are still active. If an interlock failure occurs, power will no longer reach the lamp and the **Lamp ON** button on the **Main** panel will be disabled. Upon acknowledging the alarm by clicking the **Acknowledge** button, the **Status: All Alarms** window will show a list of these alarms.
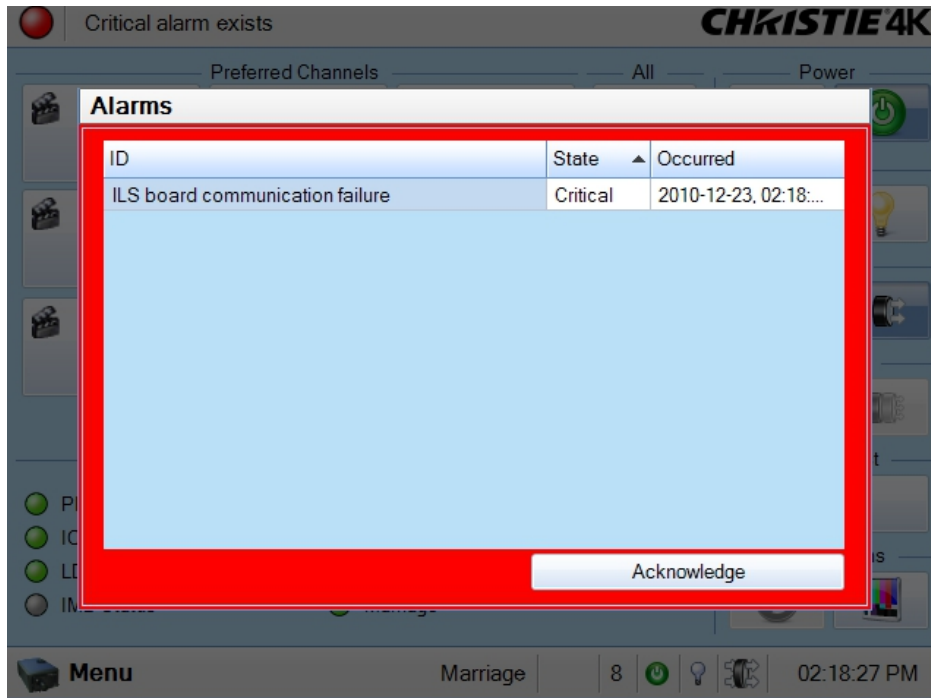
**Figure 3-7 Alarm Window**

### 3.5.3  Projector LED Status Indicators

In addition to the status indicators on the TPC, there are 2 sets of color-coded LED status indicators affixed to the top, rear corner of the projector skins - one set per side. These LEDs are designed to be easily viewable from a distance and on a wide angle so that the status of multiple projectors in a multiplex can be determined with a quick glance. The LEDs are ordered from top to bottom as red, yellow, and green. To communicate more information, the LEDs can be solid, flash or blip. Flashing is a regular ON/OFF cycle of the LED, while blipping has a long ON time with a brief OFF time. A blipping LED should appear to be solid, with periodic hiccups. Each LED has a specific meaning that quickly communicates the state of the projector.

**Table 3.6 Projector Status LED Legend**

| LED | State | Description |
| --- | --- | --- |
| **Solid Green** | Lamp ON | Power is ON, Lamp is ON. |
| **Green Blip** | Power ON | Power is ON, Lamp is OFF. The lamp can be struck when in this mode. |
| **Solid Yellow** | Standby mode | Power is OFF, Lamp is OFF. Power saving mode. |
| **Yellow Blip/ Green Blip** | Cool down mode | Transitioning to Standby mode. Power is ON, Lamp is OFF. The lamp can be struck when in this mode. |
| **Flashing Red** | New critical alarm or warning | New critical alarm or warning has NOT been acknowledged by operator. |
| **Solid Red** | Existing critical alarm or warning | Critical alarm or warning exists, but has been acknowledged by operator. |

### 3.5.4 Diagnostics Window

Required permission level - **Operator** (except DLP Management), **Administrator** or **Service**.

#### Diagnostics: Interrogator Window

The **Diagnostics: Interrogator** window captures the current state of the system that can assist in the diagnostics of projector components. It retrieves all of system logs and current configuration information and compresses it into a single file. **Interrogator** can run in two modes:
- **Basic Mode** which enables the collection of log files only
- **Enhanced Mode** which creates log files plus registered batch files.
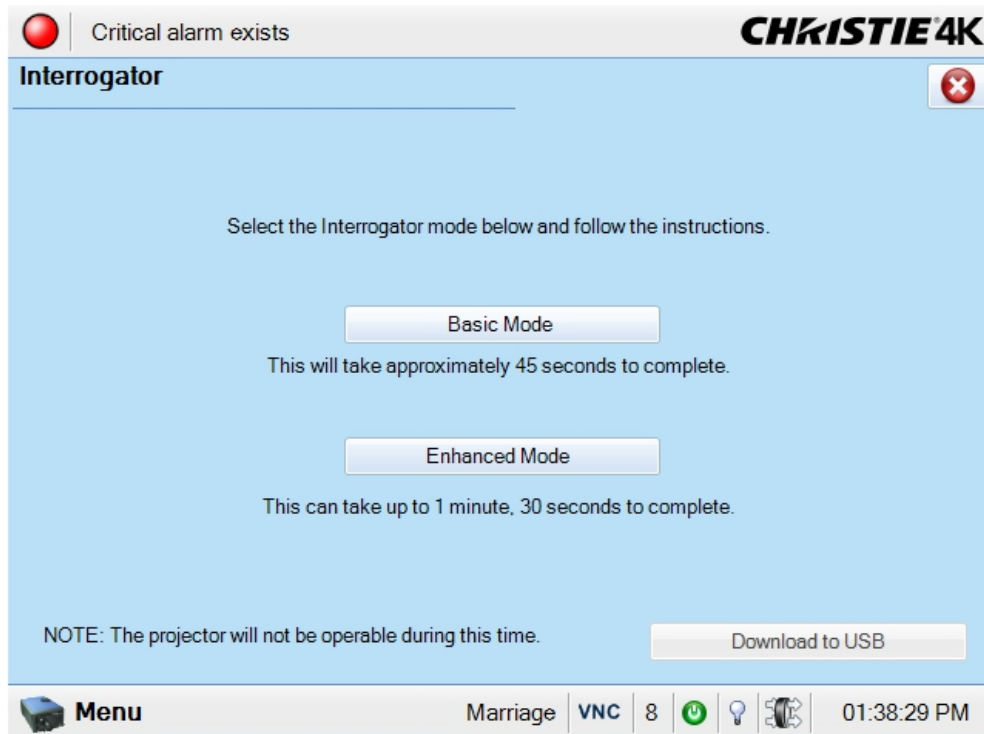


**Figure 3-8 Diagnostics: Interrogator Window**

**Table 3.7 Diagnostics: Interrogator Window**

| Control | Description |
| --- | --- |
| **Basic Mode** | Executes the interrogator in basic mode and generates a zip file (.7z or 7-zip file format) of the results. |
| **Enhanced Mode** | Executes the interrogator in enhanced mode and generates a zip file (.7z or 7-zip file format) of the results. |
| **Download to USB** | Copies the interrogator file to a USB drive which is connected to one of the USB ports at the back of the TPC. Open the back cover to reveal the USB ports. |

**NOTE:** *Log files are compressed into a .7z or 7-zip file format. A tool for opening these archives can be downloaded from* [http://www.7-zip.org](http://www.7-zip.org).

**To Run Interrogator**

1.  Click an Interrogator mode and then click the **Yes** button to start the Interrogator process. A progress bar will display until Interrogator is finished. Once started, the Interrogator cannot be stopped. During this time, you cannot modify the projector settings. **Warning!** *Never run Interrogator during a show as this could cause image disruption.* **NOTES: 1)** *For Interrogator to successfully retrieve these diagnostic files, the projector must remain in its "failed" state (with an incorrectly displayed image on-screen).* **2)** *Always run Interrogator first before power cycling the projector otherwise important diagnostic files will be unusable.*

2.  Once complete, download these files to a USB drive. Open the back flap of the TPC to gain access to the USB ports. Insert the USB drive and click the **Download to USB** button.

## Diagnostics: SMPTE Errors Window

The **Diagnostics: SMPTE Errors** window shows the number of SMPTE Errors reported. The SMPTE error count is a numerical representation of signal integrity on the HD-SDI inputs reaching the projector on the BNC signal cables. A long or poor quality connection can cause higher counts and may be detectable before sparkles, or image artifacts are visible. These errors can be cleared, which will also clear the error count and free up memory for future logs.



**Figure 3-9 Diagnostics: SMPTE Errors Window**

**Table 3.8 Diagnostics: SMPTE Errors Window**

| Region | Control | Description |
|--------|---------|-------------|
| SMPTE Error Counts | **292-A Total** | The total count of 292-A errors. |
| | **292-A Recent** | The recent count of 292-A errors. |
| | **292-B Total** | The total count of 292-B errors. |
| | **292-B Recent** | The recent count of 292-B errors. |
| | **Clear Errors** | Clears the SMPTE errors from the logfile and resets all SMPTE Error Counts to 0. This is used for testing to see if the error returns. |
| **SMPTE Error History** | | A history of SMPTE errors. |

## Diagnostics: System Logs Window

This window provides status information about the projector's components and log files for each device to be saved for diagnostics.
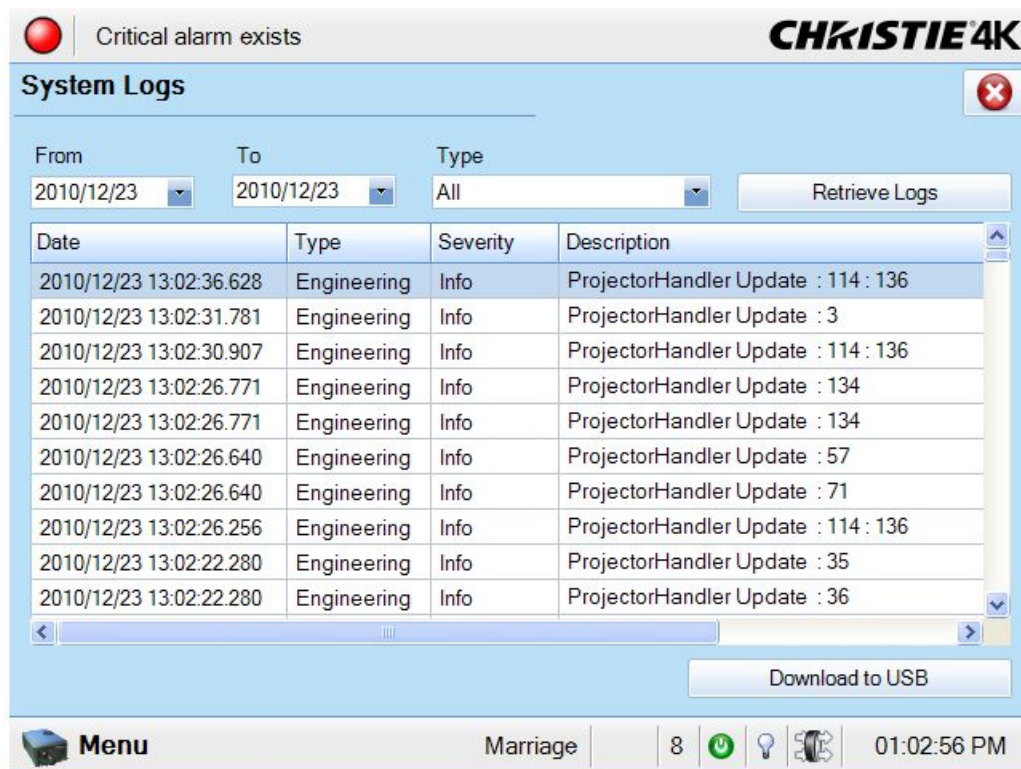


**Figure 3-10 Diagnostics: System Logs Window**

**Table 3.9 Diagnostics: System Logs Window**

| Control | Description |
|---------|-------------|
| **From: To** | Date range to download system log information. Click the **From** arrow to select a start date from the calendar that displays and click the **To** arrow to select an end date for the system log information. |
| **Type** | Select the type of log file to retrieve, one of **All**, **System**, **Event**, **Maintenance**, **Operational**, **Security**, or **Engineering**. **System** retrieves all of the **Event**, **Maintenance**, **Operational**, and **Security** log files. **All** retrieves all **System** and **Engineering** log files. |

| Control | Description |
|---|---|
| **Retrieve Logs** | Click to display the log information. |
| **Download to USB** | Click to download the system log information that displays on-screen to a USB drive. Open the back flap of the TPC to gain access to the two USB ports. |

### Diagnostics: Server Test

The Server Test window provides controls for testing or confirming subtitling and/or metadata commands supplied with presentation content from the site's controlling cinema server. The relevant .xml files-one for subtitling, one for metadata-can be searched and examined for errors in content or in transmission from the server. Reported errors can then help point to potential problems with the server, the .xml file, or the communication link to the projector. Note that controls in the **Server Test** menu do not turn OFF/ON metadata or subtitling. Controls are diagnostic tools only.

To verify the subtitling/meta-file of a movie, first begin playing the movie then access the **Server Test** menu. The Meta File URI and Subtitling URI (XML files) will display in their respective fields, if the files exist for that content.
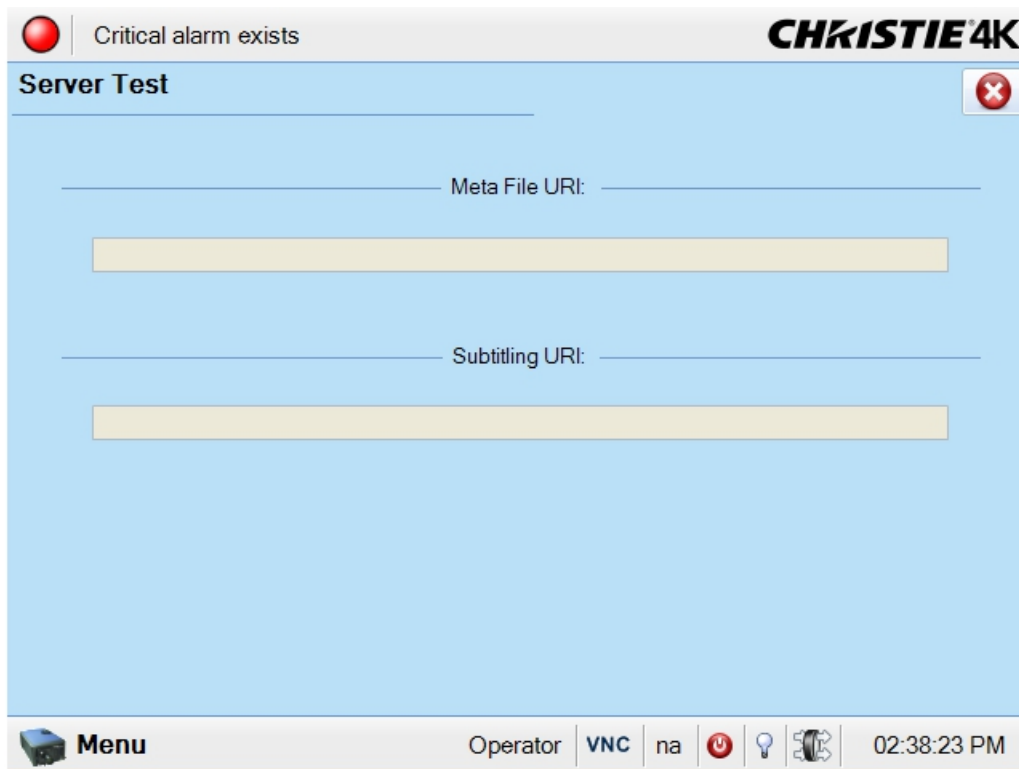


**Figure 3-11 Diagnostics: Server Test**

### Table 3.10 Diagnostics: Server Test

| Control | Description |
|---|---|
| **Meta File URL** | Displays the URL of the Meta File (XML) for the current digital content, if one exists for that content. |
| **Subtitling URL** | Displays the URL of Subtitling (XML) for the current digital content, if one exists for that content. |

## Diagnostics: DLP Management Window

The **DLP Management** window has controls for interacting with the TI Integrated Cinema Processor (ICP) electronics such as allowing you to turn off communication with the DLP hardware, copying the ICP/LD certificates, resetting the ICP board, and running a number of ICP and LD self tests.
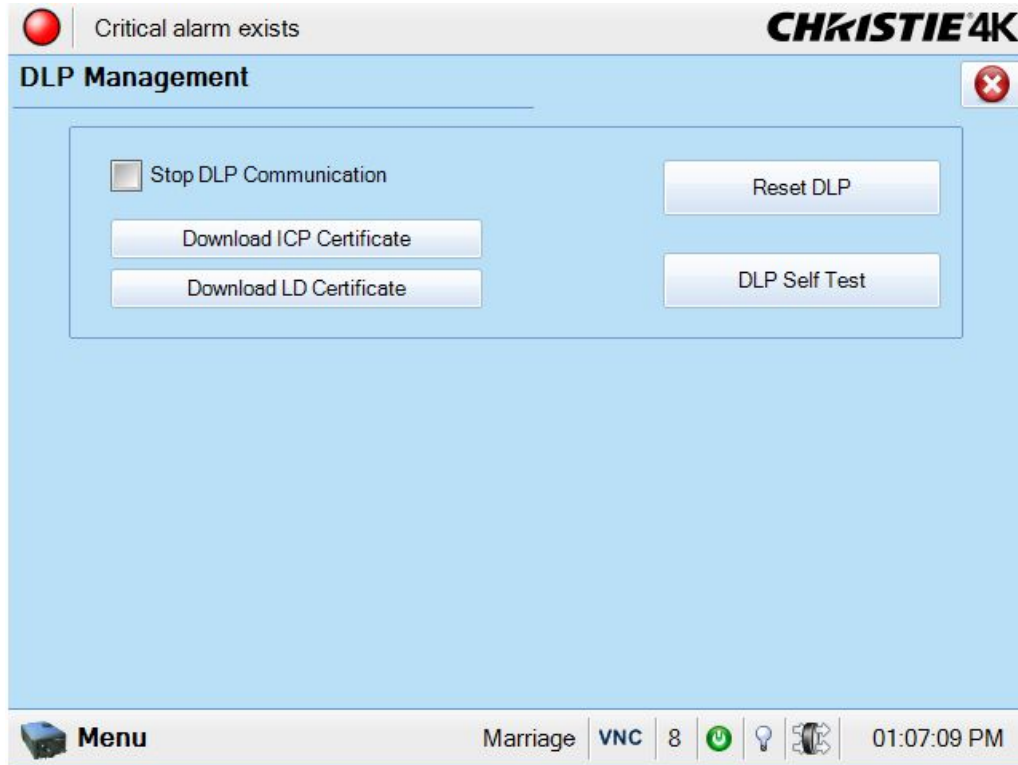


**Figure 3-12 Diagnostics: DLP Management Window**

**Table 3.11 Diagnostics: DLP Management Window**

| Control | Description |
| --- | --- |
| **Stop DLP Communication** | Turns off communication to the DLP hardware (Integrated Cinema Processor and Link Decryptor). When the **Stop DLP Communication** check box is selected, communication commences. |
| **Download ICP Certificate** | Allows you to copy the ICP certificate to a file on the USB drive. Open the back flap of the TPC to gain access to the USB ports. If no USB drives are found, an error returns. |
| **Download LD Certificate** | Allows you to copy the LD certificate to a file on the USB drive. Open the back flap of the TPC to gain access to the USB ports. If no USB drives are found, an error returns. |
| **Reset DLP** | Resets the ICP board. **NOTE:** *Ensure to reset the DLP when a movie is NOT playing since this will interrupt the playing content.* |
| **DLP Self Test** | Run a number of ICP and LD self tests of the DLP hardware and reports the results on-screen. |

### 3.5.5 Network Devices

The **Network Devices** menu is an optional menu that only displays when a Network Device has been defined in the **Administrator Setup: Network Devices** window. Network Devices such as Christie ACT and an Integrated Media Block can be accessed. Refer to the *Administrator Setup: Network Devices Window, on page 3-57*.
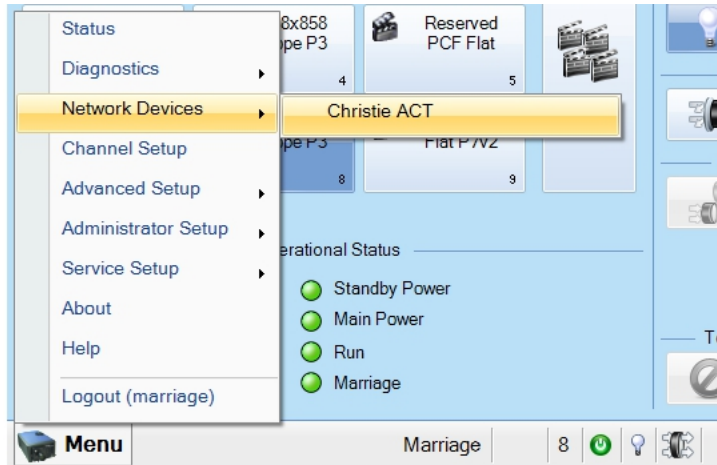


**Figure 3-13 Accessing Christie ACT via the Network Devices Window**

You can interact with the device via an on-screen keyboard by clicking ⌨ in the top right corner of the window. You can also alter the zoom of the device by clicking the drop-down menu, Zoom: 100% ▾ , in the top right corner of the window.



**Figure 3-14 Christie ACT Displayed Through the TPC**

### 3.5.6 Channel Setup Windows

Required permission level - **Advanced**, **Administrator**, or **Service**.

Channels are projector presets that control how the projector handles and displays different content/inputs on the projection screen. In general, the options available through the **Channel Setup** window enable users to tailor projector processing for any type of incoming source, including 3D material, and collect these settings into a unique channel that any user can select from the **Main** panel. Up to 64 channels can be defined.

The **Channel Setup: Config 1** and **Config 2** windows consist of numerous display settings that can be adjusted and collectively saved as a custom setup or channel. Nine channels display as buttons directly on the **Main** panel while all 64 channels are accessible by clicking the **All Channels** button. You can activate a channel by selecting the proper channel from the **Main** panel or selecting the **Channel Name** in any **Channel Setup** window and clicking the **Activate** button. The status bar shows the active channel. (**Figure 3-15**)



**Figure 3-15 Channel Setup Window**

**Table 3.12 Channel Setup Window**

| Control | Description |
|---|---|
| **1: Channel Name** | In the **Channel Name** list, select a channel to display its settings. Channels are displayed with the format **#: Name** where # is the channel number and **Name** is the name of the channel. To determine the current active channel, refer to the second item in the status bar. If the current channel is the active channel, a check mark displays beside the **Launch Dialog** button. **NOTE**: *Selecting a channel from the **Main** panel does not change the channel listed in the **Channel Name** list. You must manually select the channel from the list to see the settings for the active channel.* |
| **2: Edit Name** | Click the **Launch Dialog** button to edit the name of the currently selected channel. |

| Control | Description |
|---------|-------------|
| **3: Active Channel** | The check mark indicates the selected channel in the **Channel Name** list is the active channel. |
| **4: Activate** | Clicking the **Activate** button activates the currently selected channel. If the **Activate** button is greyed (disabled), the current channel selected is the active channel. |
| **5: Config 1** | General configuration options. |
| **6: Config 2** | Colour configuration options. |
| **7: 3D Control** | Features to support 3D displays. |
| **8: Warning** | The warning symbol indicates that the currently displayed file does not exist on the system and needs to be defined in the applicable **Advanced Setup** window. |
| **9: Defaults** | Clicking the **Defaults** button launches a dialog for you to return the factory defaults of the current channel or all channels. |

## Channel Setup: Config 1 Window

The **Channel Setup: Config 1** window provides general configuration options when setting up a channel.
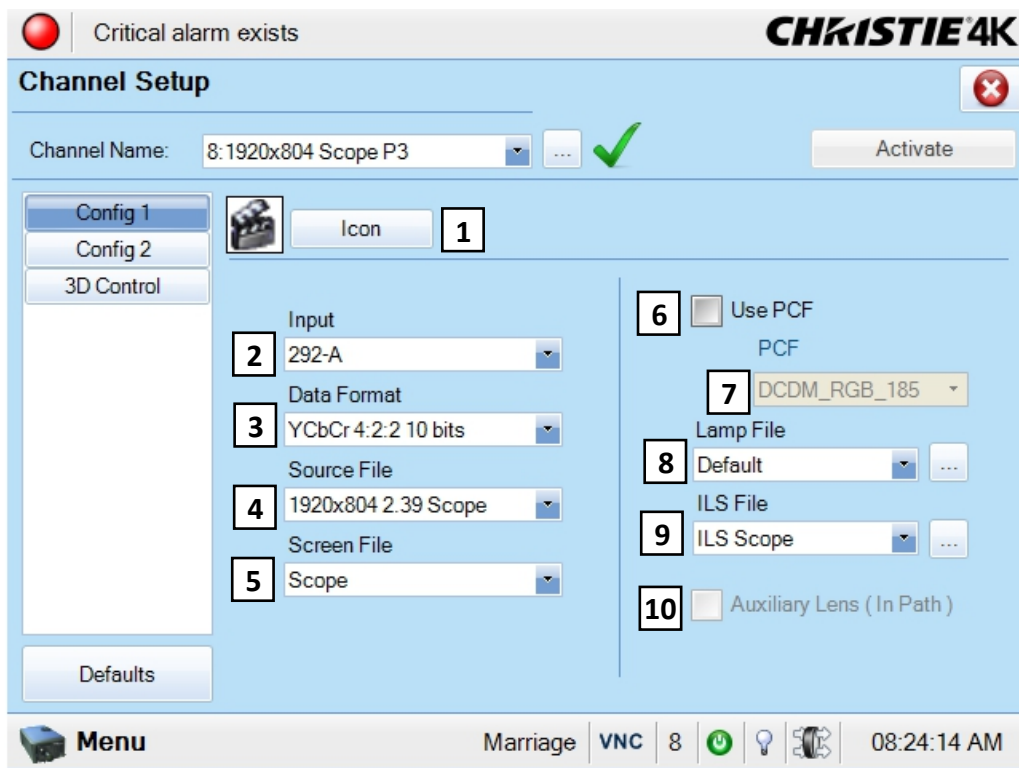


**Figure 3-16 Channel Setup: Config 1 Window**

### Table 3.13 Channel Setup: Config 1 Window

| Control | Description |
|---|---|
| **1: Icon** | Displays the icon associated with that channel. The **Icon** button allows you to select a new image from a list of available options. |
| **2: Input** | Identifies/sets the location/connection of the current source, such as cinema port 292-A, 292-B or a DVI graphics port. |
| **3: Data Format** | Identifies the source type (8-10-12 bit) and whether or not it is packed. The projector will process the incoming signal according to the data format selected here. **NOTE:** *Available data formats depend on which projector input is selected and will reset to a default value if an input has not yet been selected.* |
| **4: Source File** | Identifies/sets the expected incoming source resolution and aspect ratio such as 1998x1080 Flat. The list of available sources are defined in the *Advanced Setup: Source File Setup Window, on page 3-40*. The source file is part of any pre-defined PCF that controls image processing for a given source. When the **Use PCF** check box is selected, this component is greyed out and protected from further change. |
| **5: Screen File** | Identifies/sets display area, masking, cropping and expected lens for the current source. The default Screen Files are **Flat** or **Scope**, which must be defined in the **Advanced Setup: Screen File Setup** window. For more details, refer to the *Advanced Setup: Screen File Setup Window, on page 3-43*. |
| **6: Use PCF** | Select the **Use PCF** check box to use a pre-defined Projector Configuration File (PCF) for this source and prohibit further Channel adjustments. When selected, the following PCF components will be greyed out: **Source File** in the **Channel Setup: Config 1** window and **Target Color**, **Color Space**, **Gamma**, and **LUT-CLUT** in the **Channel Setup: Config 2** window. Next, select the desired PCF from the **PCF** list below. Clear the **Use PCF** check box if you wish to adjust the Channel settings. |
| **7: PCF** | In the **PCF** list, select the desired PCF from the available PCF files. This option is greyed when the **Use PCF** check box is clear. |
| **8: Lamp File** | In the **Lamp File** list, select a lamp configuration that will associate the selected configuration with this channel. To edit the selected lamp file settings, click the **Launch Dialog** button to the right of the **Lamp File** list. This launches the **Lamp File** dialog, which offers the same options as those available in the **Advanced Setup: Lamp Power/LiteLOC™ Setup** window. For more details, refer to the *Advanced Setup: Lamp Power / LiteLOC™ Setup Window, on page 3-29*. Any changes made in the **Lamp File** dialog are saved and will affect other channels that access this lamp file. |
| **9: ILS File** | (Optional) - In the **ILS File** list, select an ILS configuration. This will associate an ILS configuration with this channel. To edit the selected ILS file settings, click the **Launch Dialog** button to the right of the **ILS File** list. This launches the **ILS File** dialog, which offers the same options as those available in the **Advanced Setup: ILS File Setup** window. For more details, refer to the *Advanced Setup: ILS File Setup Window, on page 3-37*. Any changes made in the **ILS File** dialog are saved and will affect other channels that access this ILS file. If the ILS is not enabled (the **Enable Automatic ILS** check box on the **Advanced Setup: Lens Setup** window is not selected), an error message returns prompting you to enable the ILS before proceeding with adjusting the ILS values. |
| **10: Auxiliary Lens** | (Optional) - Indicates whether to use the anamorphic lens for this channel. If the lens mount is not installed, the **Auxiliary Lens** check box is greyed out. |

### When to Use a PCF?

The availability of functions in the **Channel Setup: Config 1** window depends on whether you choose to utilize predefined Projector Configuration Files (PCFs) already downloaded to projector memory, or whether you prefer to implement your own settings. PCFs can be created using the DLP Application then downloaded to the projector. By enabling the **Use PCF** check box, you can select and implement a predefined PCF.

Most applications such as cinema, post production and "alternative" or "non-cinema" displays require one or more display parameters to be individually adjusted. In this case, clear the **Use PCF** check box.

## Channel Setup: Config 2 Window

The **Channel Setup: Config 2** window provides color configuration options.
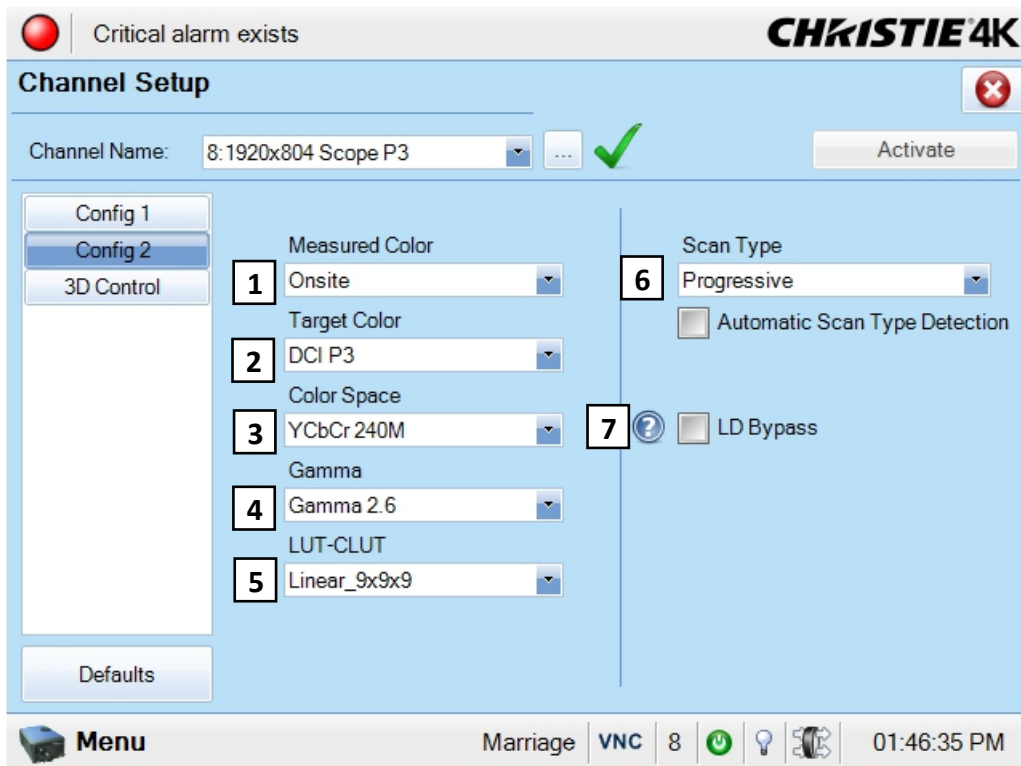


**Figure 3-17 Channel Setup: Config 2 Window**

**Table 3.14 Channel Setup: Config 2 Window**

| Control | Description |
|---|---|
| **1: Measured Color** | For a given channel/source, select the desired Measured Color Gamut Data (MCGD) file representing native "uncorrected" colors to use as a reference for calculating target color processing. The default MCGD file is **Onsite**, which must be defined in the **Advanced Setup: MCGD File Setup** window as a final step after installation as a calibration. For more details, refer to the *Advanced Setup: MCGD File Setup Window, on page 3-46*. |
| **2: Target Color\*** | Identifies/sets the special color processing called Target Color Gamut Data (TCGD) established for a given presentation. TCGD files are defined in *Advanced Setup: TCGD File Setup Window, on page 3-47*. |
| **3: Color Space\*** | Identifies/sets the method of color decoding for the current source. Default = YCbCr for all DVI sources. Default = Unity RGB for all cinema sources (i.e., SMPTE 292 A or 292 B ports). |
| **4: Gamma\*** | Identifies/sets the desired gamma (a.k.a. "de-gamma") correction needed for proper tonal range of the source material, for example, a grayscale test pattern will be neutral and smoothly graduated. |
| **5: LUT_CLUT\*** | A complex color look-up table retrieved from internal electronics which applies a 3D color cube for increased color accuracy. |
| **6: Scan Type** | Select the video scan type. The default is **Progressive**. |
| **7: LD Bypass** | Select the **LD Bypass** check box to bypass the link decryptor. Use only if Marriage is broken and the content being displayed is non D-Cinema content, i.e. not CineLink 2 encrypted. |

*NOTE*: *Components marked with an asterisk (*) are part of pre-defined PCFs (Projector Configuration Files) that controls image processing for a given source. When the* **Use PCF** *check box is selected, these components are greyed out and protected from further change.*

### Channel Setup: 3D Control Window

This window provides numerous controls for adjusting and synchronizing incoming 3D signals (often dual L/R HD-SDI signals at the SMPTE 292 A and 292 B ports with each other and with external 3D equipment such as screens, emitters and glasses.) For more details on setting 3D configurations, refer to *3.8 Working with 3D, on page 3-85*.
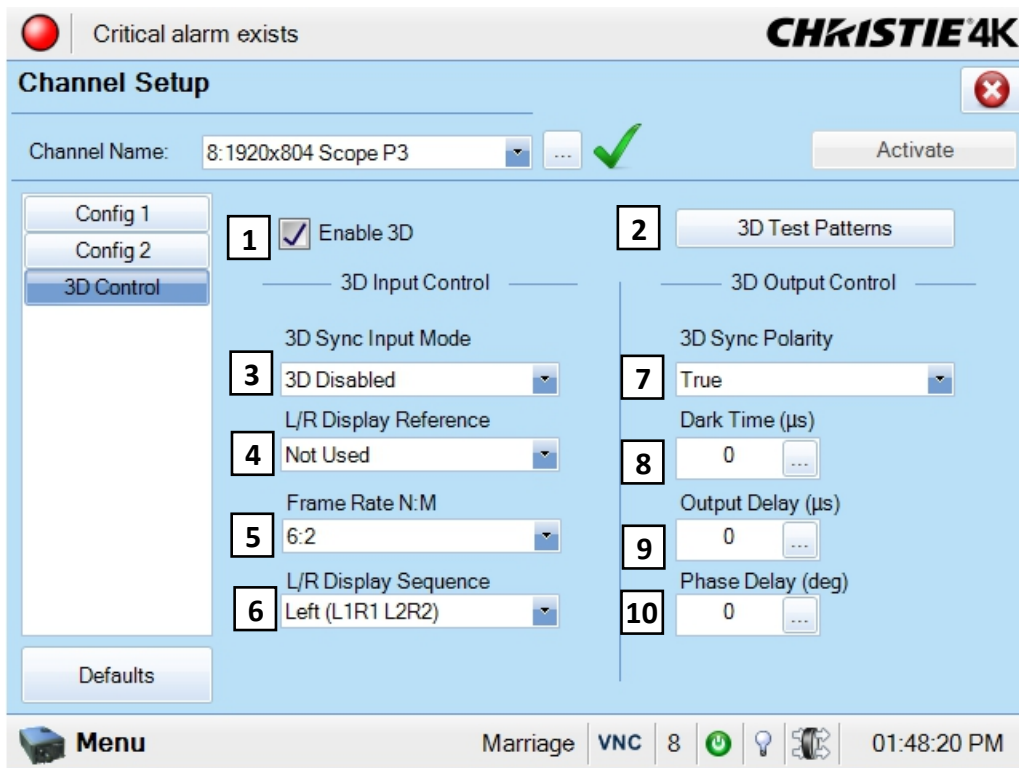


**Figure 3-18 Channel Setup: 3D Control Window**

**Table 3.15 Channel Setup: 3D Control Window**

| Region | Control | Description |
|---|---|---|
| | **1: Enable 3D** | Select to enable 3D. |
| | **2: 3D Test Patterns** | Click the **3D Test Patterns** button to display a dialog containing all 3D test patterns. |

| Region | Control | Description |
|---|---|---|
| **3D Input Control** | **3: 3D Sync Input Mode** | Specify whether a specific frame of input data has left eye or right eye data. This option would typically be applicable for 3D that does not require Frame Rate N:M. See *3D Sync Input Mode* below. |
| | **4: L/R Display Reference** | Specify which frame of eye data is to be displayed during a specific display frame. This signal is referenced to the display frame rate which is specified by the Frame Rate N:M. |
| | **5: Frame Rate N:M** | Sets how many frames to display per number of frames that form one complete image. Increase the display frame rate to reduce flicker from your source(s). See *Frame Rate N:M Notes* below. |
| **3D Input Control** | **6: L/R Display Sequence** | Defines frame order (L-R or R-L) required for 3D perspective. Correct setting ensures smooth motions and depends entirely on the original source mastering. This option only has meaning when the Frame Rate factor M is equal to 2. For this case, 2 input frames of data are required to constitute a complete frame of image data. This parameter tells the system which frames go together to make a complete image. **NOTE**: *When using **Line Interleave** as the **3D Sync Input Mode**, ensure that **Left (L1R1 L2R2)** is selected.* |
| **3D Output Control** | **7: 3D Sync Polarity** | Keeps 3D stereo sync output the same as input (true) or reversed (inverted). **True**: 3D L/R sync output from GPO will match L/R sync input. **Inverted**: 3D L/R sync output from GPO will be the opposite of sync input (left = right, right = left). |
| | **8: Dark Time** | Create a blank time interval between left and right frames to allow for LCD shutter glasses, Z screen, or rotating 3D wheel to synchronize the output. See *Dark Time and Output Delay Notes* below. Values between 0 and 65535 are accepted. Click the **Launch Dialog** button to enter the dark time value. |
| | **9: Output Delay** | Non-image time in Microseconds (μ). Offset 3D stereo sync output in relation to dark time interval. See *Dark Time and Output Delay Notes* below. Values range between -32768 and 32767 are accepted where a positive offset = delay and negative offset = start early. Click the **Launch Dialog** button to enter the output delay value. |
| | **10: Phase Delay** | Controls the degree of reference between the L/R sync output. A vertical adjustment is typically required when using a z-screen. Values between -180 and 180 are accepted. Click the **Launch Dialog** button to enter the phase delay value. |

3D SYNC INPUT MODE NOTES

Select the option matching your source type and how the 3D sync is supplied:

• **Use GPI:** Select only if using a single 3D signal requiring a separate 3D stereo sync input at the GPIO.

• **Use Selected Input Port:** Select if your 3D source provides separate left and right data via 2 cables at the HD-SDI A and HD-SDI B SMPTE ports. This assumes the 3D stereo sync signal is included with the image data inputs rather than supplied separately at the GPIO port.

• **Use White Line Code:** Select only if using a single 3D input signal in which an embedded white line at the bottom of each frame identifies left vs. right, and an additional separate 3D stereo sync input at the GPIO port is not present. The bottom row of the left-eye sub-field should be pure white for the left-most 25% of the pixel row and pure black for the remainder of the row. The bottom row of the right-eye sub-field should be pure white for the left-most 75% of the pixel row and pure black for the remainder of the row.

• **Use Line Interleave:** For use with 3D source data only. When specified, the TI system will de-interleave each line into the left image or right image in memory as specified. Line interleave can be used with PsF 3D data (left and right data for one field, then left and right data for second field)

**FRAME RATE N:M NOTES**

These N:M ratios define how many frames to display per number of frames that form one complete image. For all 3D use, the denominator is 2, indicating that two frames (left and right) are combined into every complete display frame. For non-3D, it is 1 frame. Set to the highest rate possible without image cropping.

*EXAMPLE*

| 4:2 = | **4 frames displayed** |
|-------|------------------------|
|       | **2 frames per image** |

*NOTE: Not for 2048 x 1080*
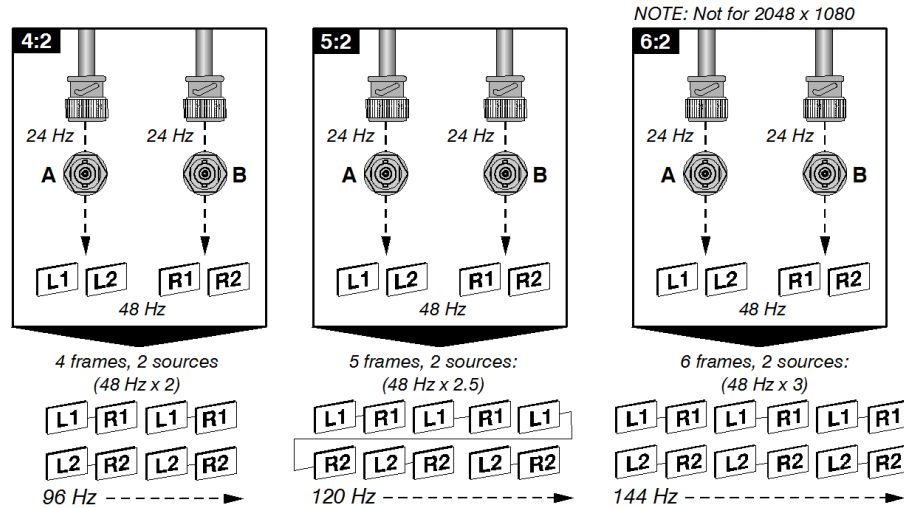


**Figure 3-19 Examples of Frame Rate N:M**

## DARK TIME and OUTPUT DELAY NOTES

The dark time between incoming L/R frames provides a brief interval of non-image time (in microseconds) for your switching device (such as shutters in glasses) to complete its switch. When this interval is properly set and exactly suits the speed of your device, neither eye sees image data intended for the other eye. This helps to prevent color artifacts and ghosting while ensuring that each eye sees all intended data.

The output delay setting shifts the 3D sync in relation to the Dark Time interval, starting each frame slightly earlier (-) or later (+). Adjust only as necessary—too much offset can cause "bleed-through" where each eye sees some data that is intended for the other, or causes color cropping since some DMD sequences may be clipped.

### 3.5.7 Advanced Setup Window

Required permission level - **Advanced**, **Admin**, or **Service**.

The **Advanced Setup** windows consist of 8 windows (9 if ILS is installed) that enable users to define numerous operating parameters such as working with lamp settings and adjusting the lens position. It also offers a broad range of options used primarily for defining how the projector responds to incoming sources in the given environment when setting up the source, screen, MCGD, and TCGD files. Since these options are saved to files, all Advanced Setup windows, with the exception of the Lamp History, LampLOC™ Setup, and Lens Setup windows, share common features to save and revert changes to the specific window files.
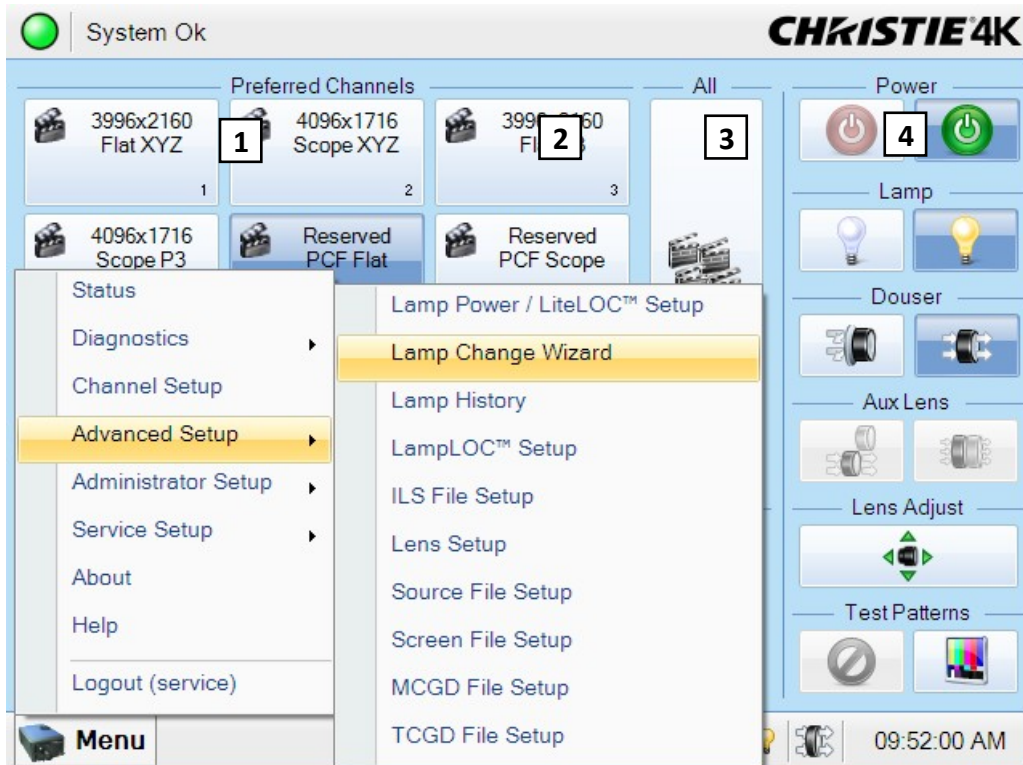


**Figure 3-20 Functionality in Advanced Setup Windows**

**Table 3.16 Functionality in Advanced Setup Windows**

| Control | Description |
|---|---|
| **1: Current File** | In the **Current File** list, select a file for which to modify the settings. This option is only available in the **Lamp Power / LiteLOC™ Setup**, **ILS Setup**, **Source File Setup**, **Screen File Setup**, **MCGD File Setup** and **TCGD File Setup** windows. When changes are saved to the current file, this affects ALL channels using this file.<br><br>**Lamp Power / LiteLOC™ Setup (Channel Setup: Config 1: Lamp File) \***<br><br>**ILS Setup (Channel Setup: Config 1: ILS File) \***<br><br>**Source File Setup (Channel Setup: Config 1: Source File)**<br><br>**Screen File Setup (Channel Setup: Config 1: Screen File)**<br><br>**MCGD File Setup (Channel Setup: Config 2: Measured Color)**<br><br>**TCGD File Setup (Channel Setup: Config 2: Target Color)** |

| Control | Description |
|---------|-------------|
| **2: Save As** | Displays a dialog to enter a new configuration name and saves the current on-screen settings to this file. |
| **3: Save** | Saves the current configuration with the on-screen settings. **Important!** *If you wish to save your settings to a new screen file, make sure to edit the screen file name before you save, otherwise, you will overwrite the settings of the loaded screen file. Clicking the **Revert** button will not cancel a **Save**.* |
| **4: Revert** | Cancels new (unsaved) screen settings and reloads the settings for this file. |

\* You can also edit these options in a dialog that launches from the **Channel Setup: Config 1** window.

### Advanced Setup: Lamp Power / LiteLOC™ Setup Window

LiteLOC™ is a lamp power control algorithm, which maintains a constant brightness as long as possible for the lamp by adjusting the power. As the lamp dims, over time the power level is increased and the red bar rises to keep the same brightness that was initially set. You can also set a precise power level for the lamp. A read-only area on the screen displays lamp performance details. The side bar graph represents the current light output and, if LiteLOC™ is enabled, a heavy line shows the chosen LiteLOC™ setting.
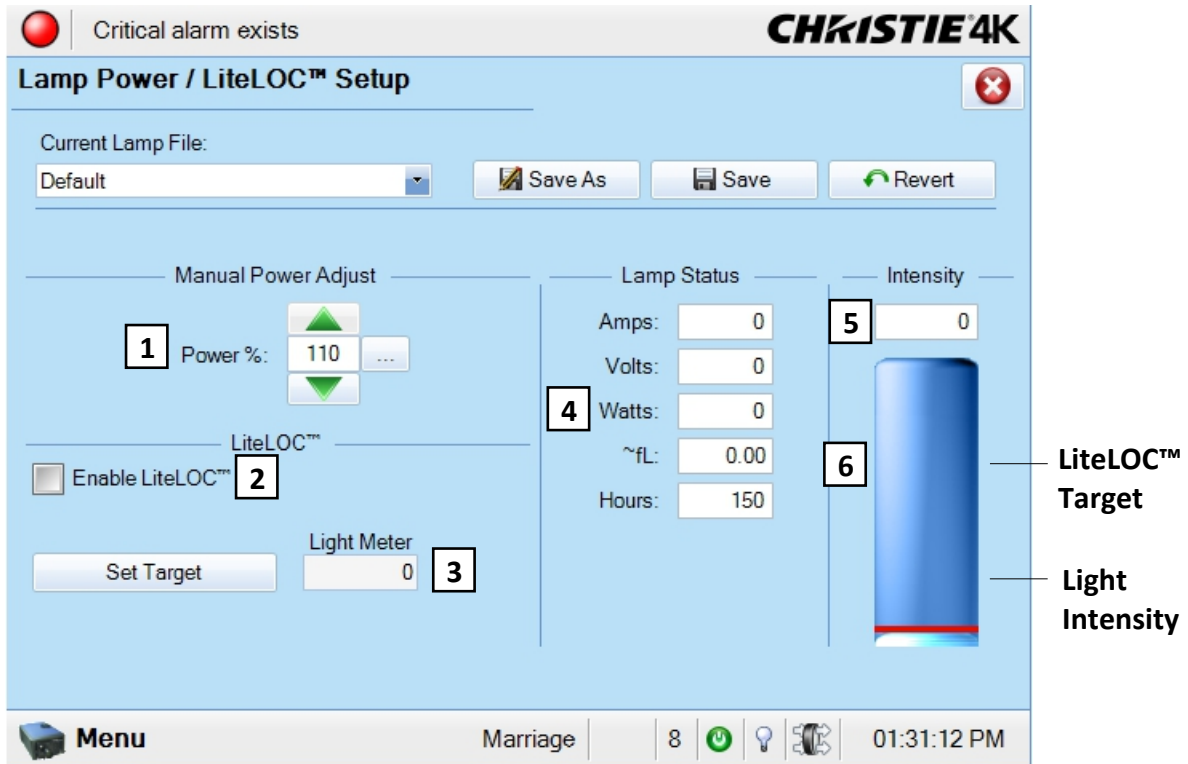


**Figure 3-21 Advanced Setup: Lamp Power / LiteLOC™ Setup Window**

**Table 3.17 Advanced Setup: Lamp Power / LiteLOC™ Setup**

| Region | Control | Description |
|---|---|---|
| Manual Power Adjust | 1: Power % | Indicates the percentage of power to supply to the lamp and automatically overrides the LiteLOC™ setting that may be in effect. Refer to **Table 3.18** for the valid Lamp Power ranges for specific lamp types. Adjusting the Lamp **Power %** causes the bar graph to rise or fall as lamp power increases or decreases. The LiteLOC™ red line and **Lamp Status** values will not change unless the **Set Target** button is clicked. This defines a new LiteLOC™ setting and selects the **Enable LiteLOC™** check box. Lamp Power % is enabled only when the **Enable LiteLOC™** check box is clear. |
| LiteLOC™ | 2: Enable LiteLOC™ | Select the **Enable LiteLOC™** check box to use LiteLOC™ for the current channel. When LiteLOC™ is enabled, the last saved target value is used. |
| | 3: Light Meter - Set Target | Clicking the **Set Target** button automatically enables LiteLOC™ (**Enable LiteLOC™** check box selected) and maintains the current brightness level (shown in the **Lamp Status** region) as long as possible. Arbitrary units-of-measure shown in the text region to the right of the **Set Target** button, not lumens or fL. |
| Lamp Status | 4: Amps, Volts, Watts, ~FL, Hours | Lamp current in amperes, lamp voltage in volts, lamp power in watts, approximate Foot Lamberts reading on the light sensor (assuming a calibration was performed), and hours on current lamp. These read-only values are updated automatically from the projector. |
| Intensity | 5: Text Region | Shows the current light sensor reading in arbitrary units-of -measure and does not represent actual lumens or fL. This read-only value is updated automatically from the projector. |
| | 6: Light Bar | This visual representation of the projector's light sensor indicates the current light intensity (vertical bar) and LiteLOC™ target (red horizontal line). The LiteLOC™ target updates automatically by moving the bar up or down based on the amount of light measured by the projector light sensor. The limits are self adjusting, so the absolute scale is not important. |

**Table 3.18 Minimum and Maximum Lamp Power by Lamp Type**

| Lamp Type | Lamp Size | Min Lamp Power | Max Lamp Power |
|---|---|---|---|
| CDXL-20 | 2 kW | 1000W (50%) | 2200W (110%) |
| CDXL-30 | 3 kW | 1800W (60%) | 3300W (103%) |
| CDXL-45 | 4.5 kW | 2700W (60%) | 4950W ( 110%) |
| CDXL-60 | 6.0 kW | 3600W (60%) | 6600W (110%) |
| CDXL-60SD | 7.0 kW | 3600W (51%) | 7100 (101%) * |

* The maximum power of the lamp power supply is restricted to 7000W ± 100W.

Christie provides a wide lamp power range to give flexibility in meeting different exhibition configurations. However, older lamps may not always strike at the lowest power settings. For more details, see *Section 6 Specifications*. For more information on setting lamp power, refer to *3.6.3 Adjusting Lamp Power, on page 3-79*.

While it is common recommended practice in cinemas to run lamps only within their specified current ranges, we allow for an adjustment on the power supplies that allow operation of the lamps much lower than their specified wattage and up to 10% above. This is done for 2 reasons. Under-current operation is sometimes needed in systems that are normally operating both 2D and 3D operational modes and for 2D presentations. While there can be ignition problems if the current is dramatically lower than the specification, such problems don't develop until the lamp has aged significantly. Over-current operation is used for LampLOC™ purposes. As a lamp ages, the voltage decreases. This allows for higher current to be used during the latter part of a lamp's life and therefore extend the usability of the lamp.

### 3.5.8 Using the Lamp Change Wizard

**NOTICE:** *Make sure that the lamp is powered off before running the Lamp Change Wizard to prevent a hot restrike.*

1. For instructions on how to manually change the lamp, refer to the lamp replacement instructions in the **CP4230 Service Manual (P/N: 020-100622-xx)**.

2. To access the Lamp Change Wizard ensure you are logged in at the Advanced level. For details, refer to *3.4 User Access and Rights, on page 3-8*.

3. Navigate to the **Advanced Setup>Lamp Change Wizard** window (**Figure 3-22**).
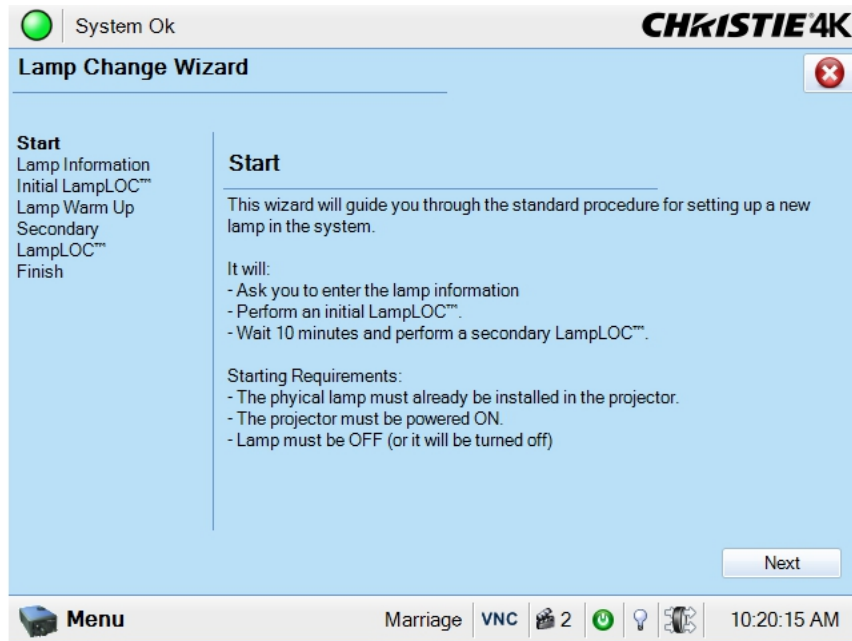


**Figure 3-22 Lamp Change Wizard**

4. Click **Next** to access the **Add Lamp** window (**Figure 3-23**).

5. From the **Type** drop-down menu select the type of lamp you are installing.

6. Click the Drop-Down button (1) to access the On Screen Keypad and manually enter the serial number of the lamp (**Figure 3-23**).
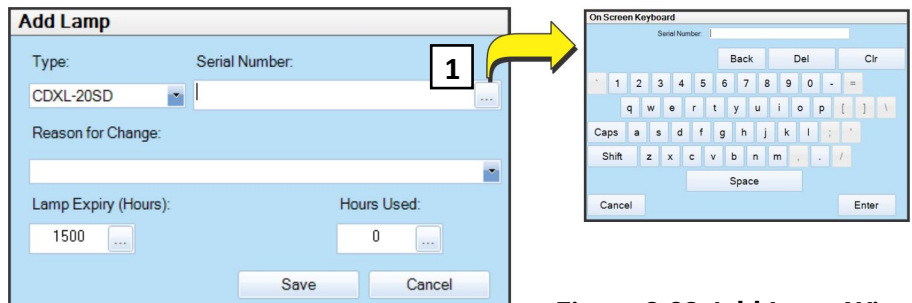


**Figure 3-23 Add Lamp Win-**

7. From the **Reason for Change** drop-down menu chose from:

   • Regular Lamp Maintenance (Lamp Life)
   • Regular Lamp Maintenance (Internal)
   • Regular Lamp Maintenance (General)
   • Lamp Test
   • Lamp Failure
   • Lamp Exchange for Increased Brightness (3D)
   • Lamp Exchange for Decreased Brightness (2D)

8. Enter the **Lamp Expiry (Hours)** and the number of **Hours Used**.

9. Click **Save**.

10. Initial **LampLOC™ Auto Adjust** begins (**Figure 3-24**). Once this is complete lamp warm-up is initiated, followed by the secondary LampLOC™ adjust. This takes approximately 10 minutes.
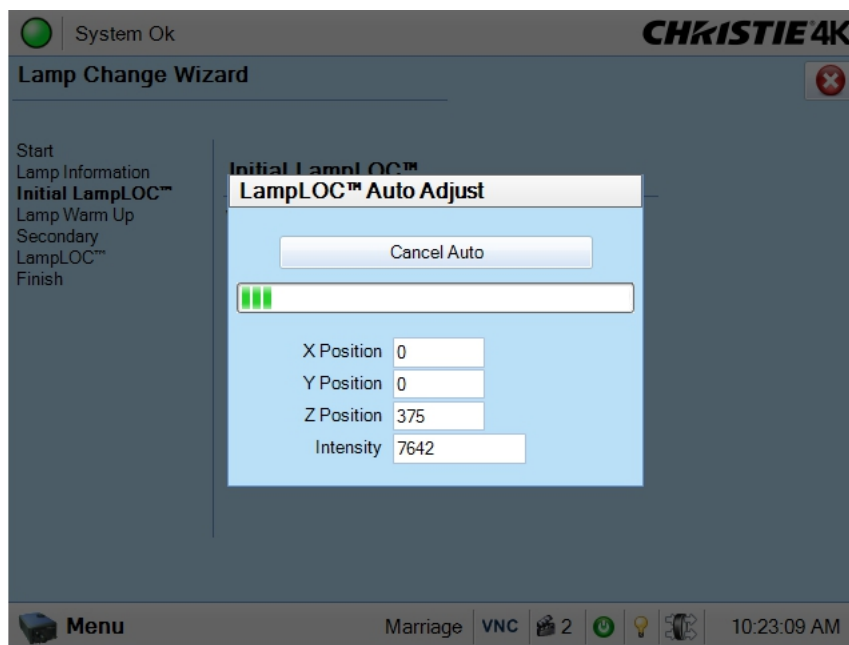


**Figure 3-24**

11. Once the lamp change is complete click **Finish** from the screen shown in **Figure 3-25**.
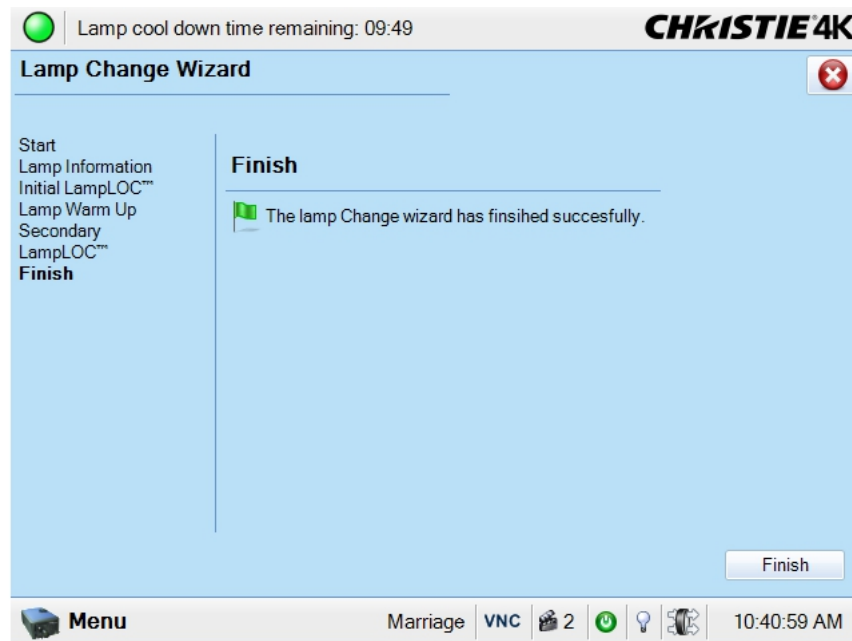


**Figure 3-25 Lamp Change Completed**

## Advanced Setup: Lamp History Window

The **Advanced Setup: Lamp History** window displays a read-only list of the previous and current lamps used by the projector. Once a lamp has been added, it can not be removed. When adding a new lamp, a separate dialog displays with editing boxes to record the new lamp type, serial number and the number of hours already logged on the lamp, if any. **Important!** *Ensure the projector is in full power ON mode when adding a new lamp. If done in stand-by mode, lamp information may be lost.*
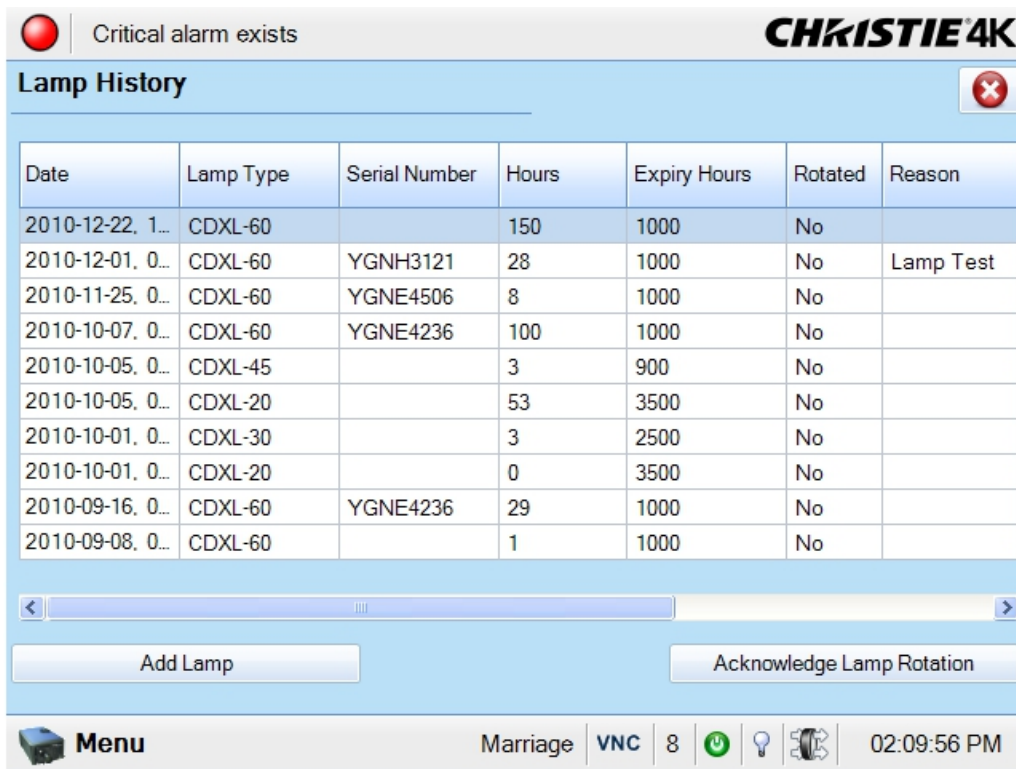
**Figure 3-26 Advanced Setup: Lamp History Window**

**Table 3.19 Advanced Setup: Lamp History Window**

| Control | Description |
|---|---|
| **Date** | The date the lamp was installed. **NOTE:** *Ensure TPC date and time are correctly set to automatically record the lamp change date properly.* |
| **Lamp Type** | The lamp type. |
| **Serial Number** | The lamp serial number. |
| **Hours** | The number of hours logged on the lamp. |
| **Expiry Hours** | The recorded number of hours the lamp will expire. |
| **Rotated** | States if the lamp has been rotated or not. |
| **Reason** | The reason for changing the lamp. |
| **Add Lamp** | Click the **Add Lamp** button to launch the **Add Lamp** window. See *Add Lamp Window, on page 3-35*. |
| **Acknowledge Lamp Rotation** | Click to acknowledges when a lamp has been rotated. |

**Add Lamp Window**
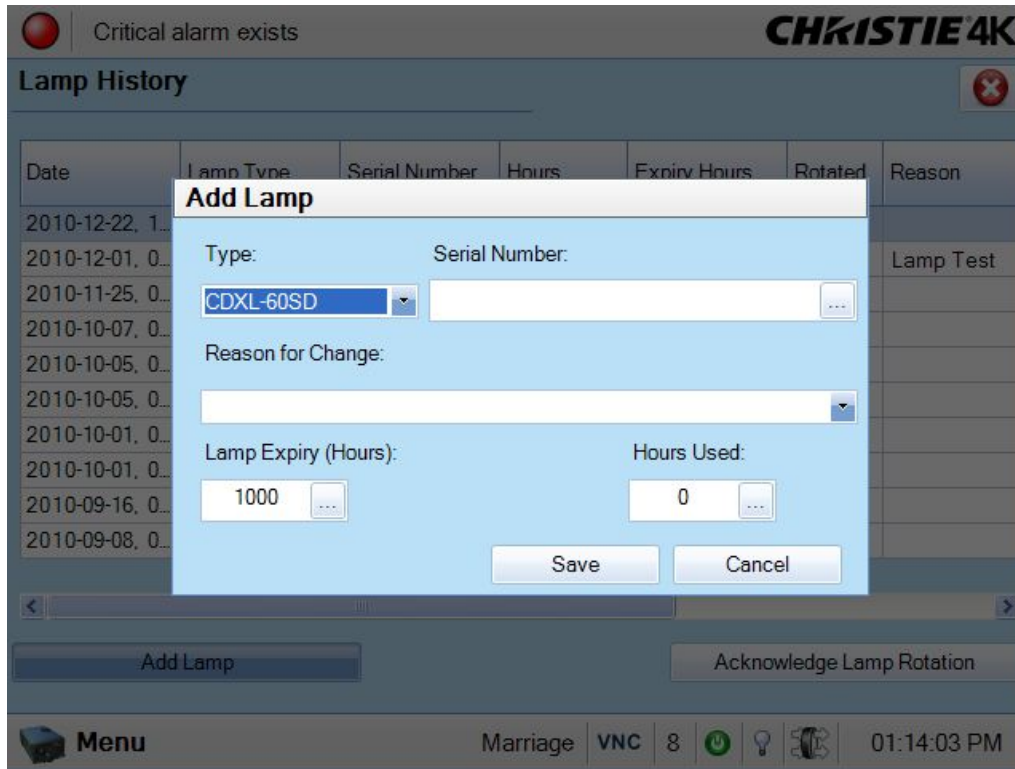


**Figure 3-27 Advanced Setup: Add Lamp Window**

**Table 3.20 Advanced Setup: Add Lamp Window**

| Control | Description |
|---------|-------------|
| **Type** | In the **Type** list, select the lamp type. |
| **Serial Number** | In the **Serial Number** box, click the **Launch Dialog** button to enter the serial number of the new lamp. A serial number can be up to 128 alpha-numeric characters. |
| **Reason for Change** | In the **Reason for Change** list, select a preset reason as to why you are installing this lamp. |
| **Lamp Expiry** | In the **Lamp Expiry** box, click the **Launch Dialog** button to enter the number of hours in which the lamp will expire. The default value is 2000 hours for all lamps. |
| **Hours Used** | In the **Hours Used** box, click the **Launch Dialog** button to enter the number of hours on the lamp. The value defaults to zero assuming a new lamp is being installed. If a used lamp is being inserted, enter the number of hours already on the lamp. |

**Advanced Setup: LampLOC™ Setup Window**

LampLOC™ buttons activate motors that reposition the bulb in the projector for optimized light output. Click the **Do Auto** button (recommended) to perform LampLOC™ or the individual buttons. **NOTES: 1)** *The lamp must be ON before beginning LampLOC™. If it is turned off during a re-positioning, the bulb will return to its former position.* **2)** *The douser opens and remains non-functional during a LampLOC™ adjustment.* **3)** *For optimized performance during long term operation of the lamp, it may be beneficial to run LampLOC™ every month or two to improve lamp performance during lamp electrode burn back.*
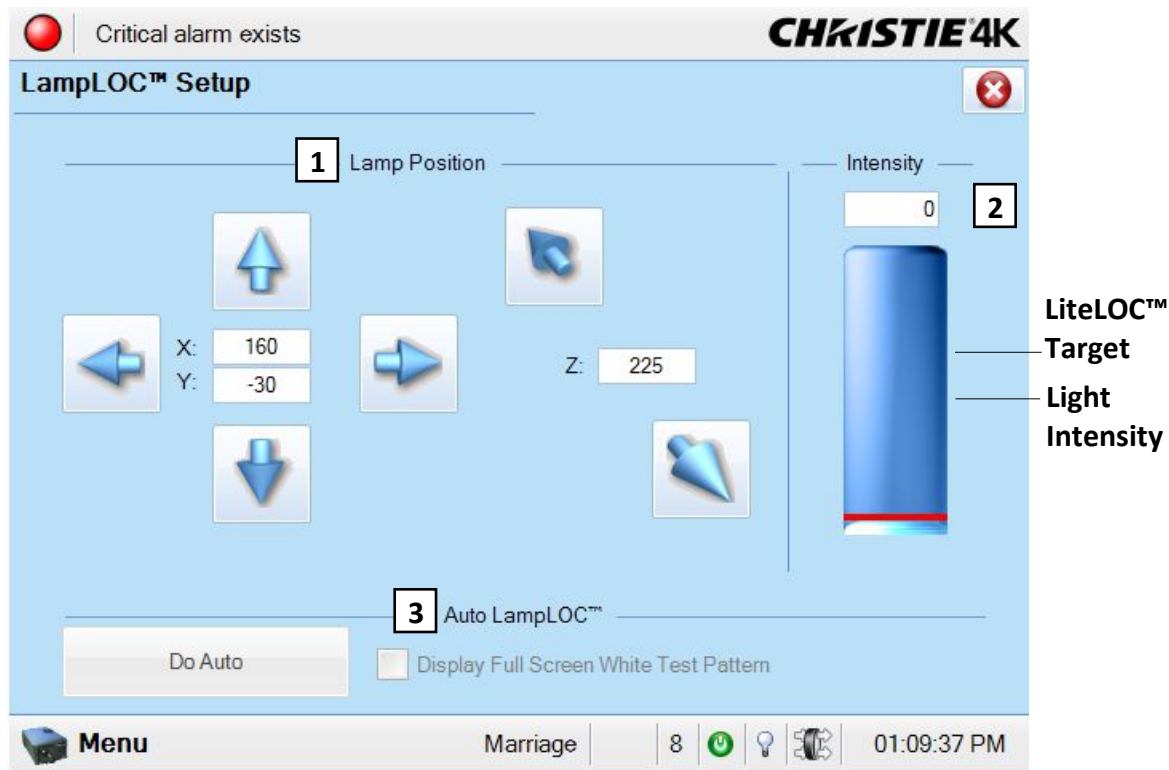
**Figure 3-28 Advanced Setup: LampLOC™ Setup Window**

**Table 3.21 Advanced Setup: LampLOC™ Setup Window**

| Region | Control | Description |
|---|---|---|
| **1: Lamp Position** | **Left/Right Up/Down In/Out Arrow Buttons** | Manually moves lamp position in the X axis (left/ right for horizontal movement), Y axis (up/down for vertical movement), and Z axis (in/out for lamp axial axis movement). The current position of the lamp displays in cartesian coordinates. A single click corresponds to a single integer increment/decrement. Adjust one short click at a time, several longer clicks, or hold the button for an accelerated movement. There are projector hardware specific limits, beyond which the lamp position will no longer move. These limits are to be defined during implementation. |
| **2: Intensity** | **Value** | Shows the current light sensor reading in arbitrary units-of -measure and does not represent actual lumens or fL. This read-only value is updated automatically from the projector. |
| | **Light Bar** | This visual representation of the projector's light sensor indicates the current light intensity (vertical bar) and LiteLOC™ target (red horizontal line). The LiteLOC™ target updates automatically by moving the bar up or down based on the amount of light measured by the projector light sensor. The limits are self adjusting, so the absolute scale is not important. |
| **3: Auto LampLOC™** | **Do Auto** | Starts the auto LampLOC™ calibration procedure, which adjusts the lamp position until the highest light reading is obtained from the light sensor. Displays the LampLOC™ progress bar and **Cancel Auto** button. |
| | **Display Full Screen White Test Pattern** | Select to temporarily display a full screen white test pattern for the duration of the LampLOC™ adjustment. The previous display resumes when the LampLOC™ procedure is complete or the check box is cleared. Although it is not necessary to display a white test screen, it is often useful to visually monitor the motor action to assure the system is optimizing properly. |

| Region | Control | Description |
|---|---|---|
| | Auto LampLOC™ Progress Bar | Shows the current LampLOC™ procedure completion status when the **Do Auto** button is clicked. When status is finished, this bar and the **Cancel Auto** button become hidden again. |
| | Cancel Auto | When the **Cancel Auto** button is clicked, the current LampLOC™ procedure is cancelled. The progress bar and **Cancel Auto** button will become hidden again. |

### Advanced Setup: ILS File Setup Window

⚠ **WARNING** **1) If installed, make sure to move the MALM to the OUT position before performing any lens calibrate or reset functions on the Motorized Primary Lens Mount to prevent collision between the projection lens and the MALM. 2) Hazardous moving parts. Keep fingers and other body parts away.**

The Intelligent Lens System (ILS) automates the process of adjusting the Focus, Horizontal (X) and Vertical (Y) Offset, and Zoom of the lens using a motorized lens mount. When installed and enabled (**ILS Installed** check box and **Enable Automatic ILS** check box in the **Advanced Setup: Lens Setup** window are selected), this window is used to modify the Intelligent Lens System (ILS) settings of ILS files. Any adjustments made to an ILS file will affect every channel that uses the file. You can adjust the focus, offset, or zoom using short, quick presses to advance the motors only a small step, slightly longer presses to advance more steps at a time, or hold the button for an accelerated movement. Experiment to get the feel. Reversing direction will cause a normal and deliberate overshoot and correction to take out any play in the precision mechanism for more precise results. Position values on the window will change in real-time. For more information, refer to *Appendix A: Intelligent Lens System*. **NOTES: 1)** *The **ILS File Setup** menu is not available if the **ILS Installed** check box on the **Advanced Setup: Lens Setup** window is not selected.* **2)** *If the **Enable Automatic ILS** check box on the **Advanced Setup: Lens Setup** window is not selected, a warning will display when trying to access the **ILS File Setup** window. Upon acknowledging the message, the options in the **ILS File Setup** window will be disabled (greyed).* **3)** *Using the knobs on the lens mount to adjust these positions does not save the settings to the ILS file. Adjustments made using the knobs will be lost once ILS becomes enabled again.* **4)** *Avoid long hair, jewelry, and loose clothing exposure to the knobs during manual adjustment.* **5)** *In case of emergency, unplug the line cord to immediately halt movement of the lens mount.*
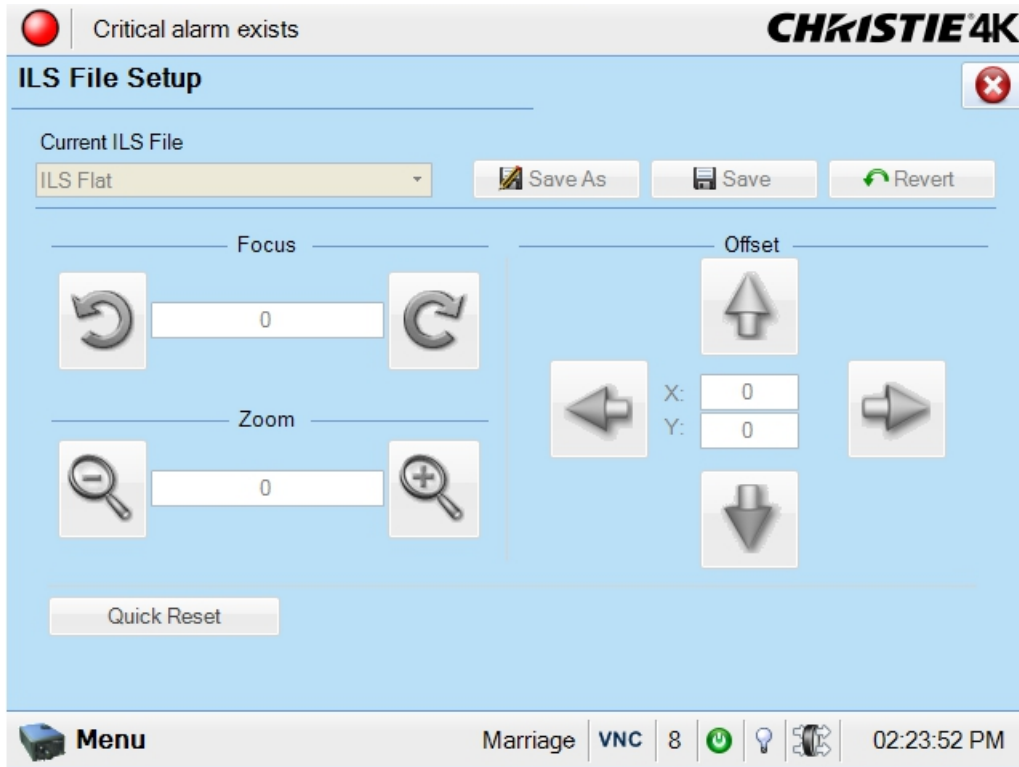
**Figure 3-29 ILS File Setup Window**

**Table 3.22 ILS File Setup Window**

| Control | Description |
|---------|-------------|
| **Focus** | Adjust the focus by clicking the **clockwise/counterclockwise arrow** buttons. Adjust one short click at a time, several longer clicks, or hold the button for an accelerated movement. If the focus limit is reached, further clicks will have no effect on the value. |
| **Zoom** | Adjusts the zoom by clicking the **negative/positive magnifying glass** buttons. Adjust one short click at a time, several longer clicks, or hold the button for an accelerated movement. If the zoom limit is reached, further clicks will have no effect on the value. |
| **Offset** | Adjusts the offset by clicking the **up/down/left/right** buttons to adjust the X/Y coordinates. Adjust one short click at a time, several longer clicks, or hold the button for an accelerated movement. If the offset limit is reached, further clicks will have no effect on the value. Values range from 0 to an upper limit based on the source format. |
| **Quick Reset** | Resets the lens to the mechanical center before moving back to the original position. |

### Advanced Setup: Lens Setup Window

The **Advanced Setup: Lens Setup** window allows you to setup the primary and auxiliary lenses. If installed you can also setup the Intelligent Lens System (ILS).
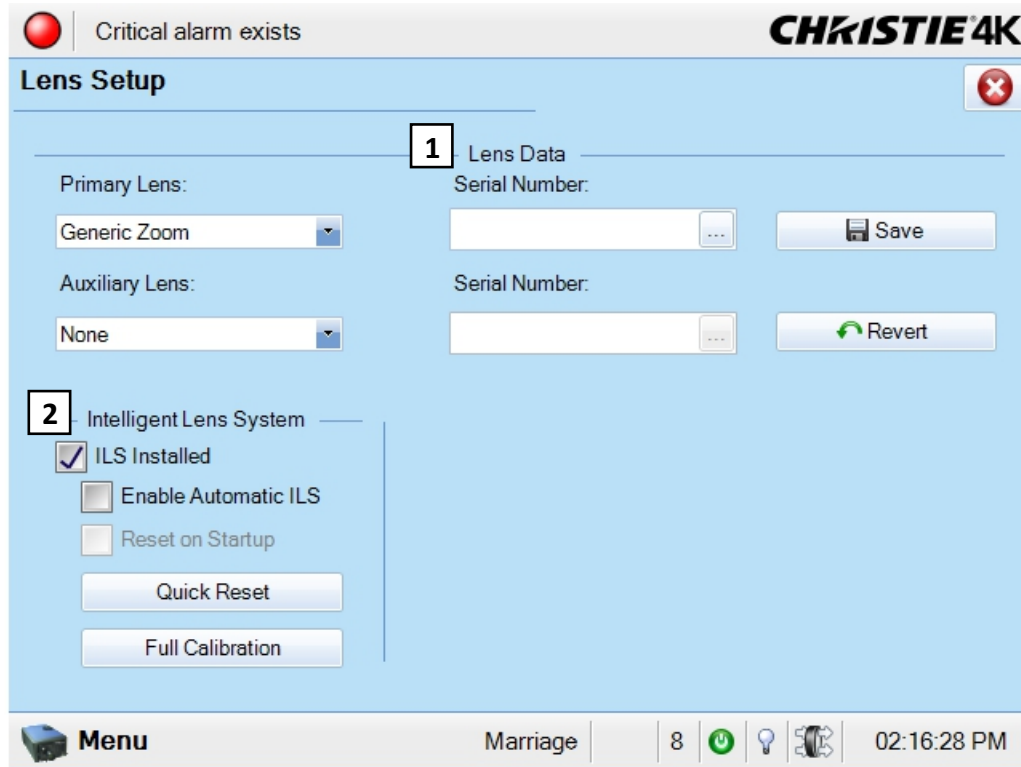


**Figure 3-30 Advanced Setup: Lens Setup Window**

**Table 3.23 Advanced Setup: Lens Setup Window**

| Region | Control | Description |
|---|---|---|
| **1: Lens Data** | **Primary Lens** | In the **Primary Lens** list, select the type of primary lens installed on the projector. |
| | **Serial Number** | In the **Serial Number** box, click the **Launch Dialog** button to enter the primary lens serial number. |
| | **Auxiliary Lens** | In the **Auxiliary Lens** list, select the type of the auxiliary lens installed on the projector. |
| | **Serial Number** | In the **Serial Number** box, click the **Launch Dialog** button to enter the auxiliary lens serial number. |
| | **Save/Revert** | Saves/reverts the changes made to the lens type and/or serial number(s). Exiting the window before saving will lose your changes. |

| Region | Control | Description |
|--------|---------|-------------|
| **2: Intelligent Lens System** | **ILS Installed** | Ensure the **ILS Installed** check box is selected when the ILS is installed. |
| | **Enable Automatic ILS** | When selected, the lens will automatically move to the position associated with the channel and all adjustments made to the focus, zoom, and offsets will over-write the saved ILS values. When clear, adjustments can only be made from the **ILS Adjust** window launched from the **Main** panel. These adjustments are pre-served when a channel changes, but are never written to an ILS file. |
| | **Reset on Startup** | Select the **Reset on Startup** check box for the ILS to calibrate the lens when the projector starts up via the wall circuit being on or the **Power ON** button getting clicked. **NOTE**: *This is not normally required. It is made available for cases where repeatability issues don't go away by powering down the projector.* |
| | **Quick Reset** | Click the **Quick Reset** button to perform a quick reset on the ILS. The lens will return to the manual position when complete. A quick reset allows the system to detect precise center positions so previous channel presets work as expected, even after manual adjustments. |
| | **Full Calibration** | Click the **Full Calibration** button to perform a full ILS calibration. The lens will return to the manual position when complete. A full calibration detects full range or movements on a new lens and also resets center detect positions. |

## Advanced Setup: Source File Setup Window

Incoming sources can vary widely in their pixel resolution and original aspect ratio. The projector must be able to respond to the myriad of possible combinations, projecting full images of the desired size, content, and proportion in every case. This consistency is achieved by creating a variety of source files in projector memory, each of which indicates the following for the projector:

- Incoming **resolution** (i.e., #pixels across, #pixels top-to-bottom)
- Desired **offset** (i.e., amount of data to discard. Rare.)
- Desired **aspect ratio** (i.e., the original display format to be recovered)

In rare cases, the content distributor may include this source information as part of a pre-defined Projector Configuration File (PCF) applied by using the PCF in the projector. Alternatively these variables can be defined in the **Advanced Setup: Source File Setup** window. With a good collection of assorted source files available in memory, the proper file can then be quickly chosen from within the **Channel Setup: Config 1** window for implementation in the projector whenever a matching input signal is encountered. **NOTE:** *For any source, the projector relies on Source File settings as well as Screen File settings. Refer to the* Advanced Setup: Screen File Setup Window, on page 3-43.
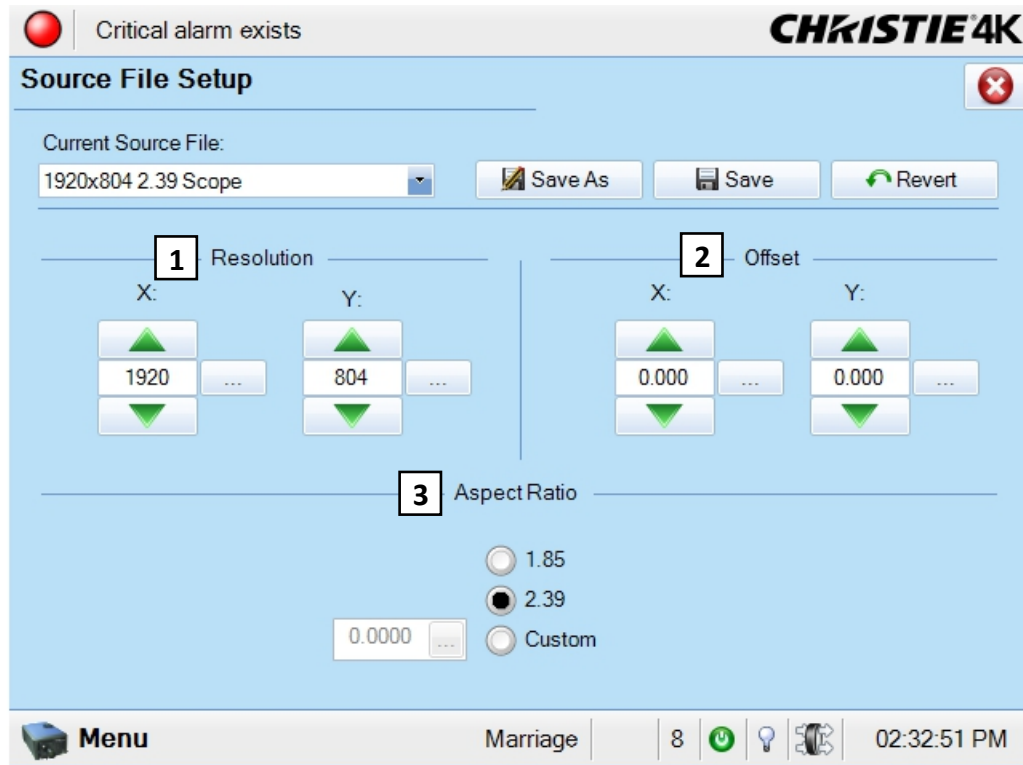
**Figure 3-31 Advanced Setup: Source File Setup Window**

**Table 3.24 Advanced Setup: Source File Setup Window**

| Control | Description |
|---------|-------------|
| **1: Resolution** | Record the X/Y resolution of your incoming signal, such as 2048 (X) and 858 (Y) or 1920 (X) and 1080 (Y). The resolution must match the incoming signal format (assuming you want to display the entire image) and may differ from the original resolution that you want to recover. See *Resolution Notes* below. Click the **up/down** buttons to increment/decrement the X/Y resolution within the defined limits. Adjust one short click at a time, several longer clicks, or hold the button for an accelerated movement. Alternatively, click the **Launch Dialog** button to the right of the X/Y text regions to enter these values. The allowable X range is 0 to 4096 pixels and Y range of 0 to 2160 pixels. |
| **2: Offset** | Record how much incoming data you wish to discard, essentially delaying the "starting" point for processing. Leave at 0 to process all available data. See *Offset Notes* below. Click the **up/down** buttons to increment/decrement the X/Y offset within the defined limits. Adjust one short click at a time, several longer clicks, or hold the button for an accelerated movement. Alternatively, click the **Launch Dialog** button to the right of the X/Y text regions to enter these values. The allowable X range is 0 to 4095 pixels and Y range of 0 to 2160 pixels. |
| **3: Aspect Ratio** | Select an aspect ratio (width-to-height proportion) of the original cinema format you are trying to recover, usually 1.85 or 2.39. See *Aspect Ratio Notes* below. To enter a custom value, select the **Custom** option button and click the **Launch Dialog** button in the **Custom** box. A custom offset value can range from 0 to 7.99. |

**RESOLUTION NOTES**

To capture (or process) all of the incoming data, enter the full resolution of the incoming source material or leave at "0" (default). Regardless of whether or not the original material has been "squeezed" for use with an anamorphic lens, enter the current incoming resolution. Depending on how the source was formatted before distribution, this may not necessarily match the resolution of the projector or the original filmed material. For example, an original 4096 x 2160 native source supplied pre-squeezed as 3840 x 2160 requires a source file indicating this incoming 3840 x 2160 resolution. **NOTE**: *Flat aspect ratio D-Cinema content normally is mastered as 3996 x 2160 pixels. Scope is mastered as 4096 x 1760 pixels. In these cases, the source file should be set to 3996 x 2160 or 4096 x 1760 respectively.*

To capture only a portion of an incoming image full-screen—like a "zoom" function—, enter the approximate horizontal width and vertical height defining the area of the image to zoom in on. The projector automatically scales a center area of this size so that it fills the projector's 2048 x 1080 display. The remaining data is ignored. It may be necessary to experiment with the values to accurately zoom in on a precise area. Offset must also be defined to zoom in on an area other than the center.

**OFFSET NOTES**

Offsetting an image is achieved by defining how much horizontal width and vertical height to discard. Offset coordinates can be particularly useful when zooming in on a portion of the image—they establish the top left corner location of the zoom area, with resolution determining the size of the area. Leave offset at 0 to process all incoming data or to zoom in at the center of the image.

- A positive "x/y" value - discards image data from top and/or left.
- A negative "x/y" value - discards image data from bottom and/or right.

**ASPECT RATIO NOTES**

In the event your source material is pre-scaled or compressed, select the **Custom** option button and enter the desired aspect ratio. Adding the 1.25x anamorphic lens widens a "squeezed" image back to its original "scope" aspect ratio. For sources that are not pre-squeezed, aspect ratio can be left at 0 (nothing selected in window).
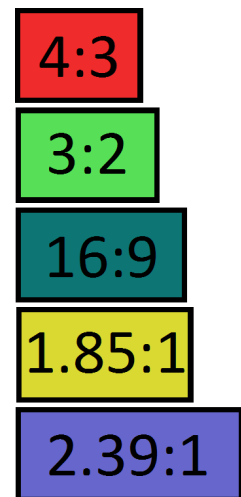
**Figure 3-32**
**Aspect Ratio**

## Advanced Setup: Screen File Setup Window

The **Advanced: Screen File Setup** window defines the portion of the projector's display panel you wish to use and any cropping that is needed to disguise possible keystoning or other geometric aberrations. Once saved, a screen file can be used with any incoming source as desired. The default source files are called **Flat** and **Scope**, which must be defined before you can select them in the **Channel Setup: Config 1** window. Screen data is not included in a PCF and is independent of source settings. Consider screen files as convenient compensations for physical limitations in the environment. You will typically need one or two screen files per site.
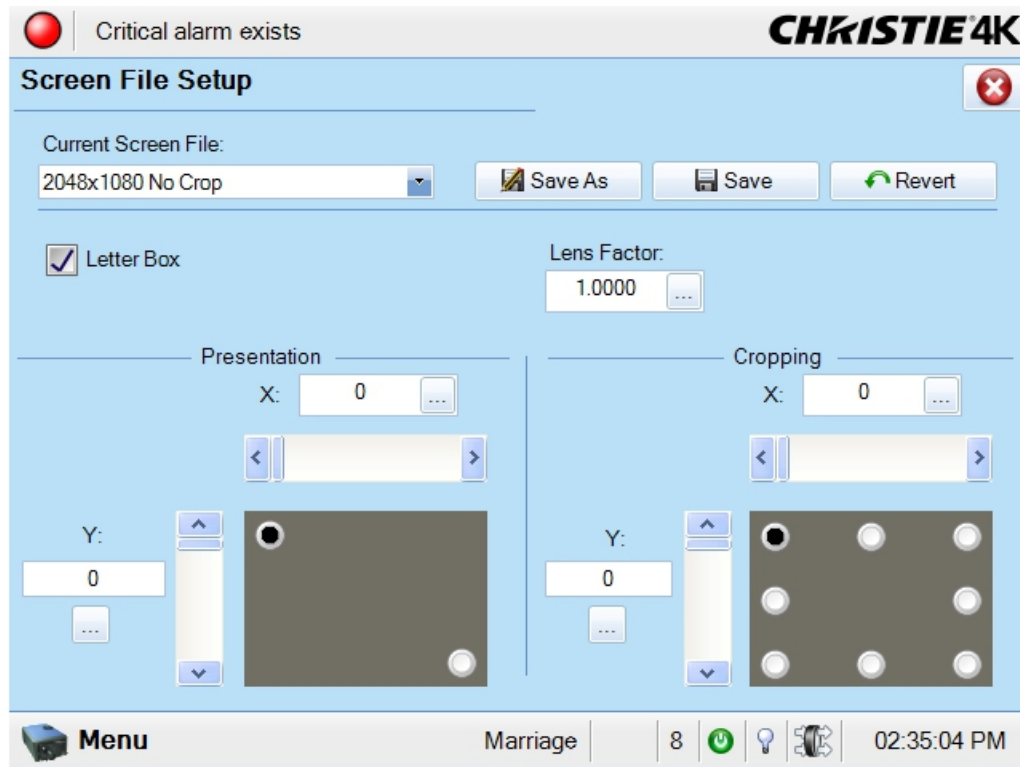


**Figure 3-33 Advanced Setup: Screen File Setup Window**

**Table 3.25 Advanced Setup: Screen File Setup Window**

| Control | Description |
|---------|-------------|
| **Letter Box** | Select the **Letter Box** check box to ensure that all image data is displayed and its aspect ratio is maintained. See *Letter Box Notes* below. |
| **Lens Factor** | Define the anamorphic lens needed to stretch an image horizontally. In the **Lens Factor** list, click the **Launch Dialog** button to enter the new lens factor where values can range from 0.00 to 7.99. Leave at **1** (default) if no anamorphic lens is needed. |
| **Presentation** | Define the projector's display area to incoming data, i.e. the display size and location. By default, the projector uses its complete display area (a full 4096 x 2160 panel). See *Presentation Notes* below. To adjust the top, left presentation point, select the **top left** option button and then adjust the X/Y values using one of the two options:<br>• adjust the sliders to increase/decrease the value. Using the sliders moves the projected display area in real-time.<br>• click the **Launch Dialog** button in the **Presentation X/Y** lists to enter a value using the on-screen keyboard.<br>Repeat this action after clicking the **bottom right** option button. |

| Control | Description |
|---------|-------------|
| **Cropping** | Cropping hides unwanted data, i.e. if the image appears keystoned. See *Cropping Notes* below. |
| | To adjust the top, left cropping point, select the **top left** option button and then adjust the X/Y values using one of the two options: |
| | • adjust the sliders to increase/decrease the value. Using the sliders moves the projected display area in real-time. |
| | • click the **Launch Dialog** button in the **Cropping X/Y** lists to enter a value using the on-screen keyboard. |
| | Repeat this action after clicking the **top right**; **bottom left**; and **bottom right** option buttons. When the **top middle, right middle, bottom middle, left middle** option buttons are selected, adjust the **Curve** value using either the slider or on-screen keyboard. |

## PRESENTATION NOTES

Presentation points define what region of the projector's available display area responds to incoming data. By default, the projector will use its complete display area, scaling the incoming data as necessary. If for some reason you want to limit the display area, enter the desired "upper left" and "lower right" presentation coordinates. To edit the upper left coordinates, select the **top left** option button and then adjust the X/Y values using either the sliders to increase/decrease the value or click the **Launch Dialog** button in the **Presentation X/Y** boxes to launch the on-screen keyboard. (**Figure 3-34**). Using the sliders moves the projected display area in real-time. You can define a smaller rectangular area in which the left and right top corners will always share the same "y" coordinate (y = 175 in **Figure 3-34**), as will the left and right bottom corners (y = 951 in **Figure 3-34**). The top and bottom left corners will share the same "x" coordinate (x = 80 in **Figure 3-34**), as will the top and bottom right corners (x = 1120 in **Figure 3-34**), thus top right and bottom left coordinates are not available to define the area. Incoming data will then automatically resize to fill the reduced rectangular area defined by the new coordinates, and any display pixels outside of this area remain off (black).
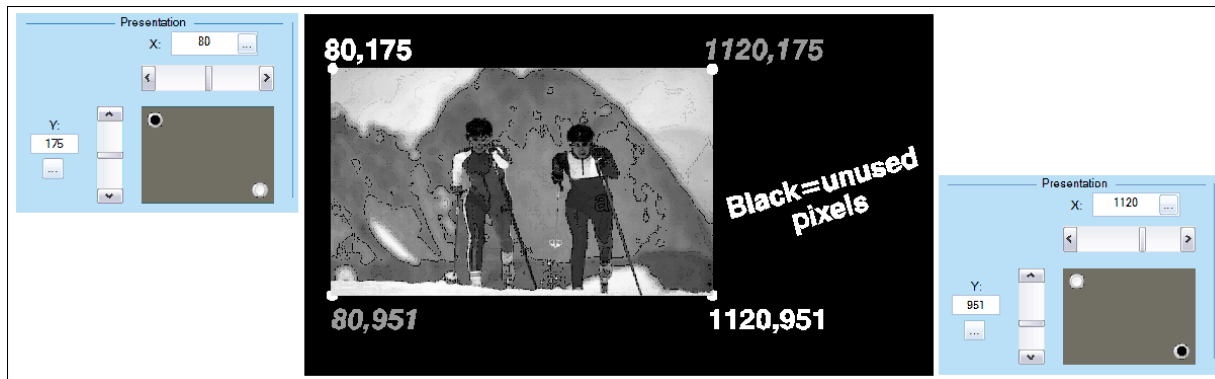


**Figure 3-34 Presentation Example**

## CROPPING NOTES

Cropping is the digital equivalent of filing aperture plates in a film projector to perfect the image "squareness". For example, if the bottom of the image appears slightly wider than the top, select the **bottom left** or **bottom right** option button and then adjust the X/Y coordinates using either the sliders to increase/decrease the value or click the **Launch Dialog** button in the **Cropping X/Y** boxes to launch the on-screen keyboard. The intent is to crop or "bring in" the corner(s) of the image slightly. **NOTE**: *This is cropping, not electronic keystoned adjustment.* In most cases, cropping assumes that the entire projector display area is in use, thus the coordinates initially define pixel locations on the projector's 4096 x 2160 display area. Images that are significantly smaller in format may actually lie beyond the range of one or more cropping adjustments, thus you will not see evidence of cropping on the edges.
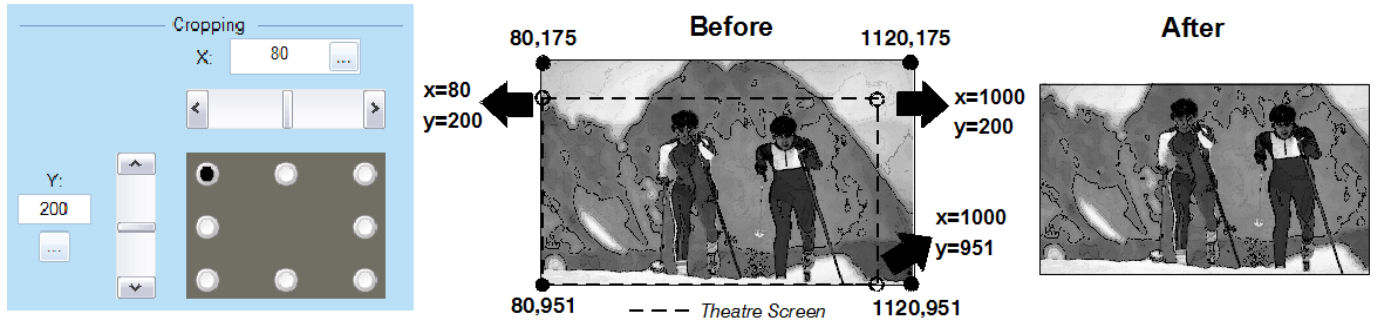
**Figure 3-35 Cropping Example**

When projecting onto a curved screen, a bowed image sometimes results. To correct these bowed edges so that the image appears properly in the display, select the **left middle** option button and then adjust the Curve value using either the sliders to increase the value or click the **Launch Dialog** button in the **Curve** box to launch the on-screen keyboard and type a new value. Repeat this step after selecting the **middle right** option button. This turns off or drops pixels outside of the cropped region.
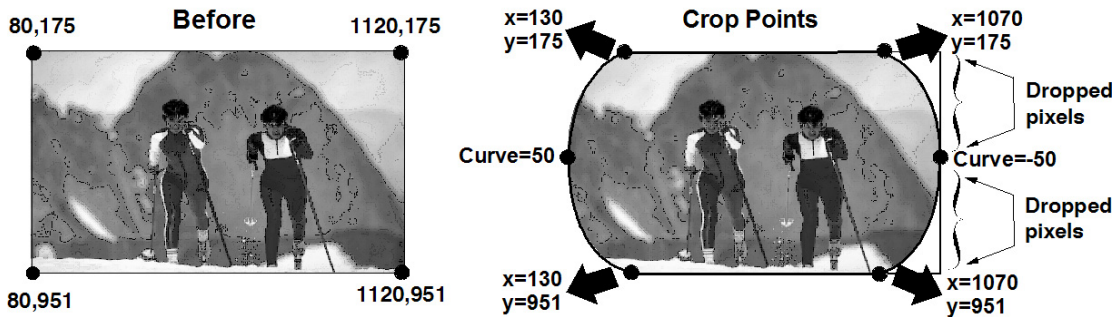


**Figure 3-36 Bow Cropping Example**

### LETTER BOX NOTES

Use Letter Box for virtually all normal operation. It ensures that all incoming data will display within your defined presentation area and nothing will be discarded. If desired, any "black bars" (unused pixels) could then be cropped off using the cropping control. Clearing the **Letter Box** check box also fills the defined presentation area, any extra data beyond this area—whether top-and-bottom or left-and- right—will be discarded. **NOTE:** *Select the **Letter Box** check box for all cinema presentations.*
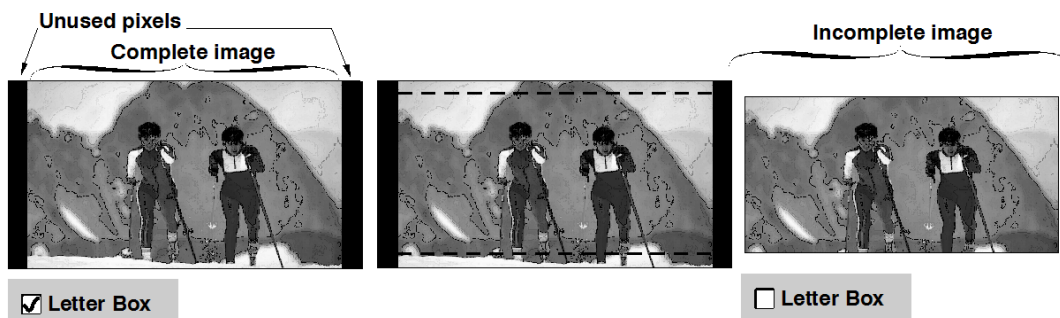


**Figure 3-37 Letter Box Example**

## Advanced Setup: MCGD File Setup Window

The **MCGD File Setup** window allows you to record measurements for currently projected "uncorrected" colors. Recording the projector's uncorrected color performance is typically completed as a final step after installation as a calibration. By default, the projector will use this MCGD to calculate and implement precise processing modifications needed to achieve any target color gamut on-screen, essentially compensating for the type of port window, screen, lens, light output, ambient light and other current environmental factors influencing on-screen colors. If the environment degrades or changes (such as if an anamorphic lens is swapped on and off) or if an internal optical module is replaced, create one or more new MCGD files. To use an MCGD file as the reference file for target color processing (such as with a certain source and/or lens), select it in the **Channel Setup: Config 2** window. **NOTE**: *If the Measured Color option in the Channel Setup: Config 2 window shows a warning symbol next to the option, the MCGD File Setup still needs to be defined. This file must be defined before you can select it.*
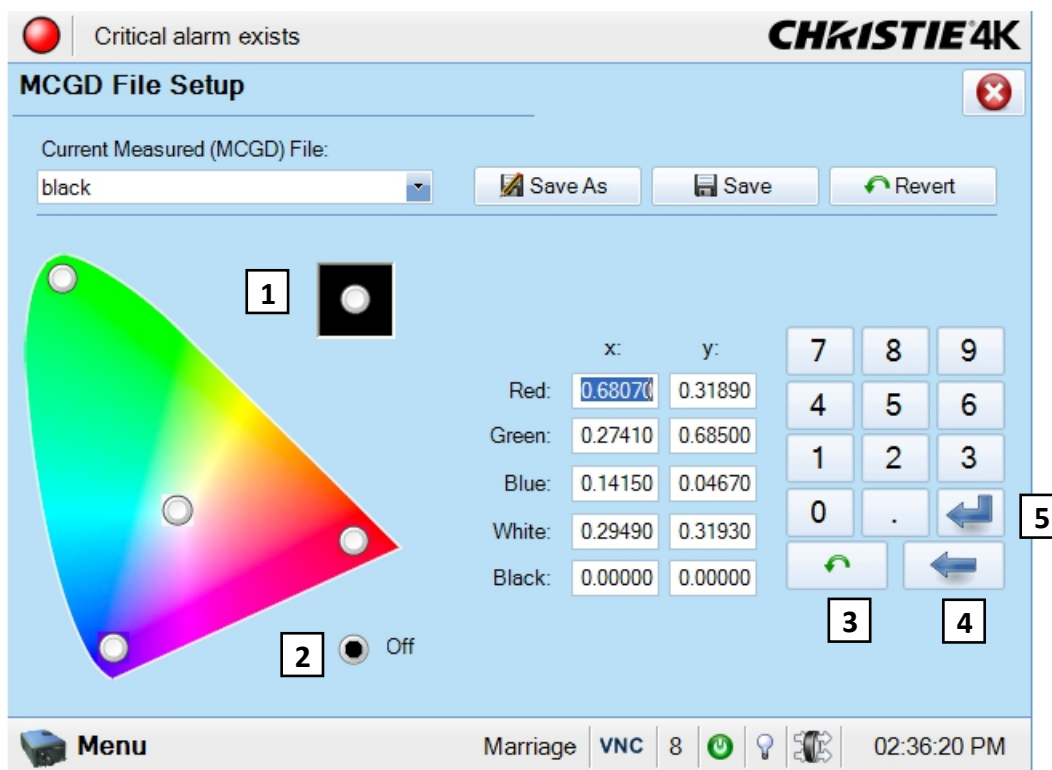


**Figure 3-38 Advanced Setup: MCGD File Setup Window**

**Table 3.26 Advanced Setup: MCGD File Setup Window**

| Control | Description |
|---|---|
| **1: Gamut Visual Control** | Click a **colour** option button to enable the colour test pattern on the screen. See *To Record MCGD Color Settings* below. |
| **2: Off Button** | Turns off the displayed color and returns the projector to content play. |
| **3: Revert Button** | With the cursor in a text box, click the **Revert** button to revert to the previously saved value. |
| **4: Back Button** | Click the **Back** button to delete the entry before the cursor one character at a time. |
| **5: Enter Button** | Click the **Enter** button to accept the current entry and advance the cursor to the next text region. |

**To Record MCGD Color Settings**

For this one-time procedure for 2D displays, measure the initial "native" (i.e., uncorrected) x/y color coordinates for each color (Red, Green, Blue, and White) at the screen using a color meter. These values represent the current viewable primary colors and collectively defines the raw color performance or reference point for the projector in the current environment. A similar file needs to be defined for 3D channels with the 3D system installed and passive glasses worn. To define the MCGD:

1. On the TPC, ensure the **Current Measured (MCGD) File** is **Onsite** in the **Advanced Setup: MCGD File Setup** window.

2. Click a **color** option button to display the full-field color. Each **color** option button activates the corresponding full-field YCbCr test pattern of this native color so that measurements can be taken.

3. Measure the coordinates at the screen using a color meter.

4. On the TPC, record the values in the nearby x and y text boxes for the selected color.

5. Repeat steps 2 - 4 for each color.

6. After all colors have been measured and recorded, select the **Off** option button to leave the special test pattern mode and then click the **Save** button. To cancel changes and return to the previous MCGD coordinates, leave the window without saving or click the **Revert** button next to the **Save** button.

### Advanced Setup: TCGD File Setup Window

The **TCGD File Setup** window allows you to modify or create custom Target Color Gamut Data (TCGD) files for new color gamut performance and set how closely you want to match the target white. **NOTE**: *Industry-defined TCG standards, such as P7v2 and others are write-protected and cannot be changed. Modifications to such a target must be saved under a new TCGD file name.* Once you have created a new TCGD file, it appears in the **Channel Setup: Config 2** window as **Target Color** where it can be selected for use in the display.
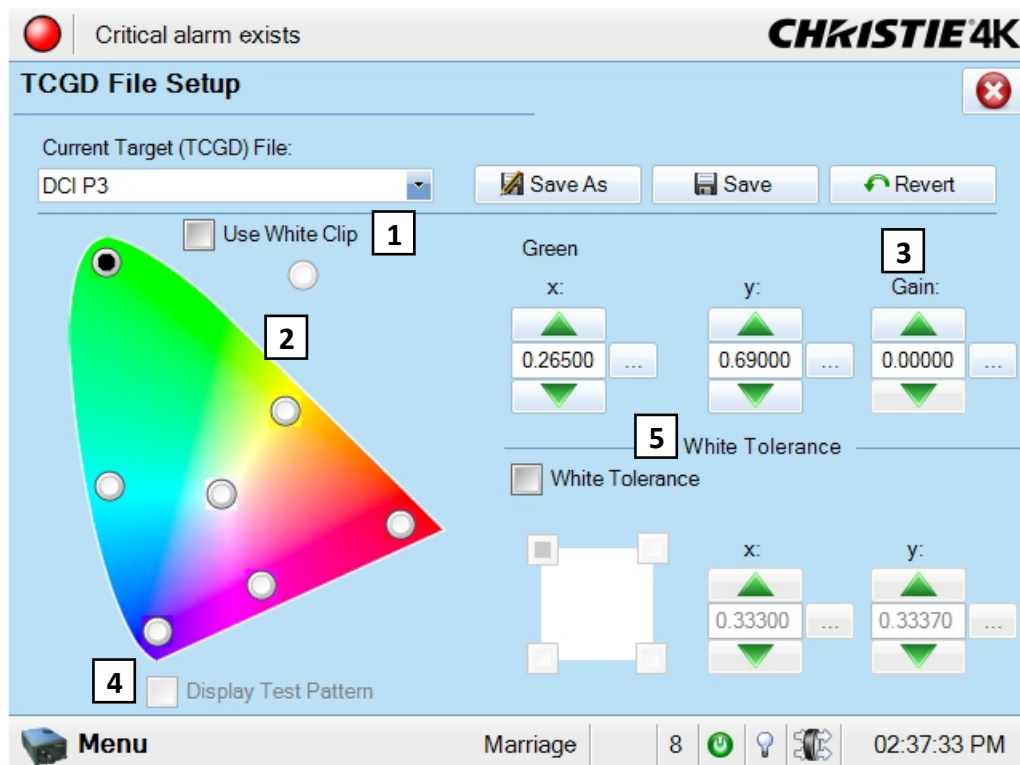


**Figure 3-39 Advanced Setup: TCGD File Setup Window**

**Table 3.27 Advanced Setup: TCGD File Setup Window**

| Control | Description |
|---------|-------------|
| **1: Use White Clip \*** | Select the **Use White Clip** check box when playing back content encoded with the DCI XYZ color space. This will help bring the chromaticity of white within range with the projector without sacrificing output brightness or contrast. To adjust the actual white clip limit, select the **Use White Clip** check box and then select the radio button below the **Use White Clip** check box. Next, adjust the x/y values accordingly. |
| **2: Gamut Visual Control \*** | The Target (TCGD) color fields show the corresponding x/y color coordinates defined for the current target color gamut in use. See *TCGD Notes* below. To adjust the value of the x/y color coordinates, click a **color** option button to display the x/y values for the selected color, and then change the value based on the measurements taken from the screen. The selected color displays above x text box. |
| **3: Gain \*** | Gain indicates the luminance (a.k.a. brightness or intensity) of each color as compared to full-on white, ranging from 0 (0%) to 1 (100%). You may want to modify one or more gain values to precisely match color levels in other adjacent displays or to accommodate a studio's internal color management technique. Gain would rarely if ever be adjusted for theatre use. |
| **4: Display Test Pattern** | Shows a test pattern when the color changes. Select the **Display Test Pattern** check box and then select a **color** option button in the **Gamut Visual Control** region. |
| **5: White Tolerance \*** | The chosen target for white coordinates (White XY) under Target (TCGD) may be relaxed by establishing a small "tolerance box" around it. This box represents four coordinates (0-1-2-3) plotted on a 1931 CIE Chromaticity graph and may vary from TCGD to TCGD. See *White Tolerance Notes* below. Select the **White Tolerance** check box to enable the White Tolerance grid and x/y text boxes. To change the value of the x/y colour coordinates measured from the screen, select one of the four corners and then adjust the value. Values range from 0.0 to 1.0. |

\* Alter the values using one of the two options:

- click the **up/down** buttons to increment/decrement the coordinates/value. Adjust one short click at a time, several longer clicks, or hold the button for an accelerated movement.
- click the **Launch Dialog** button to the right of the x/y text regions to enter a value using the on-screen keyboard.

**TCGD NOTES**

You can create a new custom target by defining different coordinates for one or more TCGD colors or simply by changing the tolerance state and then saving as a new TCGD file. For most applications, TCGD values are used simply to verify that displayed colors actually do match the standard, i.e., you can measure each color at the screen and compare its coordinates to those appearing in the TCGD fields to confirm that the projected colors are accurate. For special applications in which you want to create a unique target color standard, enter new TCGD coordinates as desired and then click the **Save As** button to save as a new TCGD file.

To Record TCGD Color Settings

For each color, record the native "uncorrected" x/y color coordinates measured at the screen. These values represent the currently viewable primary colors, and collectively define the raw color performance "reference point" for this projector in the current environment. Each **color** option button activates the corresponding full-field YCbCr test pattern of this native color so that measurements can be taken. For example, to measure the red coordinates, click the **Red** option button to change the screen display to full-field red and measure coordinates at the screen. Repeat for each color, and record them in the x/y text boxes. After all colors have been measured and recorded, click the **Save** button. To cancel changes and return to the previous TCGD coordinates, leave the window without saving or click the **Revert** button next to the **Save** button.

**WHITE TOLERANCE NOTES**

If desired, define new tolerance coordinates for the current TCGD to increase or decrease this tolerance area or to change its shape or location. Larger boxes relax the tolerance reducing the loss of light caused by precise matching. If the projector's whites must precisely match the target white point defined for the current TCGD (typical for telecine use), ensure the **White Tolerance** check box is clear. If this match can be anywhere within the tolerance box (typical for theatre use), click the **White Tolerance** check box.

The **White Tolerance** check box status is saved with the TCGD. Keep in mind that some light is usually discarded for an exact match, resulting in a dimmer image. It is recommended that you enable the tolerance box for all applications requiring maximum brightness, such as in theatres. Do not enable the **White Tolerance** check box if exact color performance is more crucial than overall image brightness, such as in telecine applications.

## 3.5.9 Administrator Setup Window

Required permission level - **Administrator** or **Service**.

### Administrator Setup: Preferred Channel Setup Window

The **Preferred Channel Setup** window enables the management and organization of all available channels. There are 64 pre-defined channels in total where nine channels display directly on the **Main** panel of the TPC. This window allows you to select and organize these nine channels.
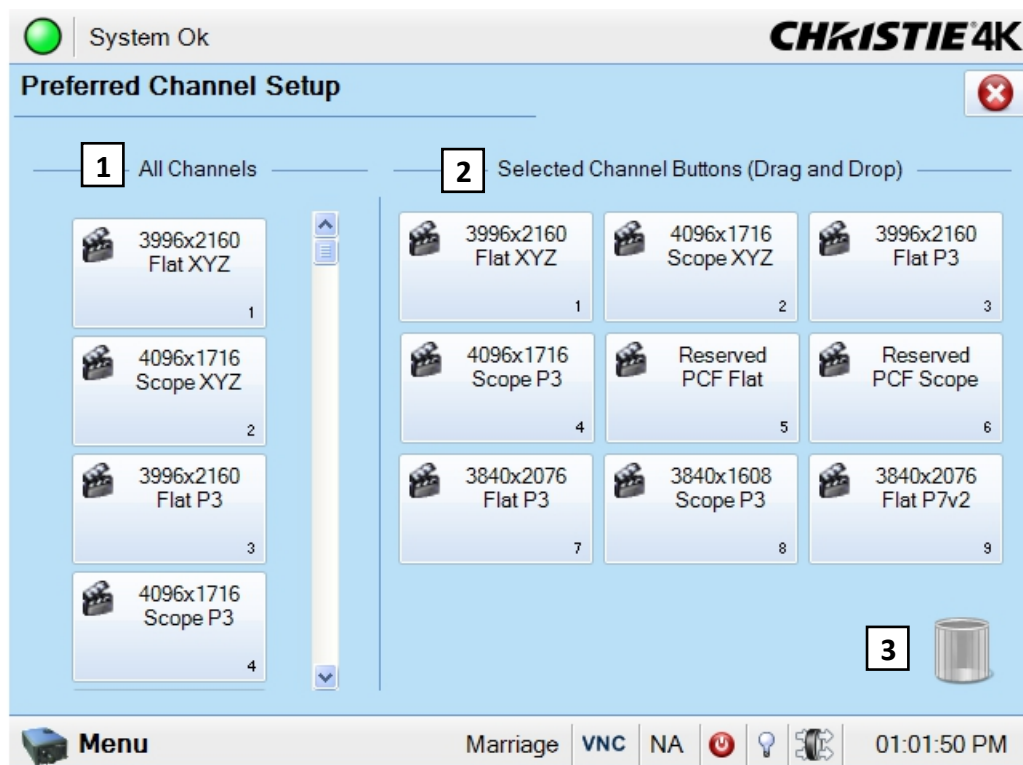


**Figure 3-40 Administrator Setup: Preferred Channel Setup Window**

**Table 3.28 Administrator Setup: Preferred Channel Selection Window**

| Control | Description |
|---------|-------------|
| **1: All Channels** | An alphabetical list of all 64 channels to choose from. |
| **2: Selected Channel Buttons** | A list of the nine buttons that display on the **Main** panel of the TPC. Buttons in this region can be dragged on top of one another to switch button locations. |
| **3: Trash Can** | Used to delete a channel from the **Selected Channel Buttons** region. |

**To Add a Channel**

To add a channel button, drag the button from the **All Channels** region (left side of graphic in **Figure 3-40**) and place it on top of a button in the **Selected Channel Buttons** region (right side of graphic in **Figure 3-40**). Buttons in this region can be dragged on top of one another to switch button locations.

**To Delete a Channel**

To remove a channel from the **Selected Channel Buttons** region (right side of graphic in **Figure 3-40**), drag and drop the channel on top of the trash can. This defines an empty channel on the **Main** panel. Channels dragged to the trash can cannot be retrieved. You need to add the channel from the **All Channels** region once again.

**Administrator Setup: Preferred Test Pattern Setup Window**

The **Preferred Test Pattern Setup** window enables the management and organization of all available test patterns. Patterns in the **User Selected** region (right side of graphic in **Figure 3-41**) are available to you via the **Test Pattern** button on the **Main** panel.
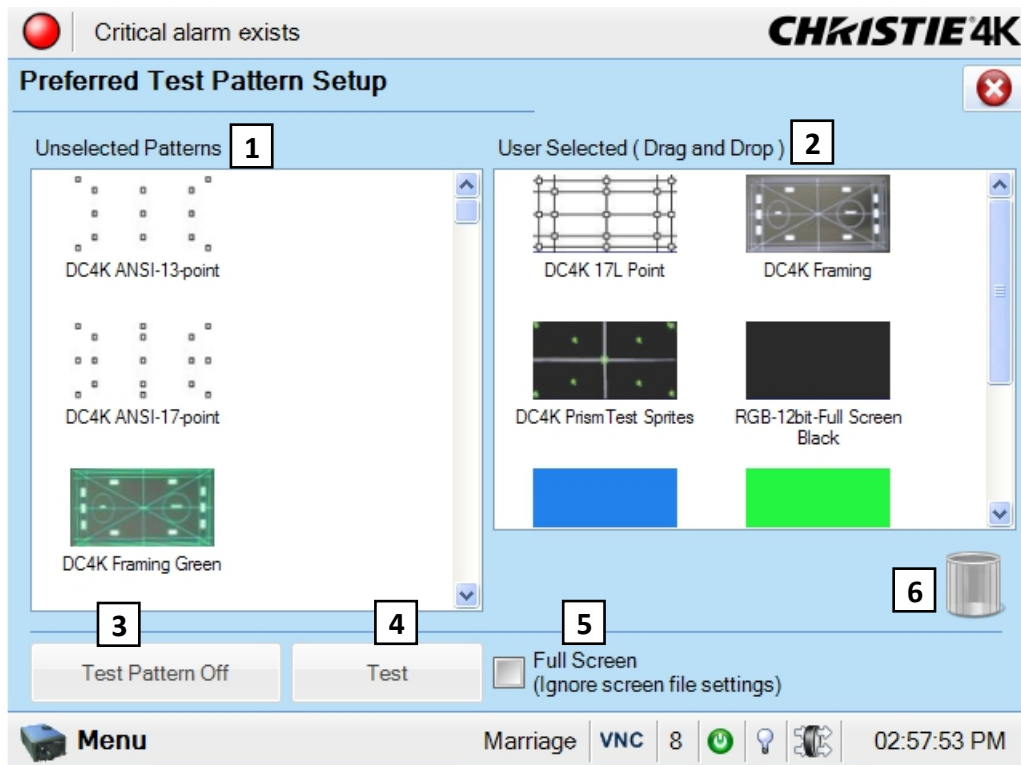


**Figure 3-41 Administrator Setup: Preferred Test Pattern Setup Window**

**Table 3.29 Administrator Setup: Preferred Test Pattern Setup Window**

| Control | Description |
|---|---|
| **1: Unselected Patterns** | An alphabetical list of all available test patterns for display by the projector for you to choose from. If a pattern is dragged to the **User Selected** region, it will be removed from this list. |
| **2: User Selected** | A list of test patterns specifically selected by the user. This list is displayed when you click the **Test Pattern** button on the **Main** panel. |
| **3: Test Pattern Off** | The **Test Pattern Off** button stops displaying the test pattern currently displayed by the projector. |
| **4: Test** | The **Test** button displays the selected test pattern on-screen regardless if the selected test pattern is in the **Unselected Patterns** region (left side of graphic in **Figure 3-41**) or **User Selected** region (right side of graphic in **Figure 3-41**). |
| **5: Full Screen** | Select the **Full Screen** check box to display the test pattern full screen, 2048 x 1080. If the **Full Screen** check box is clear, the test pattern will show in native resolution which may not fill the projection area. |
| **6: Trash Can** | Used to delete a test pattern from the **User Selected** region. |

### To Add a Test Pattern

To add a test pattern, drag a test pattern from the **Unselected Patterns** region (left side of graphic in **Figure 3-41**) and drop it in the **User Selected** region (right side of graphic in **Figure 3-41**). If the Test Pattern is added, it will be removed from the **Unselected Patterns** region.

### To Delete a Test Pattern

To remove a test pattern from the **User Selected** region, drag and drop the test pattern on top of the trash can. Test Patterns dragged to the trash can cannot be retrieved. You need to add the test pattern from the **Unselected Patterns** region once again.

### Administrator Setup: Preferences Window

The **Preferences** window provides access to various system parameters.
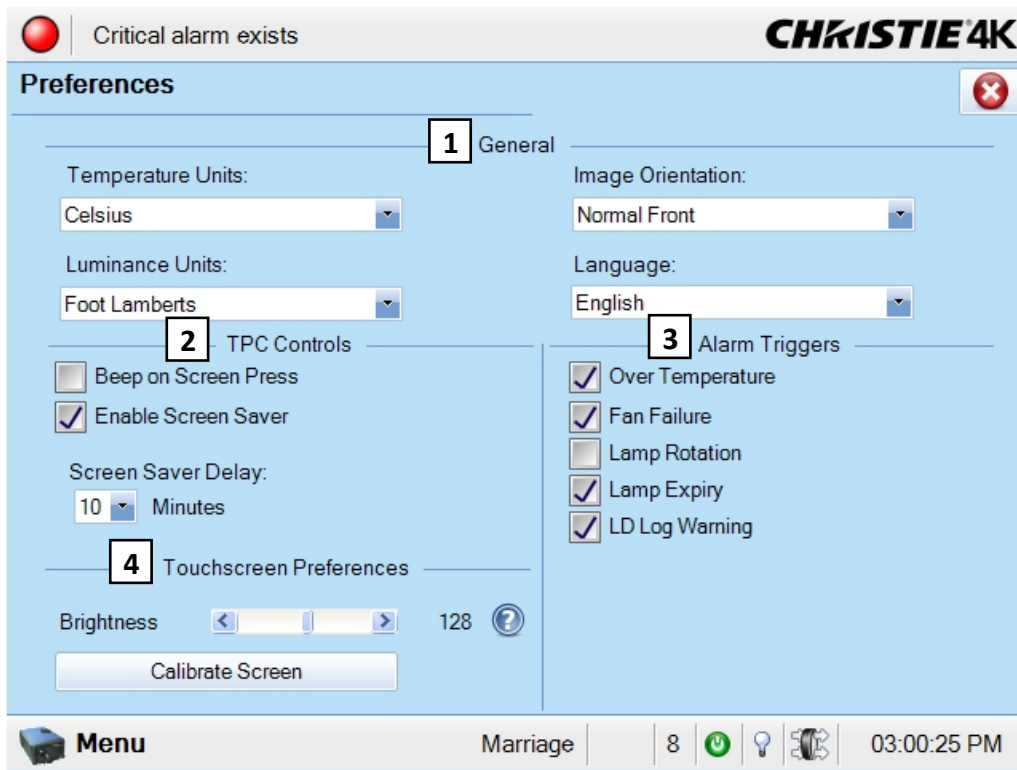


**Figure 3-42 Administrator Setup: Preferences Window**

**Table 3.30 Administrator Setup: Preferences Window**

| Region | Control | Description |
|---|---|---|
| **1: General** | **Temperature Units** | Select whether to display the temperature displayed on the TPC windows in Celsius or Fahrenheit, for example, the values in the **Status: Temperatures** window. |
| | **Image Orientation** | Select the orientation of the image on the screen. This is for flipping the image on the screen, for example if you install a projector upside down on the ceiling and need to switch the orientation. The default is Normal Front. |
| | **Luminance Units** | Select to display the luminance settings displayed on the TPC windows in Foot Lamberts or Candela, for example, the Luminance value in the **Status: Lamp Info** window. |
| **2: TPC Controls** | **Beep on Screen Press** | Select the **Beep on Screen Press** check box if you want to hear a beep every time you touch the screen. |
| | **Enable Screen Saver / Screen Saver Delay** | Select the **Enable Screen Saver** check box if you want to enter screen saver mode after a specified time of no interaction. While in screen saver mode, the screen is blank and the back light is off. In the **Screen Saver Delay** list, select the amount of non-interaction time before entering screen saver mode. |

| Region | Control | Description |
|---|---|---|
| **3: Alarm Triggers** | **Over Temperature, Fan Failure, Lamp Rotation, Lamp Expiry,LD Log Warning** | Select the **Alarm Triggers** check boxes for the conditions you want to trigger an alarm window. Interlocks, communication faults, DMD over-temperature and lamp failure are all permanent triggers. It is strongly recommended all triggers remain selected during normal operation. The Lamp Rotation alarm is triggered when the Lamp Expiry value has reached 50%. The Lamp Expiry alarm is triggered when the Lamp Expiry value that was entered when installing the lamp is reached. The LD Log warning is triggered when the number of log files reaches a certain limit. |
| **4: Touch-screen Calibration** | **Calibrate Screen** | Click the **Calibrate Screen** button and follow the on-screen instructions to touch and hold the red dot until calibration is complete. |

Administrator Setup: Content Devices Configuration

The Content Devices Configuration window allows you to select whether a Link Decrypter (LD) has been installed or a IMB or both for content configuration.
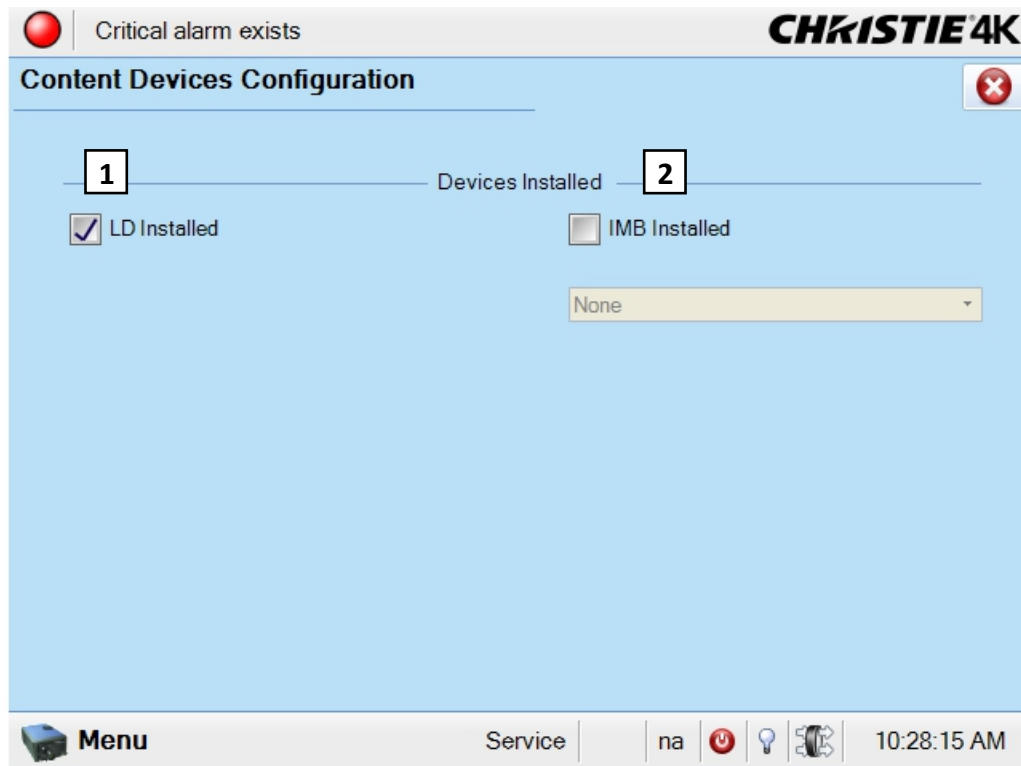


**Figure 3-43 Administrator Setup: Content Devices Configuration**

**Table 3.31 Administrator Setup: Content Devices Configuration**

| Region | Control | Description |
|---|---|---|
| **1: LD Installed** | **LD** | Select this if a Link Decrypter (LD) has been installed. **NOTE**: If a LD has been installed and this is not checked the projector will display a warning. |
| **2: IMB Installed** | **IMB** | Select this if an IMB has been installed. |

### Administrator Setup: Time Setup Window

The **Time Setup** window allows you to change the time zone and adjust the system time by up to ±15 minutes per year.
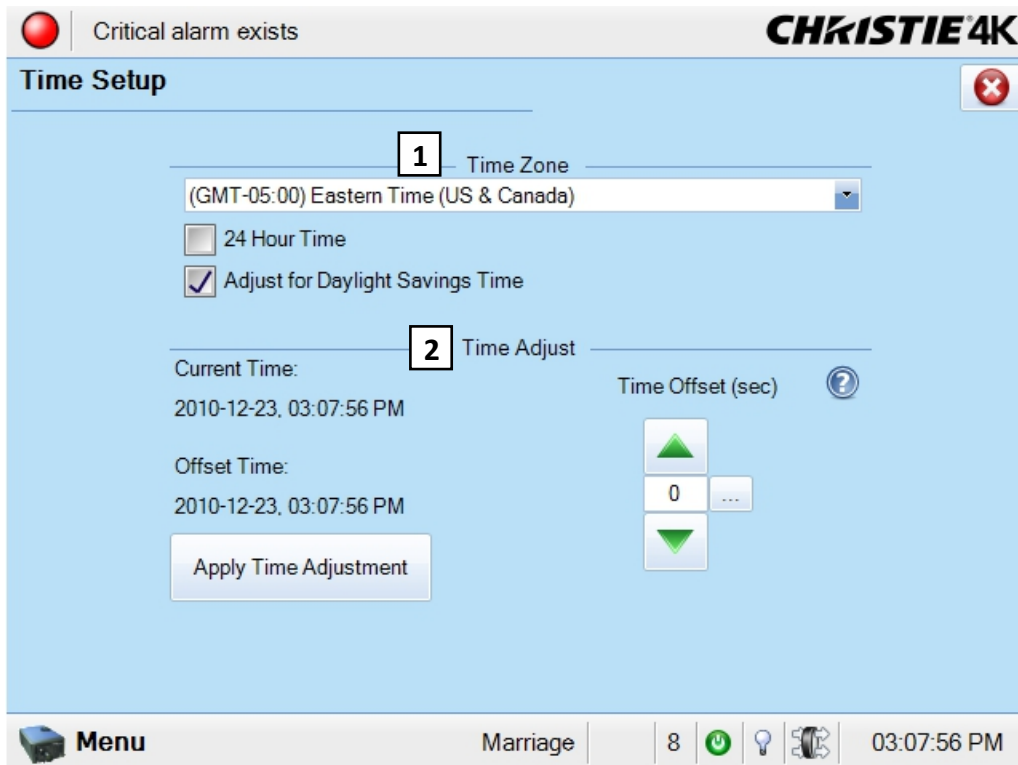


**Figure 3-44 Administrator Setup: Time Setup Window**

**Table 3.32 Administrator Setup: Time Setup Window**

| Region | Control | Description |
|---|---|---|
| 1: Time Zone | Time Zone | In the **Time Zone** list, select your time zone. |
| | 24 Hour Time | Click the **24 Hour Time** check box to display the TPC time in 24-hour format. Clear the **24 Hour Time** check box to display the standard 12-hour format. The default format is 12-hour. |
| 2: Time Adjust | Time Offset | The current time is displayed on each window of the TPC. It is retrieved from the LD board and cannot be altered. The Time Offset feature allows you to adjust the system time by a maximum of ± 15 minutes (900 seconds) per year. Click the **up/down** buttons to increment/decrement the time offset value or click the **Launch Dialog** button to the right of the time offset text region to enter the value using the on-screen keyboard. |
| | Apply Time Adjustment | Click the **Apply Time Adjustment** button to apply the changed time settings. |

## Administrator Setup: Communications Configuration Window

The **Communications Configuration** window configures the Ethernet settings, serial communication parameters, SNMP settings, and remote access settings. **NOTE**: *Record any new settings on page 1-5 of this manual.*
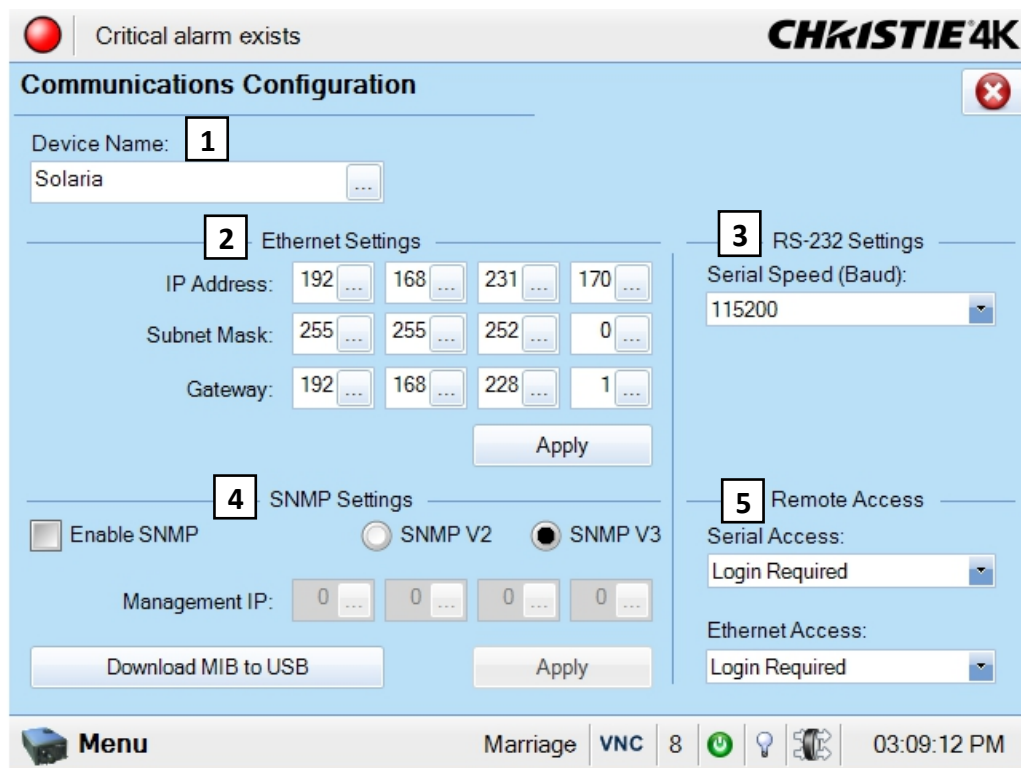


**Figure 3-45 Administrator Setup: Communications Configuration Window**

**Table 3.33 Administrator Setup: Communications Configuration Window**

| Region | Control | Description |
|---|---|---|
| 1: Device Name | Device | Assign a specific name for this device in the network. In the **Device Name** text box, click the **Launch Dialog** button to edit the device name using the on-screen keyboard. |
| 2: Ethernet Settings | IP Address | This is a unique address assigned for a specific device and site. The first three octets of the IP address identify the network to which the device belongs; the last octet identifies the specific device. |
| | Subnet Mask | All IP addresses for a network belong to the same Net Mask (also called a Subnet Mask) as defined by the network administrator. |
| | Gateway | This is a site specific network address and is common for Ethernet Management and Service Ethernet ports. |
| | Apply | Click the **Apply** button to implement the current Ethernet configuration settings. |
| 3: RS-232 Settings | Serial Speed (Baud) | In the **Serial Speed** list, select the serial port baud rate. The default value is 9600. |
| 4: SNMP Settings | Enable SNMP | Select the **Enable SNMP** check box to enable the SNMP agent. By default, the check box is clear meaning SNMP is off (no Traps sent) |
| | SNMP V2 / SNMP V3 | Select between SNMP v2 and v3 protocol. |
| | Management IP | The SNMP management IP address where traps and notifies will be sent. |
| | Download MIB to USB | Click the **Download MIB to USB** button to launch a License Agreement dialog to accept or reject certain conditions before downloading the SNMP Management Information Base (MIB) file to a USB drive. |
| | Apply | Click the **Apply** button to launch an editable version of the management IP Control and send SNMP traps to. |
| 5: Remote Access | Serial Access | In the **Serial Access** list, select the degree of permission to grant serial access. |
| | Ethernet Access | In the **Ethernet Access** list, select the degree of permission to grant Ethernet access. |

**NOTE**: *Contact Christie for the SNMP V3 user ID and password.*

### Administrator Setup: Network Devices Window

The **Network Devices** window lets you view the web interface of external peripherals such as Christie ACT and the Integrated Media Block (IMB).
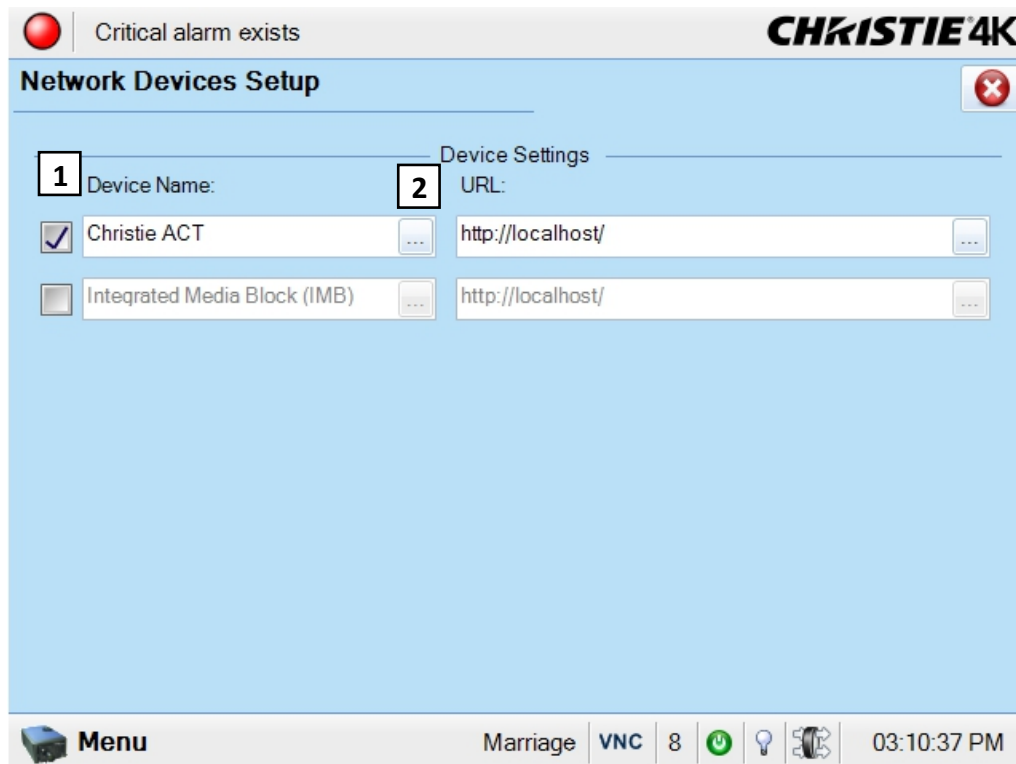


**Figure 3-46 Administrator Setup: Network Devices Window**

**To Add a Network Device**

1. Select a check box to the left of the Christie ACT or Integrated Media Block devices to enable the device. If you want to add a different device, in the **Device Name** text box, enter the device name or click the **Launch Dialog** button to enter the device name using the on-screen keyboard.

2. In the **URL** text box, enter the URL or click the **Launch Dialog** button to enter the URL using the on-screen keyboard.

3. Your network device is now defined. View the web interface of this device by clicking the **Menu** button, selecting **Network Device**, and then selecting your new device. Refer to *3.5.5 Network Devices, on page 3-20* for more information on defined devices.

## Administrator Setup: GPIO Setup Window

The **GPIO Setup** window allows for the configuration of both input and output GPIO functions. For GPI, the system can be configured to trigger a specific pin either on a rising or falling edge. When the configured trigger is received, the function associated with that pin will be executed. Similarly when a specified function is activated on the projector, like the switch to a channel or the lamp turning on, a specified pin can be configured to send a rising of falling edge signal.
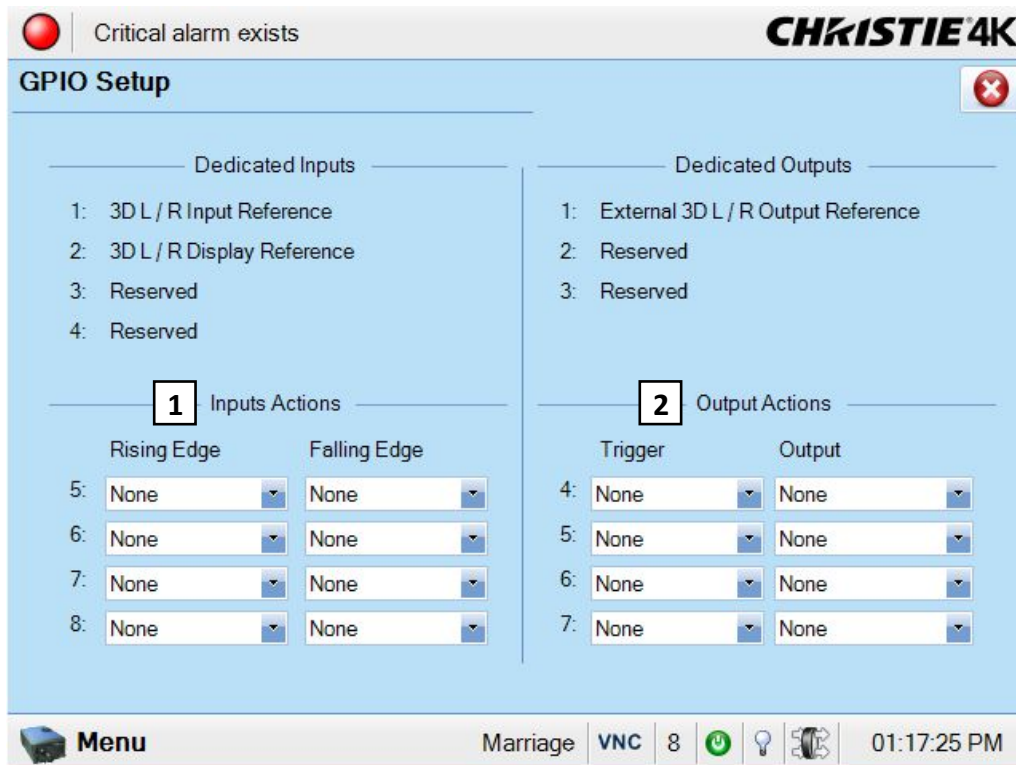
**Figure 3-47 Administrator Setup: GPIO Setup Window**

**Table 3.34 Administrator Setup: GPIO Setup Window**

| Region | Control | Description |
|---|---|---|
| **1: Inputs Actions** | **Rising Edge** | In the **Rising Edge** list, select the rising edge option which will send the signal to execute the selected function. |
| | **Falling Edge** | In the **Falling Edge** list, select the falling edge option that will execute when the selected signal is received. |
| **2: Output Actions** | **Trigger** | In the **Trigger** list, select the trigger that will be sent when the selected function is activated. |
| | **Output** | In the **Output** list, select the output that will trigger the GPO signal to be sent. |

## Administrator Setup: Foot Lamberts Calibration Window

The **Foot Lambert Calibration** window begins a series of panels that guides you through the process to calibrate the internal light sensor to Foot Lamberts. The left column of the **Foot Lamberts Calibration** window shows which state you're currently at in the calibration process. (**Figure 3-48**). Click the **Next/Prev** buttons to navigate the windows. **NOTE**: *DO NOT perform a Foot Lamberts Calibration when a show is playing as this will stop the show.*
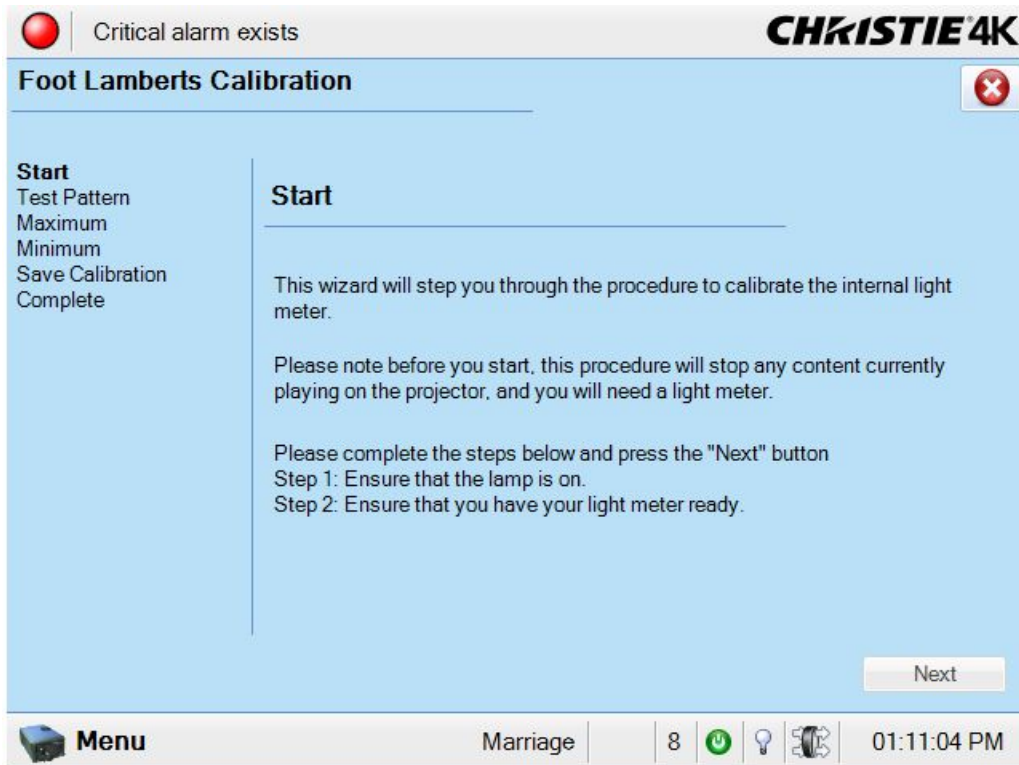


**Figure 3-48 Administrator Setup: Foot Lamberts Calibration Start Window**

**Steps to Perform Foot Lamberts Calibration**

1. Before starting the Foot Lamberts Calibration measurement process, ensure the lamp is ON and you have your light meter ready (**Figure 3-48**). Click the **Next** button to proceed to the Test Pattern window. If either of these two conditions are not met, the **Next** button will be disabled (greyed out) and will not let you proceed with the calibration.
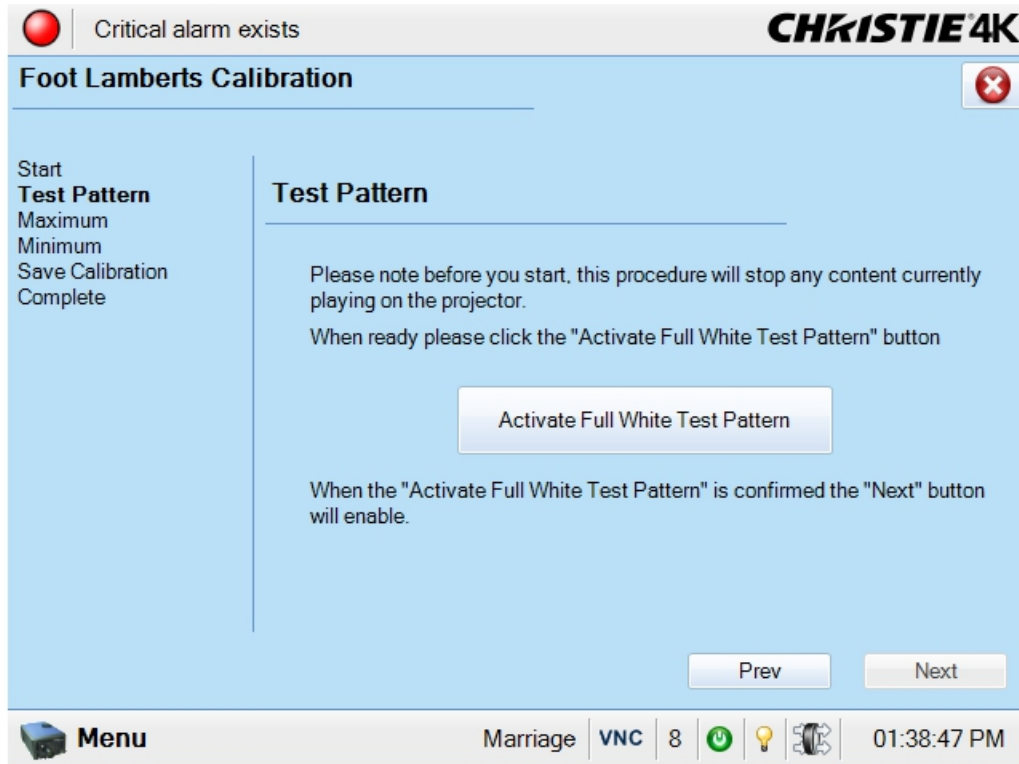


**Figure 3-49 Click to Activate a Full White Test Pattern**

2. In the **Test Pattern** window, you need to click the **Activate Full White Test Pattern** button before proceeding. (**Figure 3-49**). **NOTE**: *This procedure will stop any content currently playing on the projector.* Click the **Next** button to proceed to the **Maximum** window.
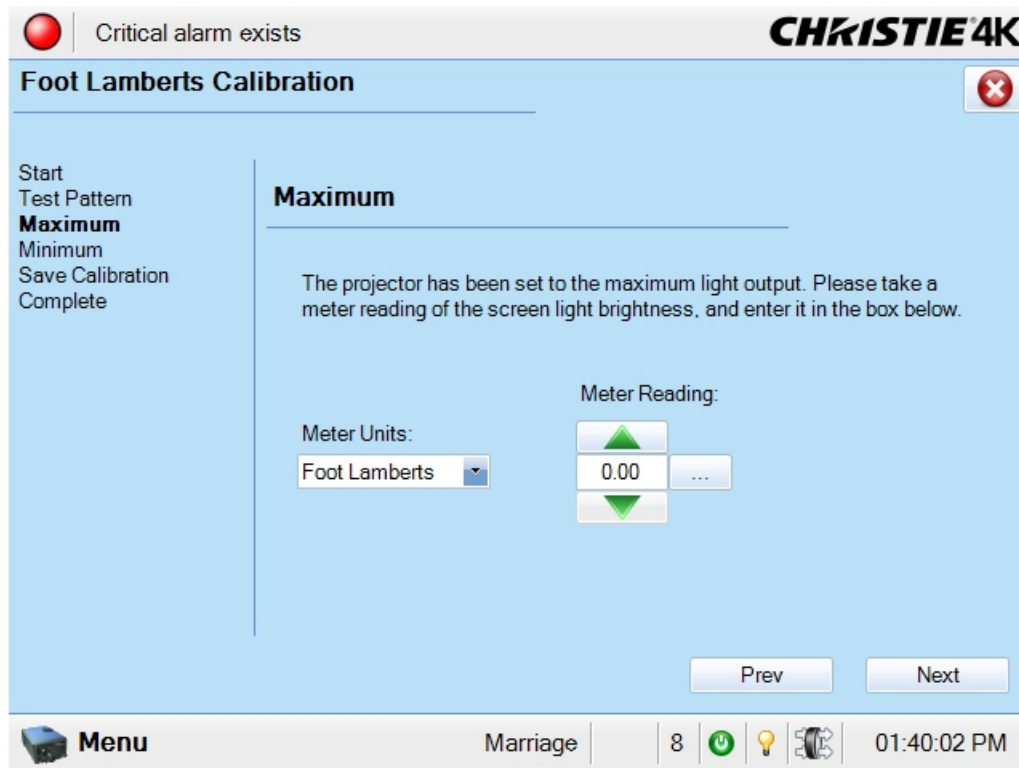
**Figure 3-50 Record the Meter Reading at Maximum Light Output**

3.  In the **Maximum** window, the projector sets the lamp to the maximum light output. Measure the screen light output at the screen with a light meter and enter the value in the **Meter Reading** text region by clicking the **up/down** buttons or clicking the **Launch Dialog** button to launch the on-screen keyboard to enter this value. (**Figure 3-50**). Values can range from 0.00 to 1000.00. In the **Meter Units** list, select the preferred units (Foot Lamberts or Candelas). Once complete, click the **Next** button to proceed to the **Minimum** window.

4.  In the **Minimum** window, repeat step 3 to record the minimum light output. Values can range from 0.00 to 1000.00. Once complete, click the **Next** button to proceed to the **Save Calibration** window.

5.  In the **Save Calibration** window, click the **Save** button to permanently save the configuration. Click the **Next** button to proceed to the **Complete** window.

6.  The **Complete** window shows the success of the Foot Lamberts calibration. Click the **Finish** button to return to the **Main** panel.

### Administrator Setup: User Accounts Window

The **User Accounts** window provides options for the management of users, passwords, and user access rights. Depending on your login level, you will be able to manage users having the same or fewer access rights as you.
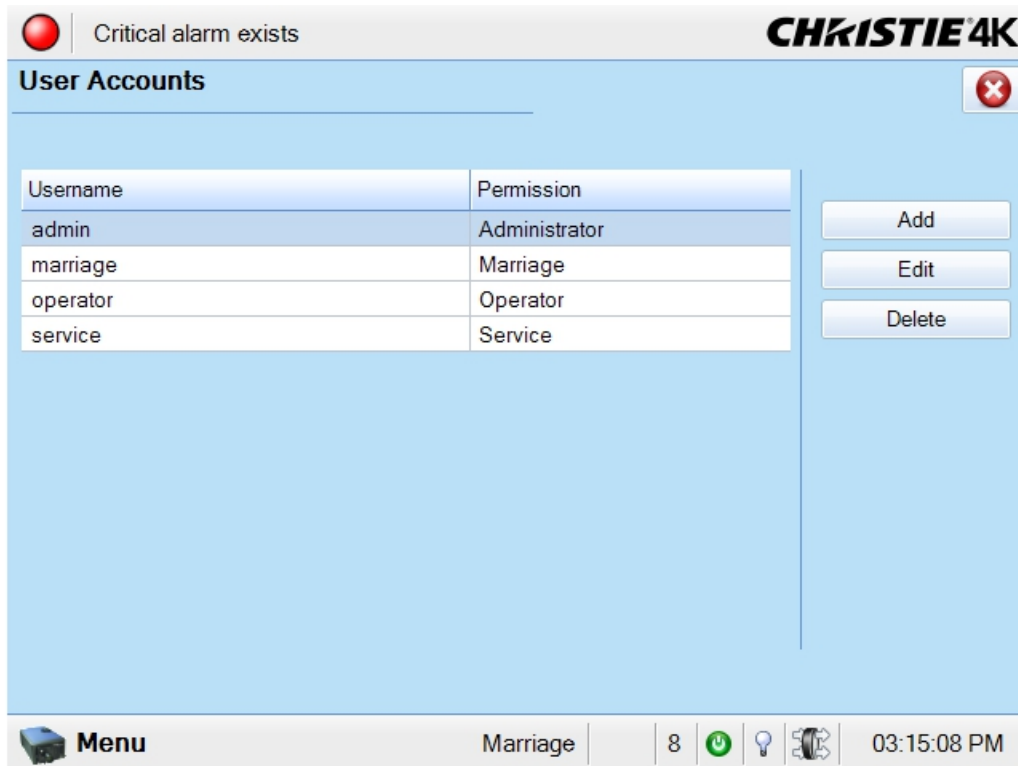


**Figure 3-51 Administrator Setup: User Accounts Window**

**Table 3.35 Administrator Setup: User Accounts Window**

| Control | Description |
|---------|-------------|
| **User Name & Permissions** | A read only data grid view used to display a list of all users and their permissions. |
| **Add** | Click the **Add** button to launch a dialog to enter the username, password and permission level for a new user. See *Adding a New User* below. |
| **Edit** | Select a user and click the **Edit** button to adjust the password and permission level for the user. If the active user is of a lower permission level then the currently selected user, a warning will display preventing the changes. |
| **Delete** | Select a user and click the **Delete** button. A confirmation dialog displays. |
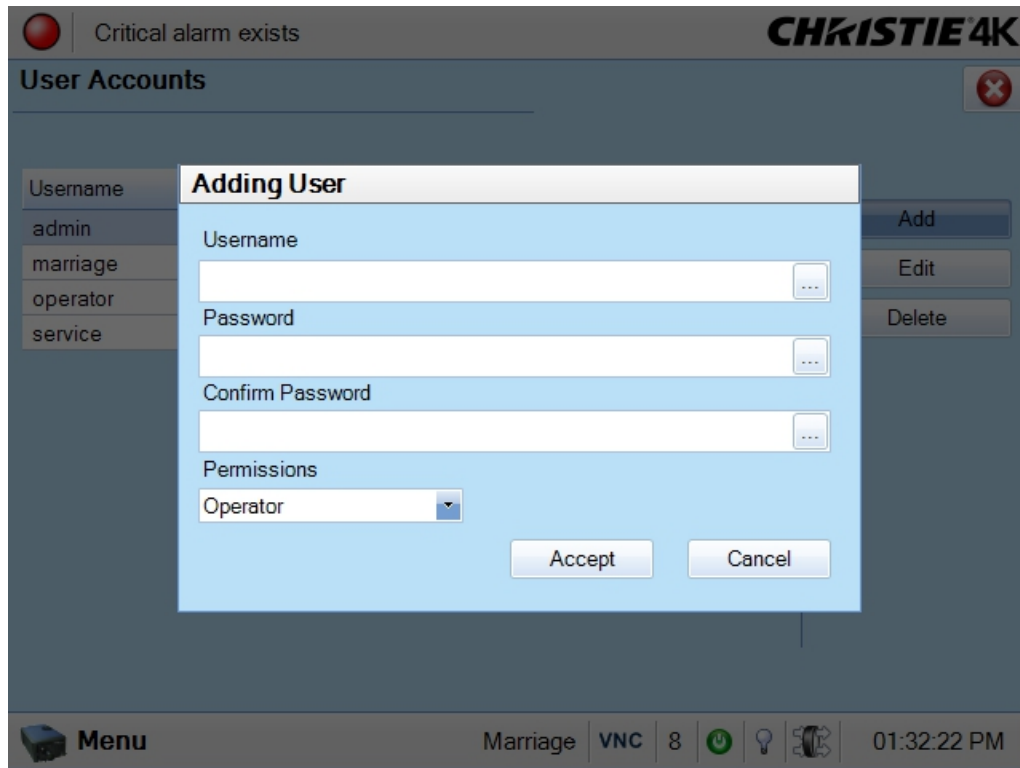
**Figure 3-52 Add a New User Window**

### To Add a New User

1. Click the **Add** button to launch a dialog to enter the username, password and permission level for a new user.

2. In the **Username** list, click the **Launch Dialog** button enter the username using the on-screen keyboard. The username requires 4 - 32 characters with no numbers or special characters.

3. In the **Password** list, click the **Launch Dialog** button enter the password using the on-screen keyboard. Passwords require 4 - 32 characters with spaces, numbers, and special characters accepted.

4. Repeat step 3 for the **Confirm Password** list.

5. In the **Permission** list, select the permission level for the new user. The level can be the same or lower than the current active user. Permission levels are Operator, Advanced, Administrator, and Service in order from lowest to highest.

### Administrator Setup: Upgrade Window

The **Upgrade** window begins a series of steps to walk you through the upgrade process. You must login with Administrator or Service permissions to use the upgrade feature. The left column of the **Upgrade** window shows which state you're currently at in the upgrade process. Click the **Next/Prev** buttons to navigate the series of steps.

### Steps to Install an Upgrade Package

1. Access the Upgrade Package using ONE of the following processes:
   - Insert the USB drive containing the upgrade package into one the USB ports at the back of the TPC. Open the back cover and reveal the USB ports. Navigate to the **Administrator Setup: Upgrade** window and click the **Upload** button. (**Figure 3-53**). This launches a file selection dialog for you to navigate and select this file. Once complete, the system automatically advances to the **Extraction** window and begins extracting the upgrade package.
   - From an FTP client, enter the projector IP address and enter the user name and password. Once connected, copy the upgrade package from the FTP site to the root folder of the projector. The upgrade package should display in the **Available Upgrade Files** region of the **File Selection** window. (**Figure 3-53**). Select the upgrade package and click the **Next** button to advance to the **Extraction** window. **NOTE**: *After copying several upgrade packages to the root folder, an alarm will occur if the disk space becomes full. Navigate to the root folder and delete the older upgrade packages. Once removed, copy the current upgrade package again.*

2. The **Extraction** window shows the progress of extracting, decrypting, and verifying the files. On any failure, the upgrade process will display an error dialog and then bring you back to the **File Selection** window. On successful extraction of the package, the upgrade process will automatically advance to the **Package Details** window. Once the extraction is complete, you can remove the USB drive.

3. The **Package Details** window shows the versions of all components installed in the projector. (**Figure 3-54**). Select the type of install to perform: **Upgrade Different Components Only, Force Upgrade All,** or **Factory Defaults Install** and click the **Next** button to advance to the **Installation** window.

4. The **Installation** window displays the state of the upgrade progress. (**Figure 3-55**). On successful completion or failure of the installation, a dialog will display indicating the state of the upgrade. Click the **OK** button. At this point, the TPC will reboot in order to install the TPC user interface software. The TPC will shut down, reboot, and display an install progress window as the user interface is installed. Once complete, click the **Finish** button to return to the **Main** panel.

5. Power cycle the projector by turning the breaker off and then on again.

6. Power cycle once more if you have any version mismatch errors.

Upgrade: File Selection Window
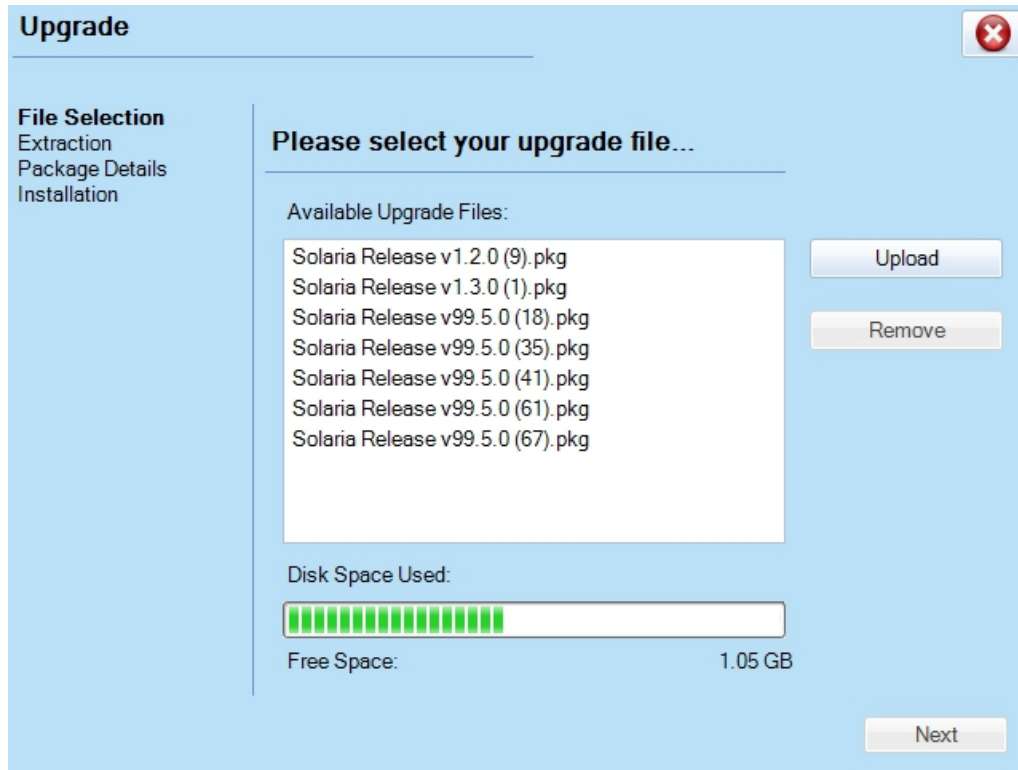
**Figure 3-53  Upgrade: File Selection Window**

**Table 3.36 Upgrade: File Selection Window**

| Control | Description |
|---------|-------------|
| **Available Upgrade Files** | The **Available Upgrade Files** region shows all the available upgrades that are currently residing in the FTP directory of the projector. Upon selecting an upgrade package, the **Remove** and **Next** buttons become active. |
| **Disk Space Used** | Displays a visual representation of the amount of disk space used on the projector. |
| **Free Space** | Displays the amount of available free space on the projector. |
| **Upload** | Click the **Upload** button to launch a file selection dialog which allows you to select a file that does not reside in the FTP directory. This would be used to load a file from a USB drive. |
| **Remove** | Highlight an upgrade file in the **Available Upgrade Files** region and then click the **Remove** button to delete the selected file from the available upgrades list. This button is disabled (greyed) if no upgrade file is selected. |
| **Next** | The **Next** button proceeds with the upgrade process by moving to the **Extraction** window. This button is disabled (greyed) if no upgrade file is selected. |

Upgrade: Package Details Window
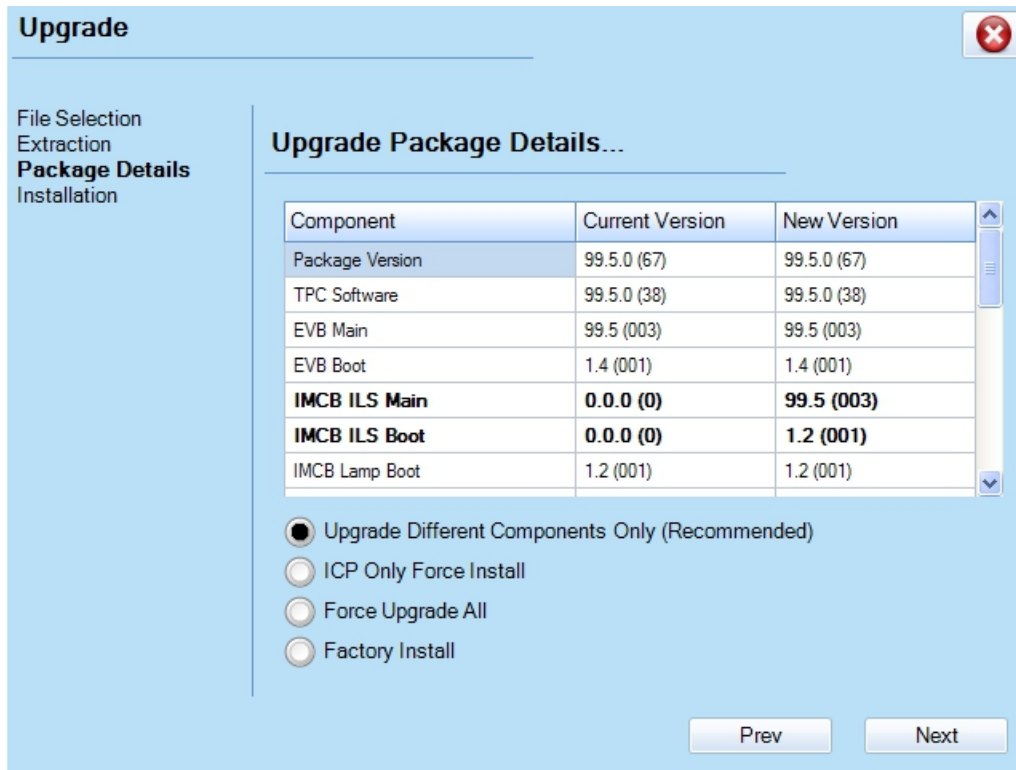
**Figure 3-54 Upgrade: Package Details Window**

**Table 3.37 Upgrade: Package Details Window**

| Control | Description |
|---------|-------------|
| **Grid View** | Displays the available components in the upgrade package. This grid also displays the currently installed version along with the new version found in the upgrade package. If the current version and new version do not match, the row will be bold to indicate what will be upgraded. |
| **Upgrade Different Packages Only** | This selection instructs the upgrade system to only upgrade components that are newer or older than the currently installed version. This is the default and recommended upgrade method. |
| **Force Upgrade All** | This selection instructs the upgrade system to upgrade all components found in the upgrade package. Components with the same version will also be upgraded. |
| **Factory Defaults Install** | This selection instructs the upgrade system to clear all configurations and upgrade all components on the system. This is equivalent to the projector when it's released from the factory. |

Upgrade: Installation Window
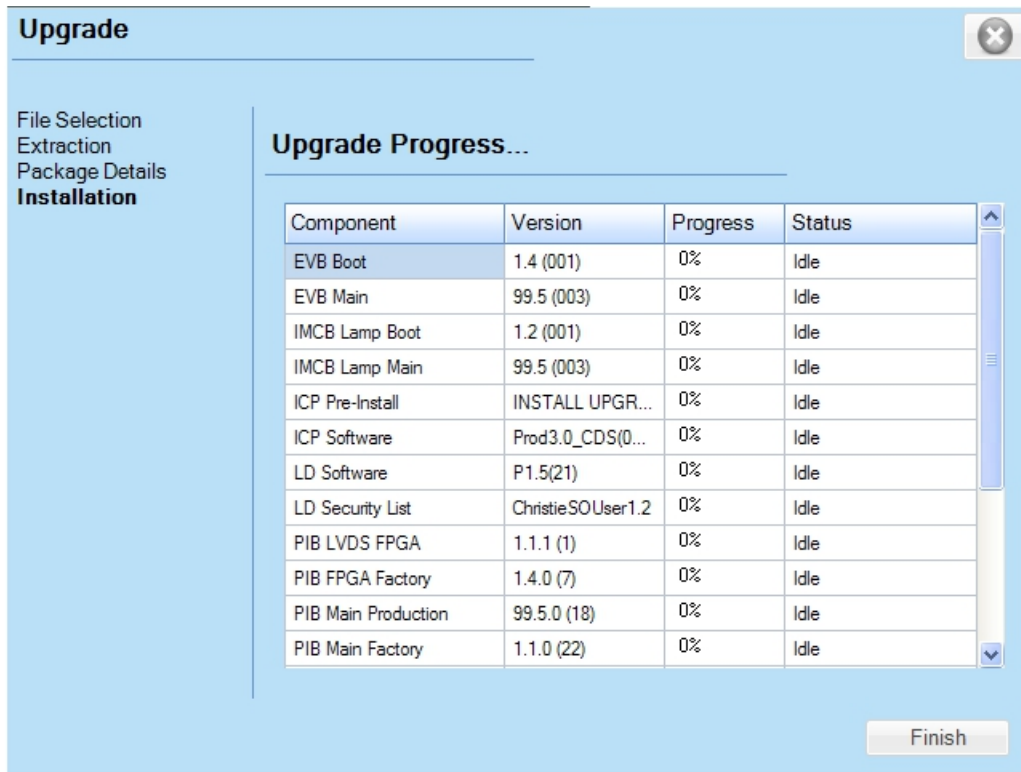


**Figure 3-55 Upgrade: Installation Window**

**Table 3.38 Upgrade: Installation Window**

| Control | Description |
|---------|-------------|
| **Grid View** | Displays the available components that are being upgraded, their versions, the current progress and current status. Current state can be one of the following: idle, transferring, programming, aborted, failed, and done. |
| **Finish** | Once the installation is complete (regardless if the installation was success or not) the **Finish** button becomes enabled. |

## 3.5.10 Service Setup

### Service Setup: File Management Window

The **File Management** window enables the management of system backup and restore of various system settings.

**Configuration -** setup information for lamp, lens, communication settings, etc.

**Channels** - channel information such as channel definitions and selected channel buttons.

**Preferences** - preference information such as preferred test patterns, defined units, etc.

**Users** - a list of users for the projector.
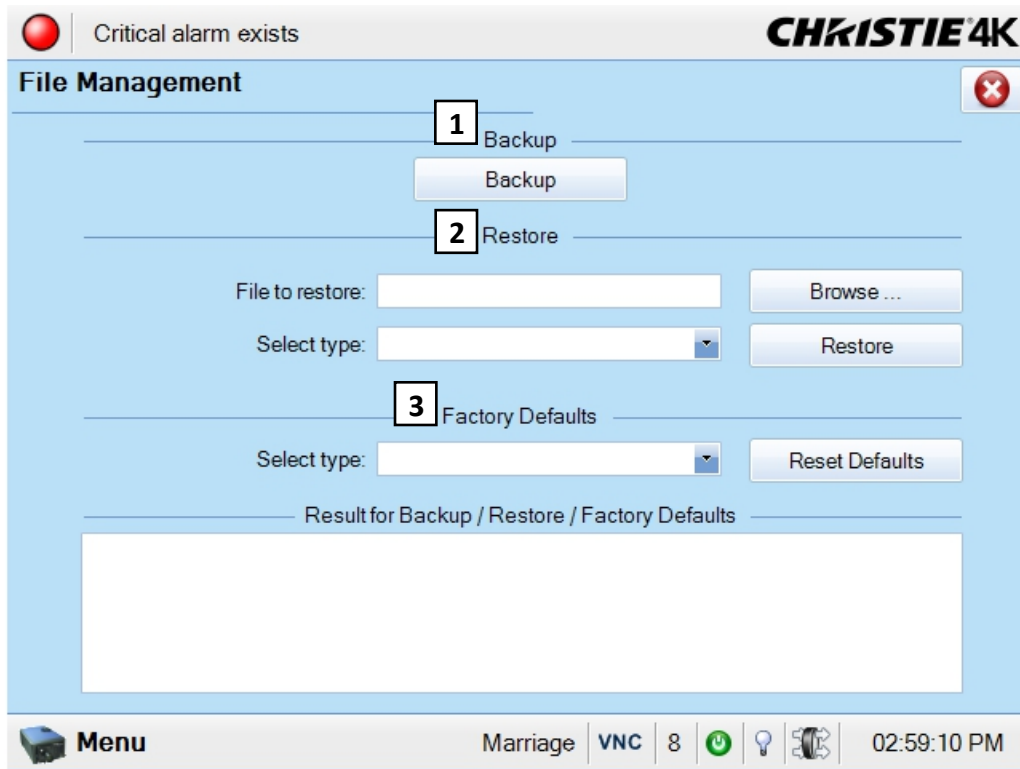
**Figure 3-56 Service Setup: File Management Window**

**Table 3.39 Service Setup: File Management Window**

| Region | Description |
|--------|-------------|
| **1: Backup** | Click the **Backup** button to backup all information (Configuration, Preferences, Channels and Users) and save the password-protected file to a USB drive. **NOTE**: *Ensure to install a USB drive before clicking the Backup button or else the file will be placed in an ftp location for you to retrieve.* |
| **2: Restore** | Restores the backup file to the system. You can select the type of information to restore. See *To Restore Backup Files* below. |
| **3: Factory Defaults** | Resets the configuration, preferences, channels, users, or all information on the projector to the factory default. In the **Select type** list, select the reset type you are restoring (Configuration, Preferences, Channels, Users or All Categories) and then click the **Reset Defaults** button. **NOTE:** *Resetting Users or All Categories* will automatically log out all users that are currently logged into the system. |

**To Restore Backup Files**

1. Click the **Browse** button to launch a file browser.

2. Navigate and select a saved backup file. Once a file is selected, the file path and name will display in the **File to restore** text region.

3. In the **Select type** list, select the file type you are restoring.

4. Click the **Restore** button to restore the saved backup file. There is a 5 - 10 second delay after the restore to allow you to read the status while the TPC prepares for the reboot or log off. **NOTE**: **1)** *Restoring* ***Configuration***, ***Preferences*** *or* ***All Categories*** *reboots the TPC and resets the router back to the factory default, which may generate loss of connection errors in the log files. All users that are currently logged into the system will automatically log out.* **2)** *Restoring Channels results in no special actions. You will remain in the* ***File Management*** *window.*

### Service Setup: Marriage Window

Required permission level - **Marriage**

Marriage is the process of engaging the DCI physical interlocks that enable the display of secured materials. The **Marriage** window begins a series of panels that guides you through the process required to engage the projector's married condition. The left column of the **Marriage** window shows which state you're currently at in the marriage process. (**Figure 3-57**) Click the **Next/Prev** buttons to navigate the series of steps. **NOTE**: *Only Service Technicians can engage the projector's marriage.*

One of the key ideas behind marriage is that an authority figure examines the projector and ensures that it has not been tampered with before a marriage can be performed. This means that a person must be physically at the projector when the marriage is performed. It cannot be done remotely. To ensure an authority figure is present, there is a marriage button on the PI Board panel which must be pressed in order for the marriage process to complete.
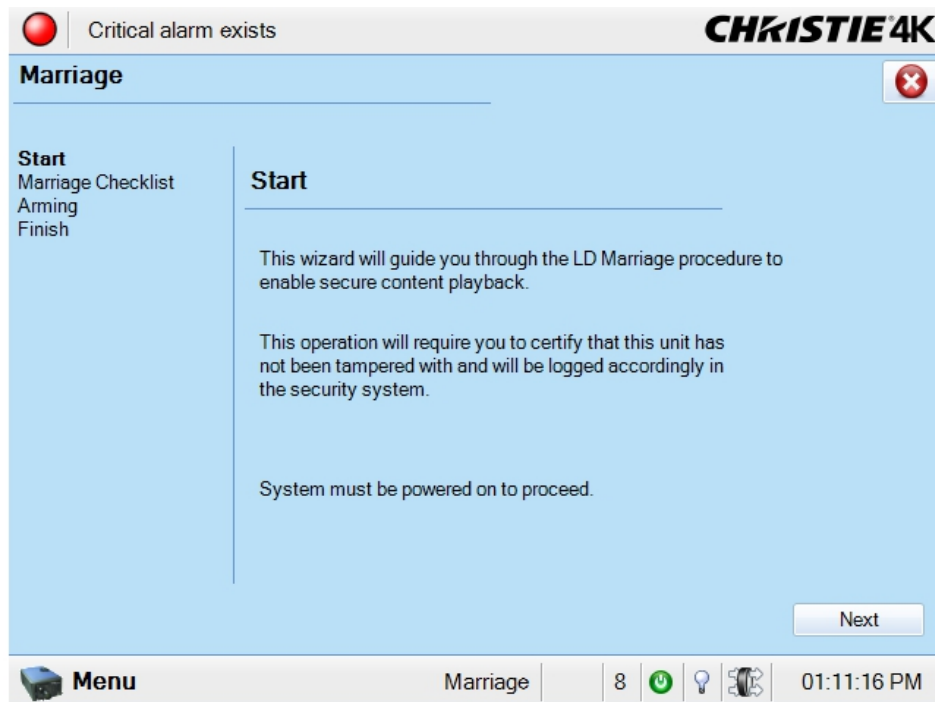


**Figure 3-57 Service Setup: Marriage Start Window**

Steps to Perform Marriage

1.  Ensure the system is in full power mode to proceed, i.e. Power is ON. Click the **Next** button to proceed to the **Marriage Checklist** window. (**Figure 3-57**).
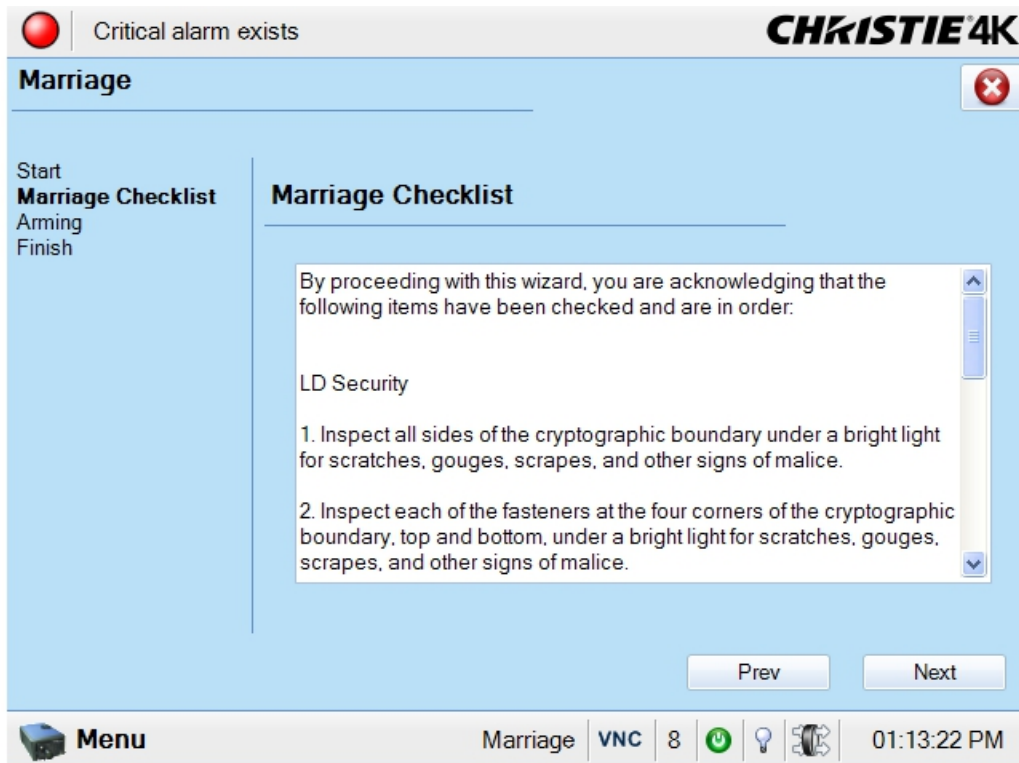


**Figure 3-58 Service Setup: Marriage Checklist Window**

2.  In the **Marriage Checklist** window, the system checks that all tamper switches are secure and lists the items that you must check to ensure the projector is secure before proceeding. Click the **Next** button to proceed to the **Arming** window.

3. In the **Arming** window, click the **Arm Marriage** button. (**Figure 3-59**). A 30 second count-down timer begins. The LED in the **Marriage** button on the PI Board will flash green during this count-down. You MUST press the **Marriage** button on the PI Board within this 30 second window in order for the marriage to take effect. When the **Marriage** button is pressed, the LED button will change to a solid green to indicate a successful marriage.
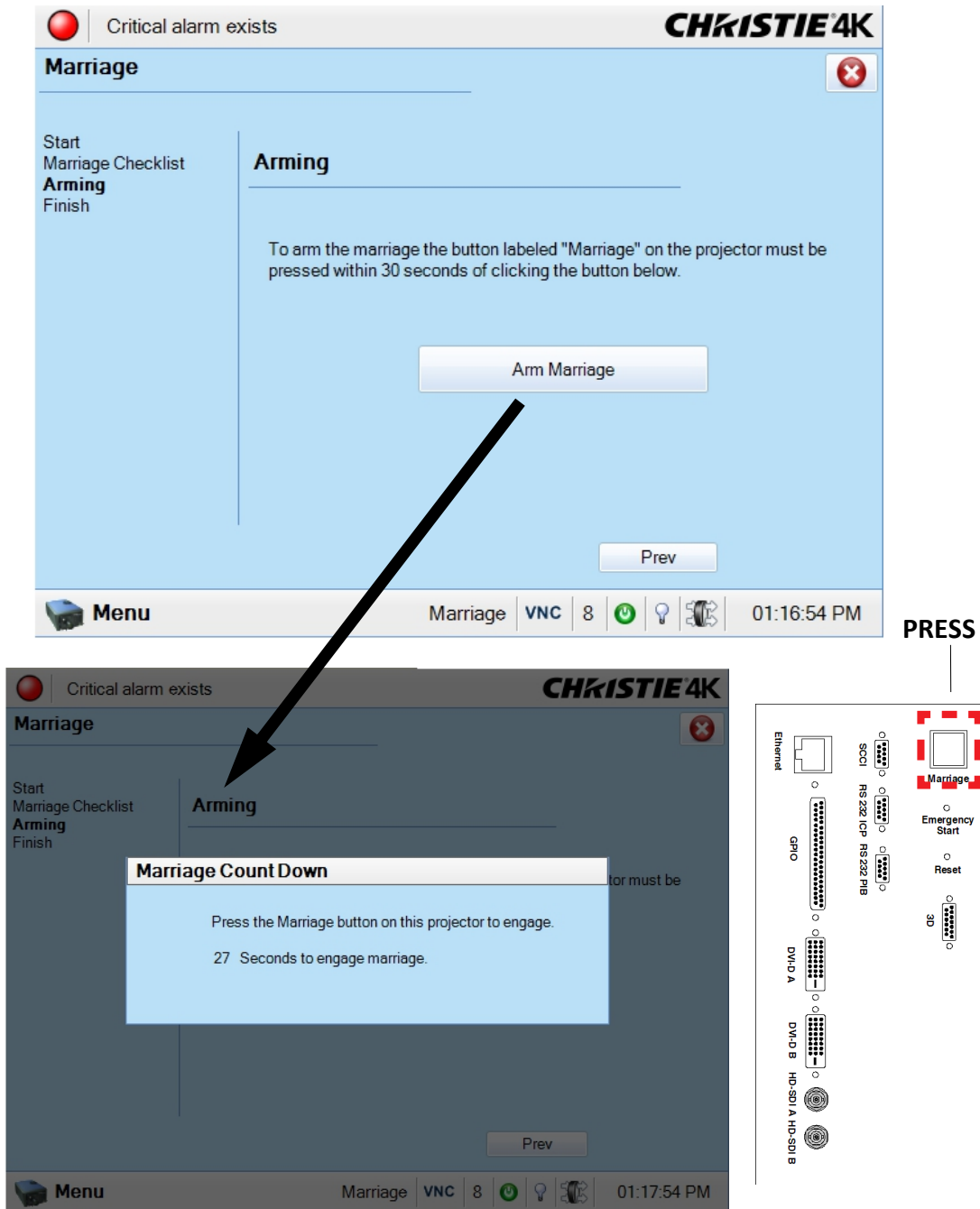


**Figure 3-59 Press the Marriage Button on the PI Board
After Clicking the Arm Marriage Button**

4.  Upon clicking the Marriage button, a confirmation window displays the time remaining for marriage to complete. (**Figure 3-60**)
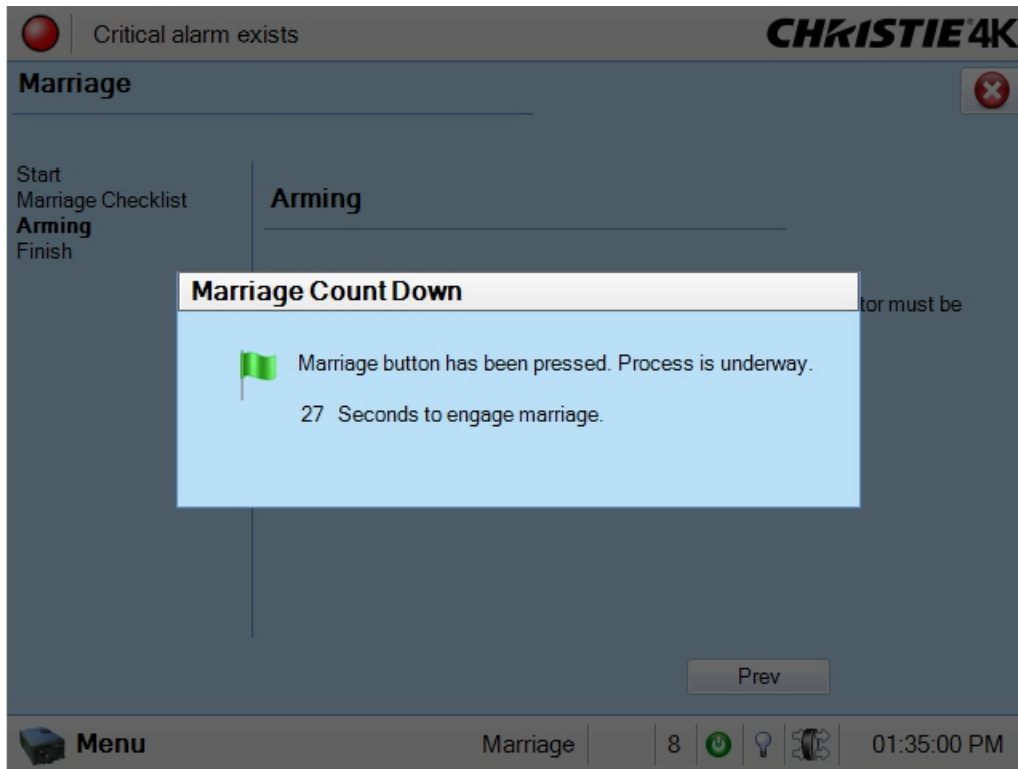


**Figure 3-60**

5.  The Finish window states the success of the marriage. Click the **Finish** button to return to the Main panel.

## Service Setup: System Access Window

The **System Access** window provides access to the Windows operating system of the TPC.
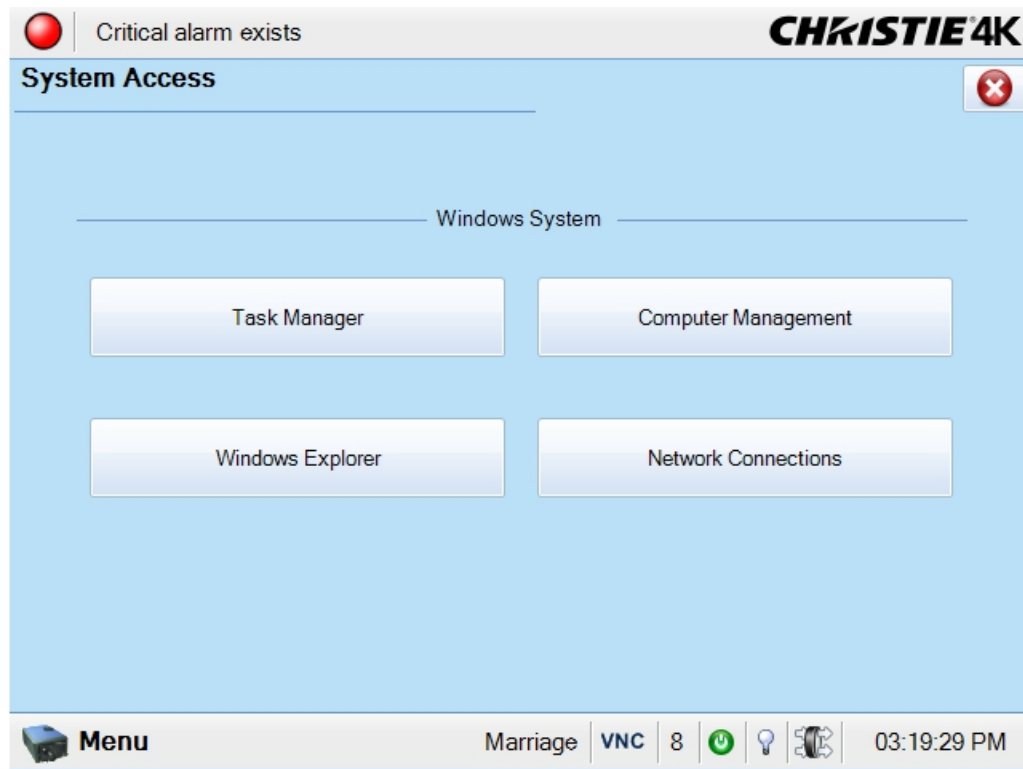


**Figure 3-61  Service Setup: System Access Window**

**Table 3.40 Service Setup: System Access Window**

| Control | Description |
|---------|-------------|
| Task Manager | Click the **Task Manager** button to launch the system's task manager. |
| Computer Management | Click the **Computer Management** button to launch the system's computer management window. |
| Windows Explorer | Click the **Windows Explorer** button to launch Windows Explorer. |
| Network Connections | Click the **Network Connections** button to interact with the system's network connections. |

### Service Setup: IMB Marriage Window

IMB marriage is identical in functionality to LD marriage. For details, refer to *Service Setup: LD Marriage Window, on page 3-70*.
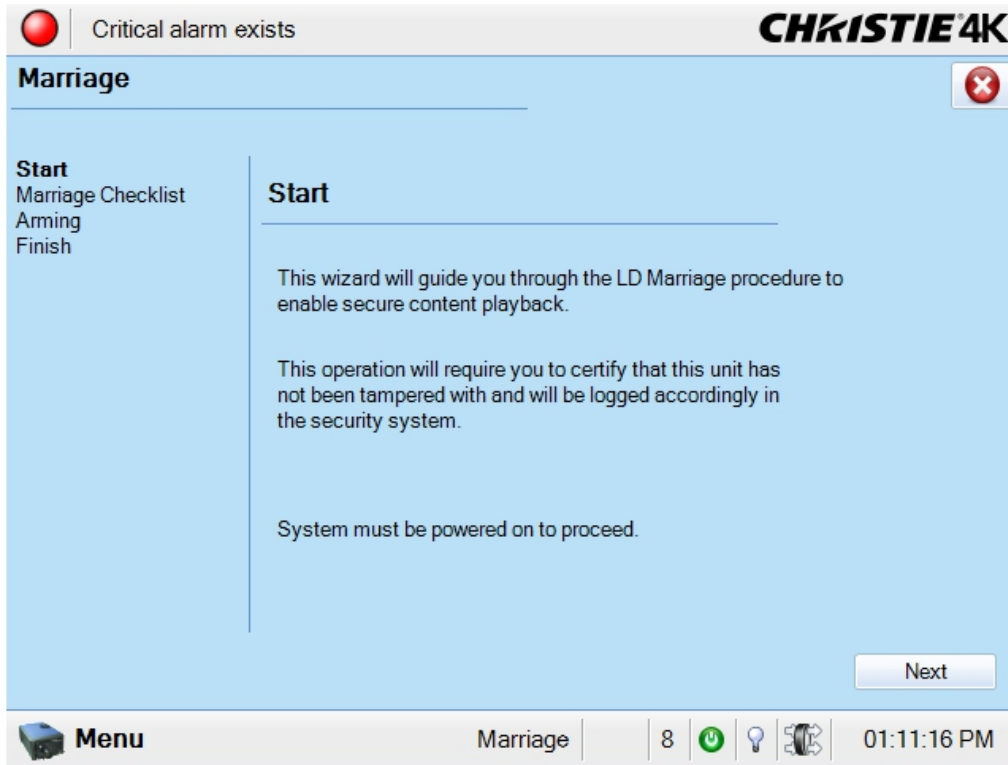


Service Setup: Lamp Power Supply

Required permission level - **Service**

In the Cable Length text box, enter the length of the cable connecting the lamp power supply to the projector, or click the **Launch Dialog** button to enter the value using the on-screen keyboard. This setting is used when the lamp power supply is located outside of the projector.
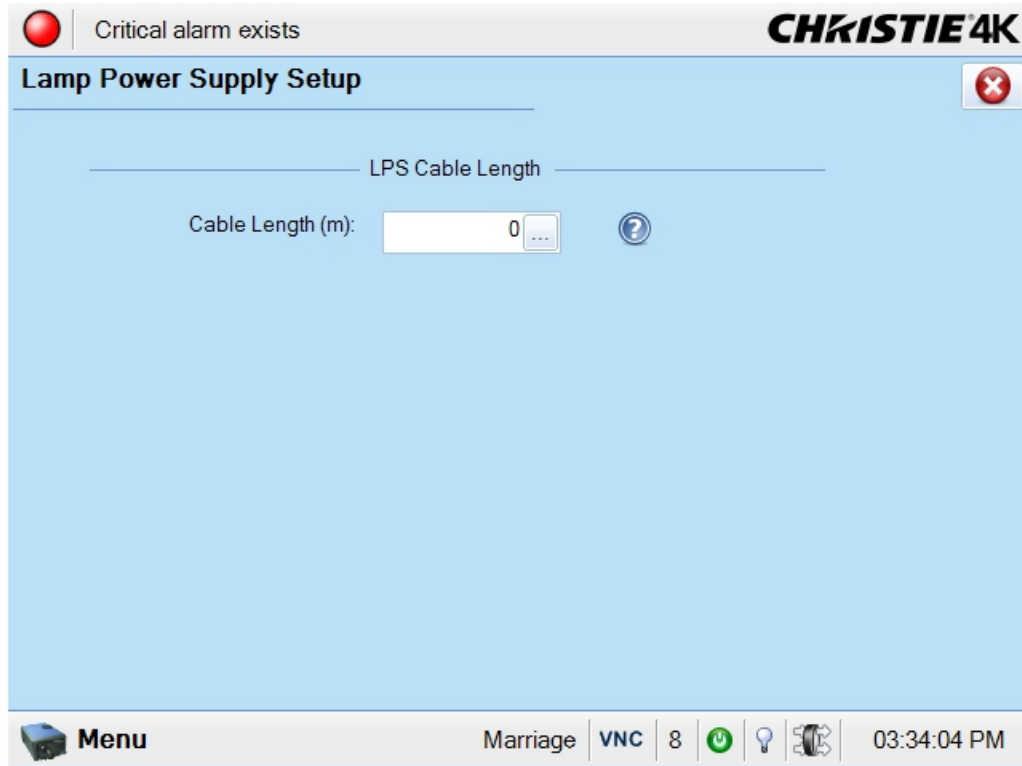


**Figure 3-62 Service Setup: Lamp Power Supply**

## 3.5.11 About Window

The **About** window is a read-only interface that lists important information about the projector such as its serial number, the current software version, DLP version, type of lens installed, and type of lamp installed.

**NOTE:** *The model number will be displayed as CP2230U for an upgraded CP2230 projector and CP4423 will be displayed as the model number if it is an original 4K projector.*
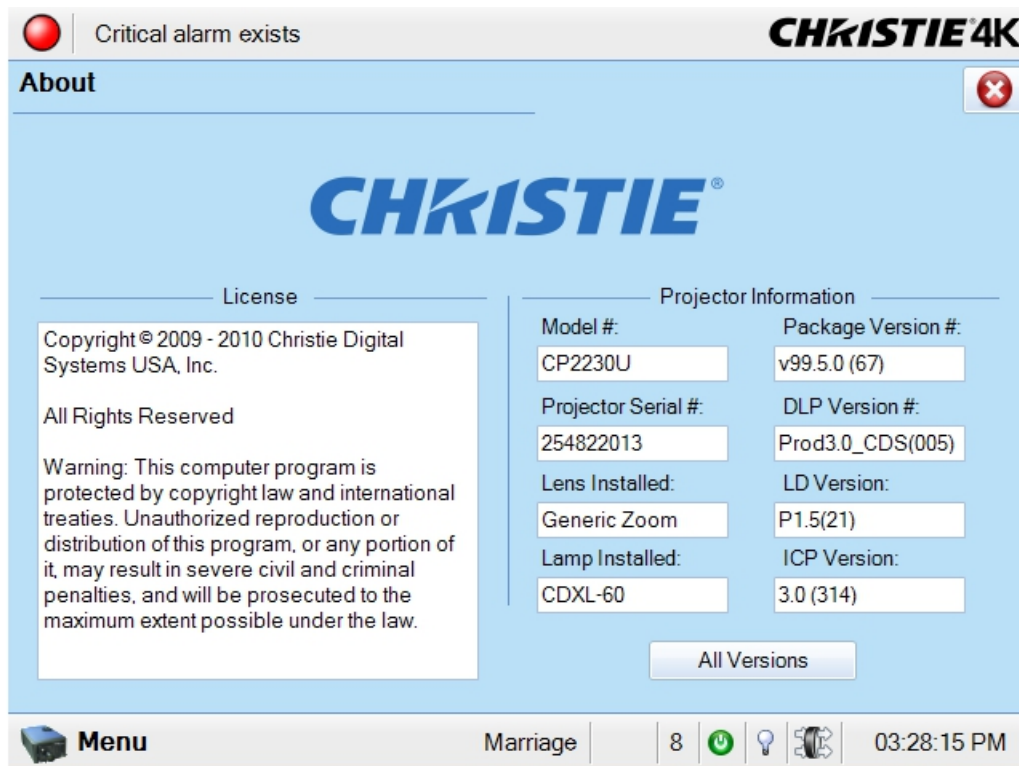


**Figure 3-63 About Window**

## 3.5.12 Help Window

The **Help** window provides on-line information for every window in the TPC. Navigating the help system is done using the table of contents in the left column of the window. (**Figure 3-64**). The table of contents is structured similarly to the menus available from the **Menu** button where content is organized in sections shown with a book icon next to it ( Advanced Setup ). Double-click the title to expand the book and reveal the help pages. Double-click the expanded title to collapse the section. Help pages are recognized by an icon of a page with a question mark in the center of it ( Main Panel ). Click the help page to display the information in the right column of the window.
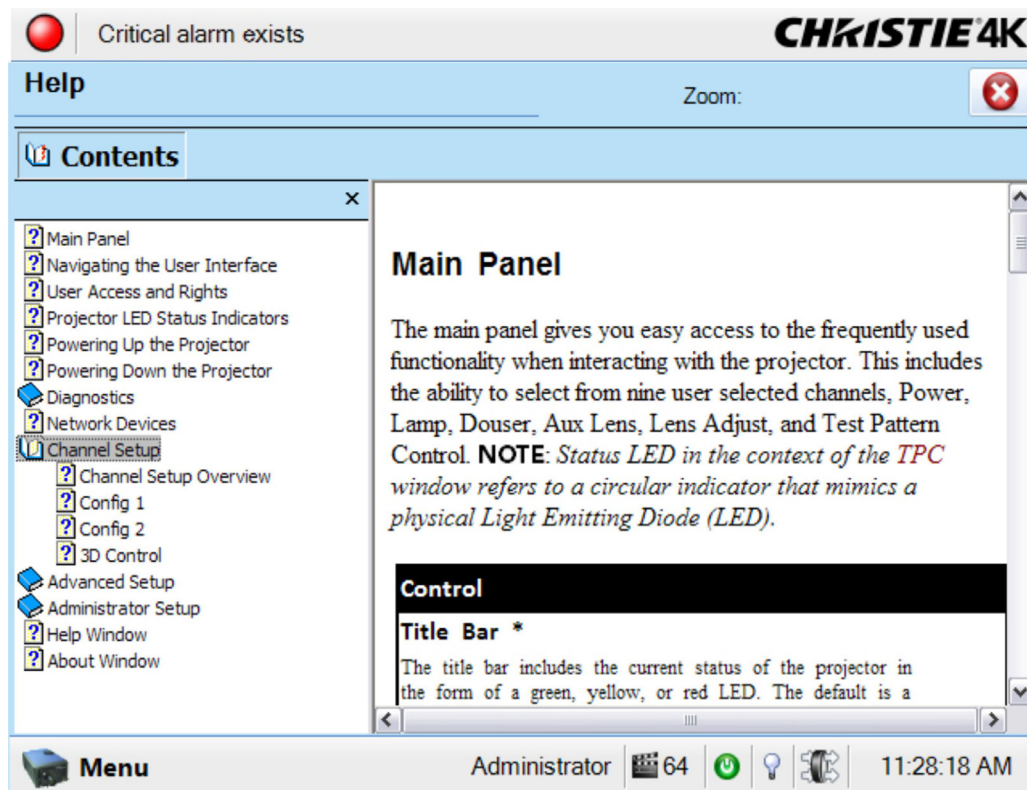
**Figure 3-64 Help Window**

## 3.6 Working with the Lamp

Simple software controls and adjustments can help to optimize lamp performance and ensure the brightest, most uniform image possible for the life of the lamp. These controls are located in the *Advanced Setup: Lamp Power / LiteLOC™ Setup Window, on page 3-29,* and the *Administrator Setup: Foot Lamberts Calibration Window, on page 3-59.*

This is a manual power-up procedure. Some cinema installations may include an automation system that controls lamp ignition in conjunction with other theatre variables such as house lights, audio and the start of the feature from a digital media storage device/server. **Warning!** *Do not attempt operation if the AC supply is not within the specified voltage range.* **NOTE**: *All primary controls on the **Main** panel of the TPC require a positive and deliberate hold time of approx. 1/4 second to activate. A short tap will be ignored.*

### 3.6.1 Turning the Lamp ON

1. Ensure the projector's wall circuit breaker is ON.

2. On the TPC, click and hold the **POWER ON** button for 1/4 second to fully power up the projector. This takes just under a minute to power ON the projector. **NOTE**: *If the **LAMP ON** button is selected while the projector is still in Standby mode, the power will be turned ON before the lamp.*

3. On the TPC, click and hold the **LAMP ON** button for 1/4 second to ignite the lamp. (**Figure 3-65**).
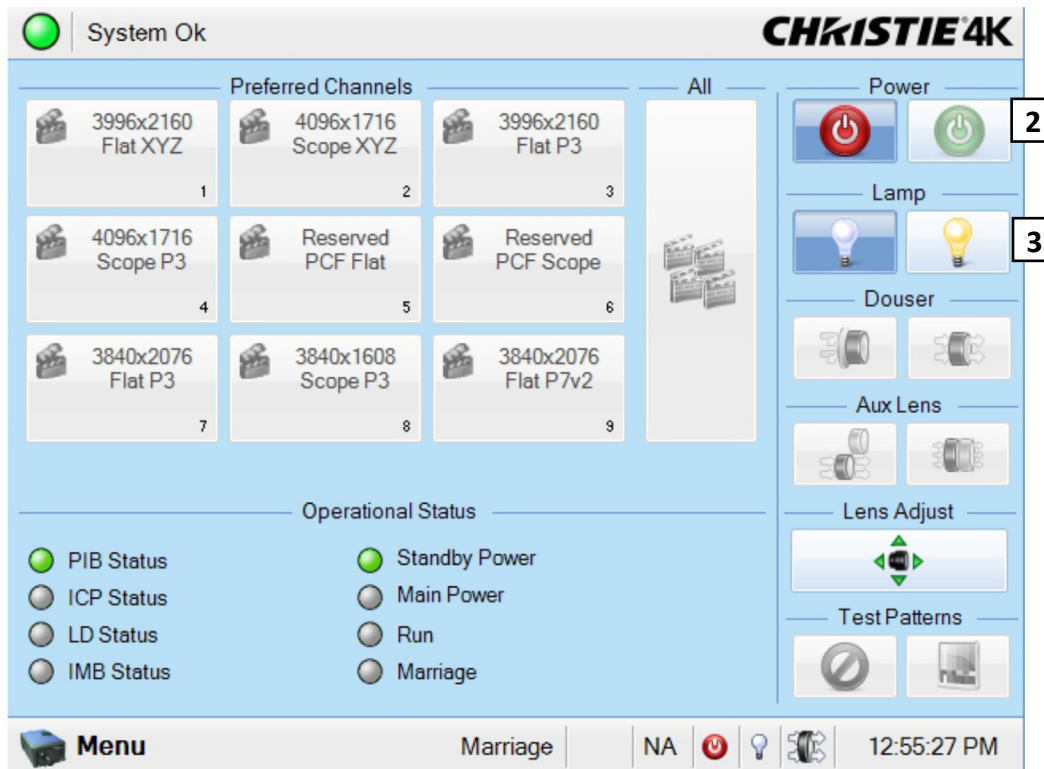
**Figure 3-65 Steps to Turn the Lamp ON**

### If the Lamp Fails to Ignite

- If a safety interlock switch is open (i.e., lamp door is open), the status LED located in the top, left corner of the TPC will illuminate solid red, and the lamp cannot be struck until the interlock problem is resolved.

- If the lamp fails to ignite even though the interlock system is ok, the projector will automatically re-try ignition using 100% of the maximum power acceptable for the installed lamp. If this re-try fails, the lamp file may be incorrect or missing. Verify the lamp file type in the **Advanced Setup: Lamp History** window. Finally, if the lamp type is correct and the re-try still fails, a new lamp is likely required. The power reverts back to what was originally defined in the **Advanced Setup: Lamp Power/LiteLOC™ Setup** window.

- Check the Ballast Voltage switch.

### If there is a Power Failure:

If your projector has been configured with a Uninterruptable Power Supply (UPS) and there is a power failure, simply click the lamp ON using the TPC once the power has been restored to continue operation. For more information, see *Section 2 Installation and Setup*.

## 3.6.2 Turning the Lamp OFF

1. On the TPC, click and hold the **LAMP OFF** button for 1/4 second. **NOTES***: **1)** The projector is still in "power on" mode, which allows for a fast lamp on response, if needed. **2)** If you are turning off the power (going to Stand-by mode), there is no need to click the **LAMP OFF** button first. You can simply click the **POWER OFF** button for the projector to turn the Lamp OFF and go into cool down mode.*

2. On the TPC, click and hold the **POWER OFF** button for 1/4 second. The lamp will power off first and then the projector automatically enters a cool down mode where the fans and electronics stay on for 10

minutes. After this cool down period, the projector enters standby mode where all fans and most electronics will power down.

3.  If you will be servicing or removing any projector cover, disconnect AC and turn the breaker OFF.

## 3.6.3 Adjusting Lamp Power

There are two different lamp modes for general operation - maintain a specific brightness level (LiteLOC™) or specify a user defined lamp power level. **NOTES: 1)** *Adjusting the lamp power requires Advanced user permissions or greater.* **2)** *Keep in mind the formula: **Current (Amperes) x Voltage (Volts) = Lamp Power (Watts)** when adjusting the power level.*

### Using LiteLOC™

Maintain a specific brightness level from your lamp over time as follows:

1.  In the **Advanced Setup: Lamp Power/LiteLOC™ Setup** window, adjust the **Power %** until the desired light output is reached at the screen (typically 14 fL). Adjusting the Power % is done by clicking the **up/down** arrow buttons to increase/decrease the current value, or click the **Launch Dialog** button to the right of the text region and enter the new value in the on-screen keyboard. Click the **Enter** button when finished. Any LiteLOC™ setting will automatically be disabled. (**Figure 3-66**)

2.  Click the **Set Target** button to record the current brightness reading in memory. **NOTE:** *Arbitrary units-of-measure are shown above the light output bar in the **Intensity** column.*

3.  Select the **Enable LiteLOC™** check box. As the lamp ages and loses efficiency, the projector gradually and automatically supplies more current to the lamp as necessary to maintain your chosen level of light output for as long as possible (the light level is read from an internal light sensor). To change your LiteLOC™ setting, adjust the Lamp Power % as desired and then click the **Set Target** button. The LiteLOC™ function automatically begins to maintain this new setting. (**Figure 3-66**).
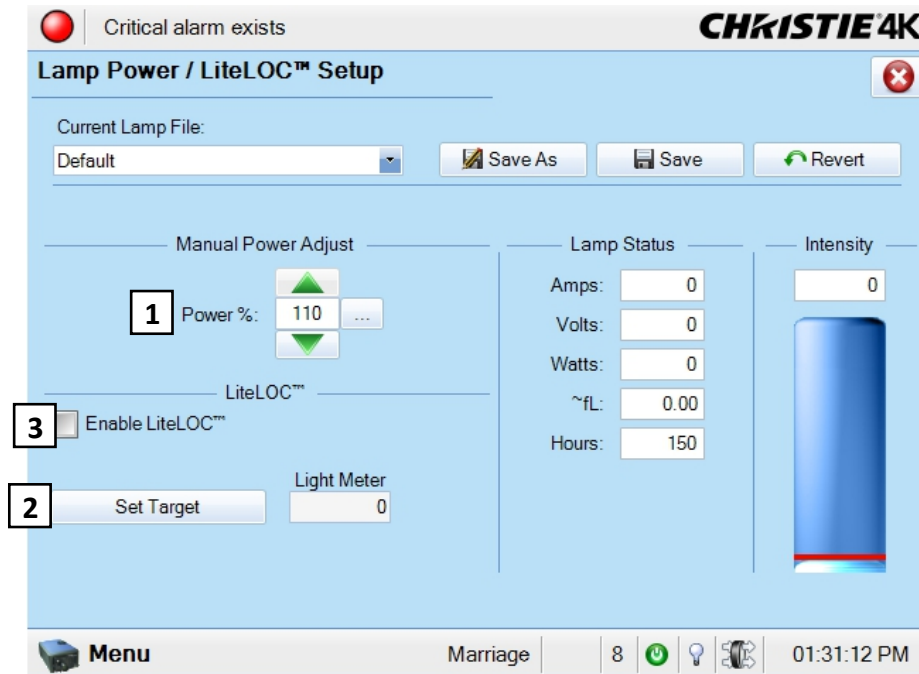
**Figure 3-66 Enable LiteLOC™**

**When should I use LiteLOC™?**

Typically, most theatre installations would use LiteLOC™ for daily operation, since it need only be set once for each lamp install and ensures consistent worry-free brightness at the screen for as long as possible. If desired, reset LiteLOC™ to a different level at any time or override with a specific lamp power setting.

**How long can I maintain brightness?**

Software can maintain a LiteLOC™ setting until the required power exceeds the maximum rating for the lamp (2.0, 3.0, 4.5 or 6.0 kW) by approximately 10%. The lower your LiteLOC™ setting, the longer it takes to reach this "over-drive" threshold and the longer you can maintain the desired brightness. For example, a 6000 watt lamp (6.0 kW) can be safely driven at no more than 6600 watts. To produce 14 fL at the screen, a new lamp would likely need less than this maximum rating-perhaps 5120 watts (example only). Over time, however, the lamp will require more and more current in order to produce the 14 fL, until eventually the lamp wattage reaches its 6600 overdriven maximum, and the power to it automatically levels off. At this point, the LiteLOC™ function terminates (i.e. the power level stabilizes), the lamp will begin to dim normally with age, and the light output gauge will begin falling. Either reduce your LiteLOC™ setting or replace the lamp.

**Using Lamp Power**

To change to a different power level, simply enter a new Lamp Power percentage at any time. This will override (and temporarily disable) any LiteLOC™ setting that may be in effect:

1.  Set **Lamp Power** to apply a specific percentage of power appropriate for the installed lamp. LiteLOC™ will automatically be disabled.

2.  Brightness will change accordingly, new values will appear for amps, volts and watts, and the blue light output bar graph will move above or below the LiteLOC™ line, depending on the new setting.

As the lamp ages and becomes more inefficient, your chosen power level will gradually produce less and less light output. To return to the previous LiteLOC™ setting, select the **Enable LiteLOC™** checkbox.

**NOTE:** *When re-enabling LiteLOC™ from a current brightness level that is more than 10% brighter or dimmer than the LiteLOC™ setting, the recovery will be immediate. When re-enabling LiteLOC™ from a brightness setting that differs by only 10% or less, the recovery will be gradual.*

### Understanding Lamp Power Values (%)

The **Lamp Power %** region accepts values from 50-110, which represents the power appropriate for the installed lamp. In other words, you can apply anywhere from 50% of the maximum power intended for the installed lamp up to an over-drive that exceeds the maximum rating by approximately 10%. Both current (amps) and power (watts) thresholds are read.

Keep in mind that higher lamp power settings do shorten lamp life-for best results, avoid over-driving a lamp for extended periods. When using LiteLOC™ (which automatically increases lamp power over time), check the Status menu lamp power readings periodically as the lamp ages, to prevent prolonged over-driving.

## 3.6.4 Adjusting Lamp Position (LampLOC™)

To ensure optimal lamp performance and peak brightness at the screen for the life of the lamp, activate LampLOC™ by clicking the **Do Auto** button in the **Advanced Setup: LampLOC™ Setup** window to adjust the lamp position whenever a new lamp is installed in the projector. Once LampLOC™ adjustment is complete, the lamp will be well-centered and distanced correctly from the remainder of the illumination system. **NOTE:** *You can adjust lamp position either before or after adjustment of Lamp Power % or LiteLOC™.*

Before adjusting LampLOC™, ensure the following criteria are met:
- The lamp is installed with the anode yoke in the correct location for the lamp type.
- The lamp must be ON and the douser (shutter) OPEN during adjustment. A 10-minute warm-up is recommended. Ensure to follow all the criteria specified in *3.1.1 Powering Up the Projector, on page 3-1*.
- Perform a white test pattern. This is recommended to allow you to view LampLOC™ progress on-screen.

### Automatically Adjusting the Lamp Position Using LampLOC™

For best results in all installations, perform a LampLOC™ adjustment. This activates a set of motors and sensors in the projector to precisely position the lamp for optimized performance and brightness, while utilizing filtering to eliminate signs of lamp flicker. Once aligned, this LampLOC™ setting can be considered fairly stable for the life of the lamp.

To automatically adjust LampLOC™, do the following:

1. Navigate to the **Advanced Setup: LampLOC™ Setup** window. (**Figure 3-67**)

2. Click the **Do Auto** button.

3. Let a few minutes pass to allow the LampLOC™ mechanism to establish the best lamp position and optimize the light output. You will see 100% displayed on the screen when the operation is complete. **TIP***: You can improve on-screen uniformity after running LampLOC™ by manually adjusting the z-axis motor. However, brightness efficiency will be decreased by a very small amount when this is done.*

For more details, refer to the *Advanced Setup: LampLOC™ Setup Window, on page 3-35.*
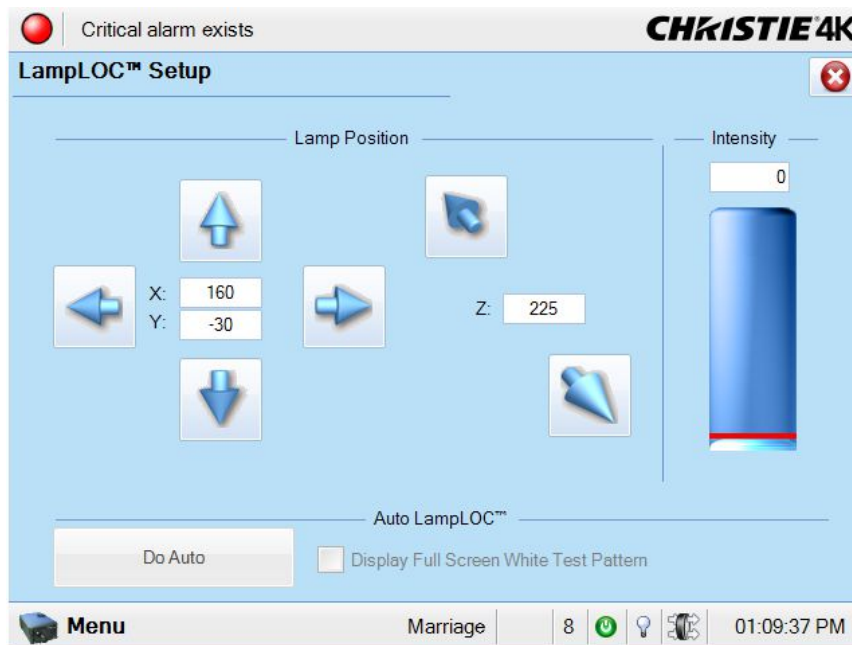
**Figure 3-67 Adjust Lamp Position**

**Manually Adjusting the Lamp Position**

The individual XYZ lamp position buttons, each of which moves the lamp in one axis only, are provided as a reassuring back-up should the **Do Auto** button fail, or if you feel the manual, operator-assisted lamp optimization results in greater output or improved brightness uniformity. Either measure your results with a light meter at the lens and screen or simply watch the light output gauge in the Intensity column of the **Advanced Setup: LampLOC™ Setup** window. **NOTE:** *These buttons may attain a slightly higher peak than the* **Do Auto** *button, but the peak may not be centered on the lamp curve and lamp performance may not be optimized. Also, the* **Do Auto** *button utilizes filtering to eliminate the effects of any lamp flicker. In general, use the individual buttons only when you feel it is unavoidable.*

Obtain peak readings on a light meter centered in front of the lens and then at the center of the screen. For each button, continue in one direction and then back up or reverse when the reading begins to decrease. **NOTES: 1)** *This is an optional procedure—use the light output gauge in the* **Advanced Setup: LampLOC™ Setup** *window if preferred.* **2)** *After performing LampLOC™ (***Do Auto***), brightness uniformity may also be improved on some lamps by manually adjusting the z-axis motor control. In some instances, this may cause a reduction in overall brightness.*

1.  Display a 100% white internal test pattern.

2.  Use a tripod to center the light meter with the lens. The distance from the lens does not matter. You may need an attenuator or wish to construct an internal foil aperture first.

3.  Adjust forward/aft (Z) until the brightness reading in front of the lens is maximized.

4.  Adjust left/right (X) and up/down (Y) until the brightness reading in front of the lens is maximized.

5.  Repeat Steps 3-4 as necessary.

6.  Repeat Steps 3-5, but reading at the screen instead of at the lens.

7.  Reset Lamp Power or LiteLOC™ if desired in the **Advanced Setup: Lamp Power / LiteLOC™ Setup** window. For more information, refer to the *Advanced Setup: LampLOC™ Setup Window, on page 3-35*

### 3.6.5 Calibrating Screen Brightness (fL)

In order to determine the screen brightness in footlamberts (fL), you must measure the screen brightness at both extremes of the lamp power (minimum and maximum) for a given lamp type and record these two readings using the **Foot Lamberts Calibration** window at **Administrator Setup: Foot Lamberts Calibration**. Refer to the *Administrator Setup: Foot Lamberts Calibration Window, on page 3-59*. These measurements establish a range (stored in memory) from which the projector can interpolate all other lamp power settings by converting them to approximate footlamberts for display in the appropriate TPC windows. Repeat the calibration if you switch to a different lamp type/size.

### 3.6.6 Age of a Lamp

#### When to Replace a Lamp

When a new lamp is installed and its serial number recorded, the lamp timer defaults to "0" and begins logging time for the new lamp. If installing a used lamp, enter the number of hours when adding the lamp for the timer to begin logging at the time specified. When replacing the lamp, be sure to specify the lamp expiry hours. For all lamp information and the ability to replace a lamp, navigate to the **Advanced Setup: Lamp History** window.

Assuming the **Lamp Expiry** check box is selected in the **Administrator Setup: Preferences** window (recommended), an expiry message will appear as an alarm window when the lamp has reached its defined **Lamp Expiry** limit and should be replaced. For details on replacing a lamp, refer to the *4.2.6 Lamp Replacement, on page 4-6*. **DANGER! 1)** *It is recommended that you set Lamp Expiry based on the average lifetime of the lamp, as older lamps become increasingly fragile and more prone to sudden failure or even explosion, which can be damaging and dangerous.* **2)** *Lamp replacement must be performed by qualified service technicians only.* These maximum limits appear in the table below:

**Table 3.41 Lamp Expiry Hours**

| Lamp Type | Replace BEFORE |
|---|---|
| CDXL-20 (2.0 kW) | 3500 hours |
| CDXL-30 (3.0 kW) | 2500 hours |
| CDXL-45 (4.5 kW) | 900 hours |
| CDXL-60 (6.0 kW) | 1000 hours |
| CDXL-60SD (6.5kW/7.0 kW) | 700 hours at 6.5kW<br>350 hours at 7 kW |

#### Lamp Rotation

When the lamp reaches mid-life, a Lamp Rotation message may appear as an alarm window to indicate the bulb should be physically rotated 180° to ensure an even burn of the lamp. For the alarm window to display, ensure the **Lamp Rotation** check box is selected in the **Administrator Setup: Preferences** window. Rotating the lamp improves its performance and life expectancy. Lamp rotation requires the same safety precautions as lamp replacement and must be performed by a qualified service technician only. For details on rotating a lamp, refer to *4.2.7 Rotating the Lamp, on page 4-9*. Follow these steps and rotate the lamp 180° after loosening the cathode and anode lamp connectors.

You must acknowledge that the lamp rotation has taken place by clicking the **Acknowledge Lamp Rotation** button on the **Advanced Setup: Lamp History** window before beginning normal operation again.

**Maintaining Foot Lamberts**

Over time, as the theatre screen ages and dust and dirt collects on the port window, the theatre may no longer be achieving the expected foot lamberts as reported. It is a good idea to periodically recalibrate foot lamberts. For more information, refer to the *Administrator Setup: Foot Lamberts Calibration Window, on page 3-59*.

# 3.7    Working with the Lenses

The Intelligent Lens System (ILS) automates the process of adjusting the focus, offset and zoom in real-time. For more information, refer to *Appendix A: Intelligent Lens System*. Refer to *2.8 Basic Image Alignment, on page 2-22* for all lens installation and boresight instruction.
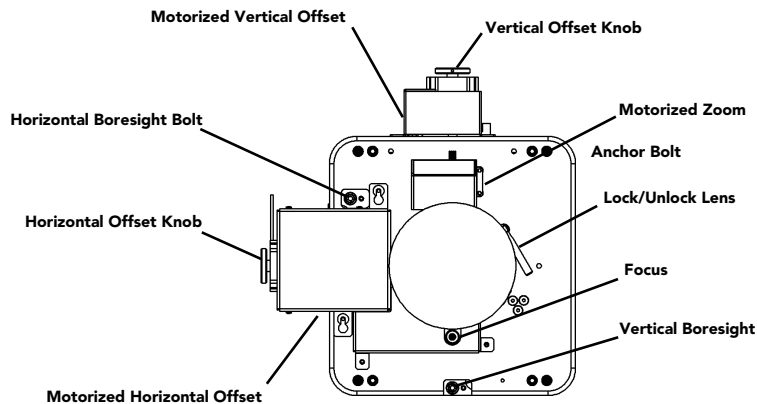
**Figure 3-68 Motorized Lens Mount**

An anamorphic lens (1.25x) can be installed into the auxiliary lens mount, then swung into place in front of the primary lens to widen a "squeezed" image into a properly proportioned "scope" anamorphic cinema display. It is typically used in theatres having side masks that are retracted for "scope" images, or in theatres having fixed side masking but a very short throw ratio.

## 3.7.1    Lens Mount Functions

### Zoom

With the projector in its permanent location, turn the lens zoom ring on the primary lens to enlarge or shrink the image in each direction as necessary.

### Focus

For overall focus improvements.

### Offsets

Adjust the horizontal offset and/or vertical offset as necessary to keep the image square on the screen. For best results, avoid extreme tilts or offsets. Corner vignettes on a white test pattern indicates extreme offset that should be avoided.

If you need more vertical offset range, you can mechanically adjust tilt to help compensate for significant differences in screen and lens height. Refer to *STEP 6 - Install Lenses* in *2.4 Installation Instructions, on page 2-2*

## 3.8 Working with 3D

A single projector can display 3D images as described below. Such images require a 3D-capable source as well as additional hardware and cabling to correctly display and interpret the signal in a typical stereo 3D viewing environment. Images generated from a 3D-cinema source consist of a series of images (frames or fields) that alternate quickly between two slightly different viewpoints corresponding to the physical separation of our left and right eyes (called parallax). When these frames are displayed with enough speed and viewed with special glasses synchronized with the left/right (L/R) frame sequencing, the resulting "single" perceived image appears with much the same depth and perspective we sense in the real world. The full resolution triple flash hardware (Brilliant3D) allows for full 2K per eye resolution using a 6:2 frame rate multiplication (Triple Flash). Triple Flash 3D is referenced to a frame rate that is of a high enough frequency to eliminate flicker as noticeable by the eye. The standard frame rate for most 2D D-Cinema content is 24 frames per second (FPS) as it is for film. For 3D, the server splits the 3D content (video signal) into 2 interleaved signals of 24 FPS each by the server, for a total of 48 FPS input into the projector. The projector's frame rate multiplication is set to 6:2, meaning the input frame rate is multiplied by 3 (Triple) for a total frame rate of 144 frames per second (Hz or FPS).

After connecting signals to the projector, use the **Channel Setup: 3D Control** window to define and control the signal processing, synchronizing the output for devices used in your stereographic 3D display. Refer to the *Channel Setup: 3D Control Window, on page 3-25*. These settings ensure critical ordering and timing of the incoming left/right frames so they merge correctly into a convincing artifact-free 3D display without cross-talk, ghosting or other artifacts.

### 3.8.1 Hardware Requirements for 3D Cinema Setups

To display 3D, the CP4230 requires a 3D capable SMPTE source and a few special hardware / software setups as described below:

• CP4230 projector
• If an external digital media server is installed there are two HD-SDI cinema signals (left and right) that are connected to the projector's SMPTE ports **HD-SDI A** and **HD-SDI B**. **NOTE:** *Use of a single input consisting of both left and right data is not currently supported for digital cinema sources.*
• If an IMB is installed it will have its own 3D mode capabilities.
• One of the 3D Hardware Systems:
    1. Pi-Cell polarizer for display on a screen that has a silver polarization-preserving surface for use with passive glasses (RealD).
    2. Rotating polarizing wheel (external) with passive circular polarizing glasses (MasterImage). Requires a silver screen
    3. IR emitter for controlling the left eye/right eye gating (switching) of active glasses (Xpand).
    4. Filter Wheel for controlling the spectrum of light for use with passive glasses (Dolby).
    5. Dual projector 3D - passive glasses (circular or linear). Requires a silver screen
• One of the following custom 3D mode output signal:
    • 3D sync output cable (GPIO) such as available from RealD:

- For routing the projector's output sync to your sync output device (connect from the projector's GPIO to the emitter, filter wheel controller or polarizer). **NOTE***: The GPIO connector can be accessed from the right side of the projector. Refer to* Appendix D: GPIO Port *for GPIO information.*
    - 3D connector accessed from the right side of the projector.
- Power supply for your sync output device, typically wired with the custom GPIO cable.
- Proper 3D configuration defined in the TPC. Use an internal test pattern for best results.

### 3.8.2 Hardware Setup

Refer to the illustrations provided for the general hardware configuration supported. Use either an IR emitter to control gating in active glasses, a polarizing Z-screen (Pi-cell) with passive glasses or filter wheel with passive glasses.

**NOTE:** For 4K content see third party IMB manual for connection.
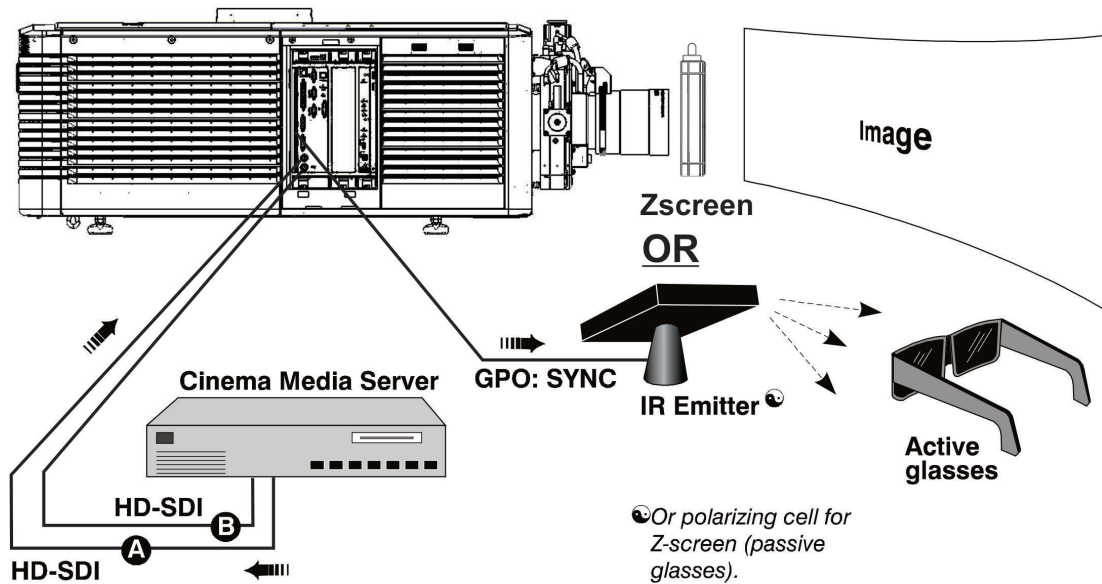


**Figure 3-69 3D Hardware Setup**

**Table 3.42 3D Hardware Systems**

|  | RealD Z-screen | RealD XL Box | Dolby Filter Wheel | Xpand | Master Image | Dual Projector |
|---|---|---|---|---|---|---|
| **Installed/ Mounted Components** | Z-screen mounted in front of the projection lens | XL box mounted in front of the projection lens | Installed filter wheel inside the projector | None | Installed wheel in front of the projector | Polarizing plates in front of lenses |
| **Silver Screen** | Yes | Yes | No | No | Yes | Yes |
| **3D Glasses** | Polarizing circular glasses | Polarizing circular glasses | Color filter glasses | Active glasses | Circular polarized glasses | Polarizing circular or linear glasses |

### 3.8.3 Installation for 3D Servers with YCxCz Interface

#### Procedure Overview

1. Install the 3D system components on the projector following the appropriate installation instructions.

2. Configure lamp brightness for 3D content by editing the **Default 3D** lamp file and select this file for all 3D channels.

3. Measure the color gamut with an appropriate color meter. Create a new measured color file, **Onsite 3D**, for use with 3D formats. Select this color file in all 3D channels.

4. Edit the channel values for your theatre. The predefined 3D Channels are named: **3D Flat 3996x2160** and **3D Scope 4096x1716**.

5. Run appropriate system test patterns to verify the performance of the new 3D channel formats.

6. Run 3D content to verify correct left and right eye data.

### Lamp Instructions

The **Default 3D** lamp file in the **Advanced Setup: Lamp Power / LiteLOC™ Setup** window needs to be edited for 3D your configuration. Set the lamp power to the required Power % and then save the **Default 3D** lamp file. For information on editing the **Default 3D** Lamp File, refer to *3.6.3 Adjusting Lamp Power, on page 3-79*.

### Measured Color Gamut Data (MCGD) Instructions

An MCGD file needs to be defined for 3D configurations. MCGD readings MUST be taken with the 3D system in place and 3D glasses held in front of the light meter to define the new x and y color coordinates for Red, Green, Blue, and White. The light path must be the same as it will be for the viewers. For information on defining an MCGD file, refer to the *Advanced Setup: MCGD File Setup Window, on page 3-46*. Once complete, save the MCGD file as "**3D Onsite**".

### Channel Setup Instructions

### Channel Setup: Config 1 Settings for 3D Configurations
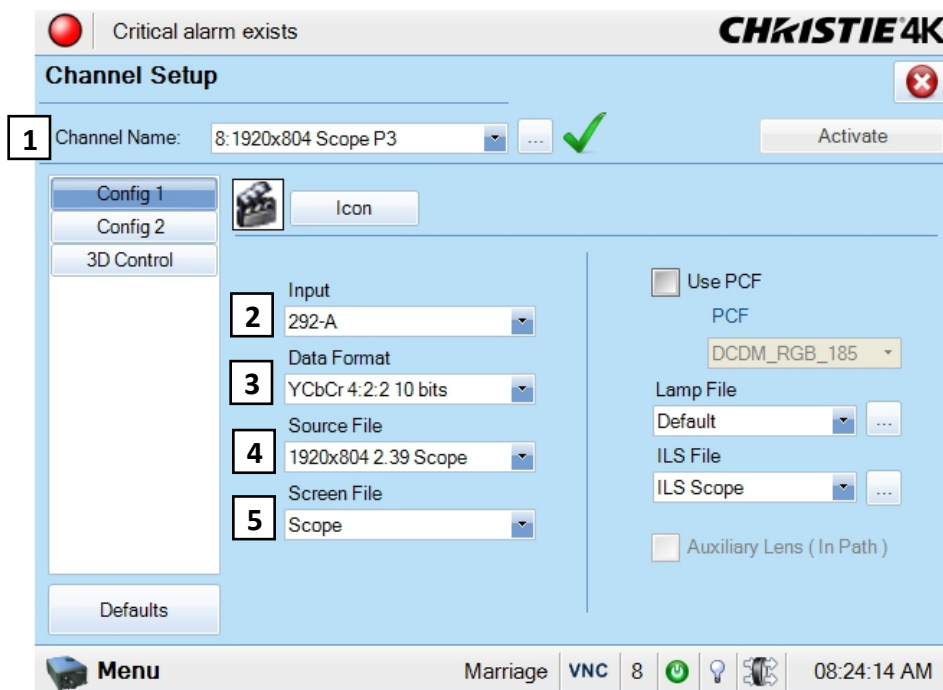


**Figure 3-70 Channel Setup: Config 1 Settings for 3D Flat 1998 x 1080**

**Table 3.43 Channel Setup: Config 1 Settings for all 3D Configurations using a Doremi Server**

| Feature | 3D Flat 3996x2160 | 3D Scope 4096x1716 |
|---|---|---|
| **1: Channel Name** | 3D Flat 3996x2160 | 3D Scope 4096x1716 |
| **2: Input*** | 292-Dual | 292-Dual |
| **3: Data Format*** | YCrCb 4:2:2 10 bits x2 | YCrCb 4:2:2 10 bits x2 |
| **4: Source File** | 3996x2160 1.85 Flat | 4096x1716 2.39 Scope |
| **5: Screen File**** | Flat | Scope |

**Table 3.44 Channel Setup: Config 1 Settings for all 3D Configurations using a Doremi IMB**

| Feature | 3D Flat 3996x2160 | 3D Scope 4096x1716 |
|---|---|---|
| **1: Channel Name** | 3D Flat 3996x2160 | 3D Scope 4096x1716 |
| **2: Input*** | IMB | IMB |
| **3: Data Format*** | 4:4:4 RGB | 4:4:4 RGB |
| **4: Source File** | 3996x2160 1.85 Flat | 4096x1716 2.39 Scope |
| **5: Screen File**** | Flat | Scope |

*The following settings are CRITICAL and are used specifically for 3D cinema presentations. Wrong settings on these parameters will destroy the image.

**The screen file needs to be edited for your theatre.

**Input** - This tells the projector that we are using both HD-SDI inputs.

**Data Format** - This setting tells the projector how the data is formatted. Any other setting will not work.

**Source File** - The Source file will either be flat or scope format, and either 3996 or 4096 containers

**Screen File** - These files will be set for scope and flat presentations.

Channel Setup: Config 2 Settings for 3D Configurations
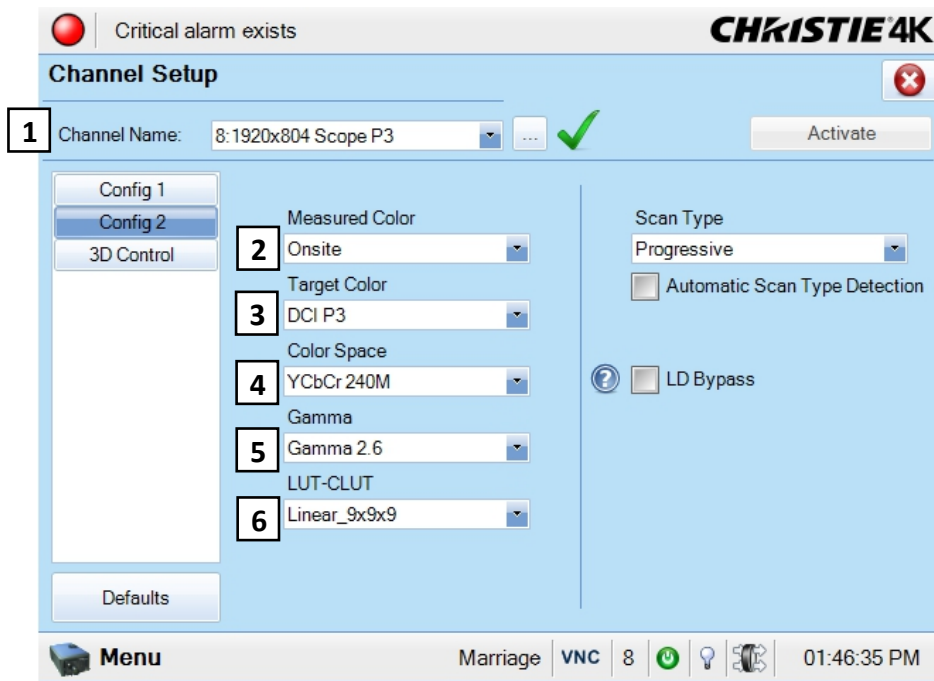
**Figure 3-71 Channel Setup: Config 2 Settings for 3D Flat 1998 x 1080**

**Table 3.45 Channel Setup: Config 2 Settings for all 3D Configurations using a Doremi Server**

| Feature | 3D Flat 3996x2160 | 3D Scope 4096x1716 |
|---|---|---|
| 1: Channel Name | 3D Flat 3996x2160 | 3D Scope 4096x1716 |
| 2: Measured Color* | 3D Onsite | 3D Onsite |
| 3: Target Color | DC28_DCI-XYZE_314_351 | DC28_DCI-XYZE_314_351 |
| 4: Color Space | YCxCz Inverse ICT | YCxCz Inverse ICT |
| 5: Gamma | Gamma 2.6 | Gamma 2.6 |
| 6: LUT-CLUT | Linear_9x9x9 | Linear_9x9x9 |

**Table 3.46 Channel Setup: Config 2 Settings for all 3D Configurations using a Doremi IMB**

| Feature | 3D Flat 3996x2160 | 3D Scope 4096x1716 |
|---|---|---|
| 1: Channel Name | 3D Flat 3996x2160 | 3D Scope 4096x1716 |
| 2: Measured Color* | 3D Onsite | 3D Onsite |
| 3: Target Color | DC28_DCI-XYZE_314_351 | DC28_DCI-XYZE_314_351 |
| 4: Color Space | Unity RGB | Unity RGB |
| 5: Gamma | Gamma 2.6 | Gamma 2.6 |
| 6: LUT-CLUT | Linear_9x9x9 | Linear_9x9x9 |

**Measured Color** - Select the measured color file you defined for your 3D configuration. You must define the **3D Onsite** file in the **Advanced Setup: Lamp Power / LiteLOC™ Setup** window before you can select this option in the **Measured Color** list.

Channel Setup: 3D Control Settings for 3D Configurations
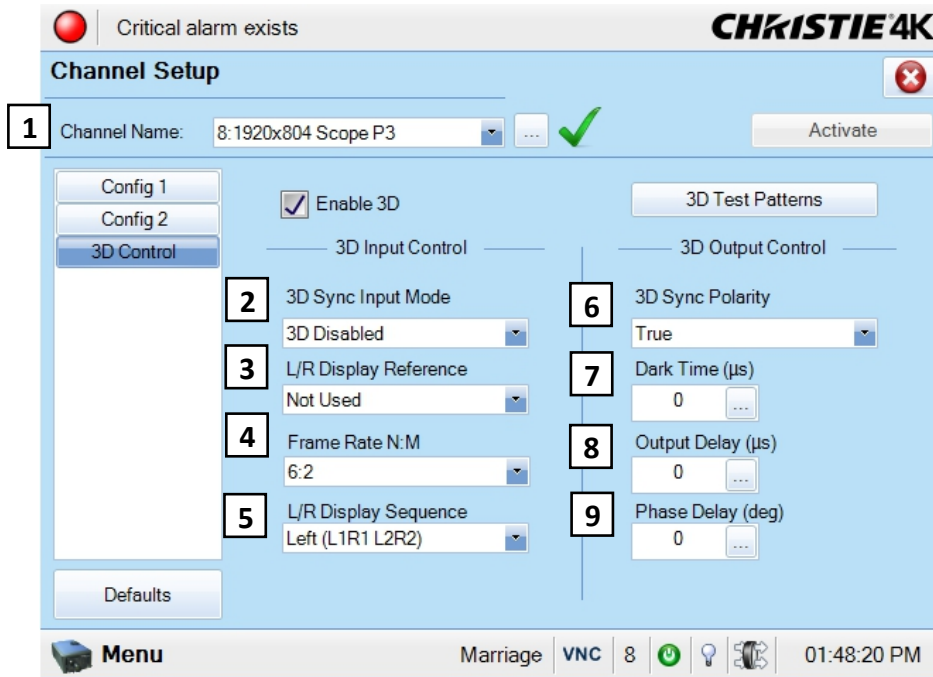


**Figure 3-72 Channel Setup: 3D Control Settings for 3D Flat 1998 x 1080**

**Table 3.47 Channel Setup: Config 2 Settings for all 3D Configurations using a Doremi Server**

| Feature | 3D Flat 1998x1080 | 3D Scope 2048x858 |
|---|---|---|
| **1: Channel Name** | 3D Flat 1998x1080 | 3D Scope 2048x858 |
| **2: 3D Sync Input Mode** | Use 'Line Interleave' | Use 'Line Interleave' |
| **3: L/R Display Reference** | Not Used | Not Used |
| **4: Frame Rate N:M** | 6:2 | 6:2 |
| **5: L/R Display Sequence\*** | Left (L1R1 L2R2) | Left (L1R1 L2R2) |
| **6: 3D Sync Polarity** | True | True |
| **7: Dark Time \*\*** | 3D system specific | 3D system specific |
| **8: Output Delay** | 3D system specific | 3D system specific |
| **9: Phase Delay** | 3D system specific | 3D system specific |

**Table 3.48 Channel Setup: Config 2 Settings for all 3D Configurations using a Doremi IMB**

| Feature | 3D Flat 1998x1080 | 3D Scope 2048x858 |
|---|---|---|
| **1: Channel Name** | 3D Flat 1998x1080 | 3D Scope 2048x858 |
| **2: 3D Sync Input Mode** | Use 'Selected Input Port' | Use 'Selected Input Port' |
| **3: L/R Display Reference** | Not Used | Not Used |
| **4: Frame Rate N:M** | 6:2 | 6:2 |
| **5: L/R Display Sequence\*** | Left (L1R1 L2R2) | Left (L1R1 L2R2) |
| **6: 3D Sync Polarity** | True | True |
| **7: Dark Time \*\*** | 3D system specific | 3D system specific |
| **8: Output Delay** | 3D system specific | 3D system specific |
| **9: Phase Delay** | 3D system specific | 3D system specific |

\*L/R Display Sequence is CRITICAL and is used specifically for 3D presentations. Wrong settings on this parameter will lose the 3D effect.

\*\* Dark Time, Output Delay, and Phase Delay values differ based on the 3D hardware system implemented.

**L/R Display Sequence** - This setting tells the projector how to find the left and right eye frames.

**Frame Rate N:M** - Sets how many frames to display per number of frames that form one complete image. This defines triple flash, where each image is shown three times to ensure a smooth, jitter free presentation. Other settings will still show 3D, but without as crisp a presentation.

**3D Sync Polarity** - This setting changes the sense of the synchronization signal from the projector. Changing it will reverse left and right images on the screen.

**Dark Time** - For 3D applications, systems typically need a period of time where the image projected on the screen is black. Without some dark time, the presentation will appear to smear because this black or "dark time" is used to switch the mechanism that controls what a viewer's left eye and right eye sees. Dark times set too short may show on screen as color and contouring errors. The projector will always produce at least 380 microseconds of dark time, so even if this setting is zero, a reasonably good presentation will result. Dark Time differs based on the 3D hardware system implemented.

**Table 3.49 Suggested Dark Time Intervals per 3D Hardware System**

| 3D System | Dark Time (in microseconds) |
|---|---|
| **RealD** | 430 |
| **Dolby - Wheel Type 4:2*** | 1142 |
| **Dolby - Wheel Type 5:2*** | 920 |
| **Dolby - Wheel Type 6:2*** | 780 |
| **MasterImage** | >1157 |
| **Xpand** | 700 |

\* Dolby recommends dark time settings that are determined by the diameter of the wheel used in the projector.

**NOTE**: *Check with 3D System Manufacturer for the most up-to-date dark time values for optimal settings.*

**Output Delay** - This defines the delay between the beginning of the dark time and the synchronization signal sent to the control module.

## 3.8.4 System Test Pattern

The CP4230 includes several test patterns for use by projectionists during pre-show diagnostic checks to verify that the system is functioning properly.

1. In the **Channel Setup: 3D Control** window, click the **3D Test Patterns** button and select a pattern.

2. With this image projected on a silver screen and the 3D hardware in place, put on a pair of 3D cinema eye wear.

3. While looking at the on-screen image, close your left eye and look at the image through your right eye. Switch when the image alternates.

| 3D Test Pattern | Action |
|---|---|
| **RGB-12bit -3D Dynamic Range** | Alternates between two images shown in **Figure 3-73**. |
| **RGB-12bit-3D Four Quadrant** | Alternates between two images shown in **Figure 3-74**. |
| **RGB-12bit-3D Full White** | Alternates between two 100% white images. |
| **RGB-12bit-3D Half Descending** | Alternates between four images shown in **Figure 3-75**. |
| **RGB-12bit-3D Horizontal Ramp** | Alternates between two horizontal ramp images. |
| **RGB-12bit-3D L-Pattern** | Alternates between two images shown in **Figure 3-76**. |

**100% black field with 100% white (TL), red (TR), green (BR), blue (BL) boxes**
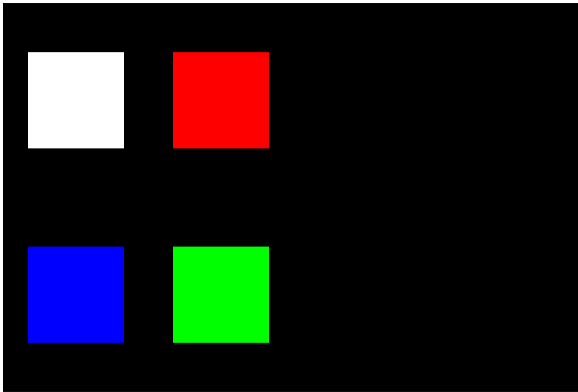
**100% black field with 100% red (TL), white (TR), blue (BR), green (BL) boxes**
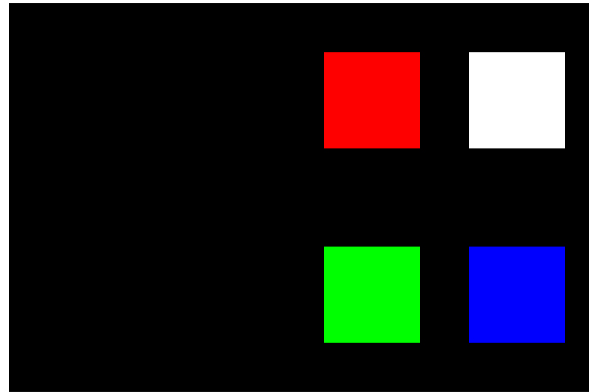
**Figure 3-73 RGB-12 bit -3D Dynamic Range Test Pattern**

**FRAME 1 - 100% white field box in 100% black field**

**FRAME 2 - 100% white field box in**

**FRAME 3 - 100% white field box in 100% black field**

**FRAME 4 - 100% white field box in 100% black field**

**Figure 3-74 RGB-12bit-3D Four Quadrant Test Pattern**

**FRAME 1 - 100 % white field with last lines 25% white and 75% black**

**FRAME 2 - 50% white field with last line 75% white and 25% black**

**FRAME 3 - 25% white field with last line 25% white and 75% black**
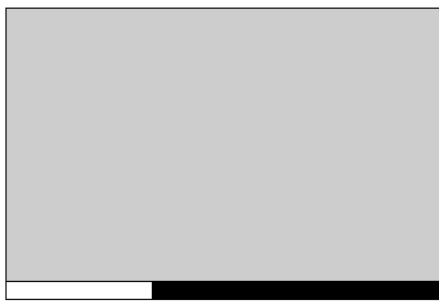
**FRAME 4 - 12.5% white field with last line 75% white and 25% black**

**Figure 3-75 RGB-12bit-3D Half Descending Test Pattern**

**Green field with white "L" and last lines 25% white, 75% black**
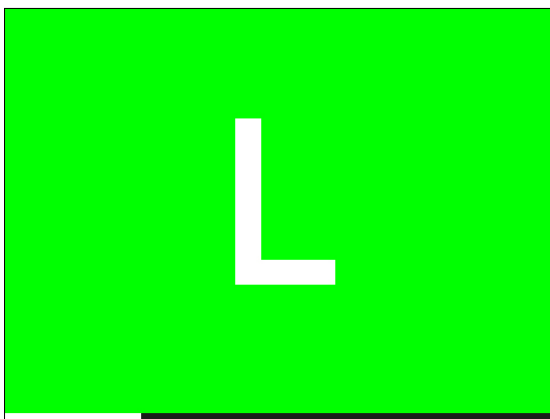
**Magenta field with last lines 75% white, 25% black**

**Figure 3-76 RGB-12bit-3D L-Test Pattern**

## 3.8.5 Verify 3D Cinema Content

After the hardware and software setup are complete, verify the synchronization of the server content. Play the actual 3D content while looking through the 3D cinema glasses to ensure the left and right eye display the content as intended. Next, reverse your glasses by putting them on while upside down to make your left eye look through the right lens and your right eye look through the left lens and see if the image improves or becomes distorted. If the image appears reversed, change the **3D Sync Polarity** field from **True** to **False** or vise versa in the **Channel Setup: 3D Control** window.

## 3.8.6 3D Troubleshooting

### Reversed 3D Effect (Pseudo 3D)

If the actual 3D content appears reversed, turn your glasses upside down (make your left eye look through the right lens and your right eye look through the left lens) to see if the image improves. If the image is reversed, change the **3D Sync Polarity** field from **True** to **False** or vise versa in the **Channel Setup: 3D Control** window.

### 3D Test Pattern

Use the 3D internal test pattern to confirm 3D mode, L/R orientation and your sync output setting. This pattern automatically activates 3D mode and increases frame rate by a factor of 6:2. **NOTE:** *The test pattern will flicker significantly due to its low frame rate and is not recommended for synchronizing projector processing with your 3D device.*

### Image Breakup

Increasing the **Dark Time** beyond its maximum may cause image breakup.

### Image is "Too Dark"

Check the lamp brightness in the **Advanced Setup: Lamp Power / LiteLOC™ Setup** window. **NOTE**: *The lamp power for 3D content will normally require to be twice as high as for 2D content except when using the RealD XL box.*

### No 3D Effect

In the **Channel Setup: 3D Control** window, ensure the **Enable 3D** check box is selected. Adjust certain settings in the **Channel Setup: 3D Control** window since they're likely reversed.

### Ghosting / Cross-talk

Ghosting or cross-talk indicates that the eyes are detecting portions of the opposing frame due to an "out-of-sync" system. Adjust **Dark Time** or **Output Delay** so that the projector's display output is synchronized with the gating (switching) of your glasses.

### Motion Artifacts

If the image seems to jump back and forth during horizontal pans or if there is a fluid-type motion artifact, the **L/R Display Sequence** is likely backwards. Change the **L/R Display Sequence** option to **Left (L1R1 L2R2)**.

### Disturbing Flashing in One Eye

If you detect a short flash each time a scene changes in 3D content, change the **L/R Display Sequence** option to **Left (L1R1 L2R2)**.

## 3.9 Cinema Operation

This section explains how trained operators can use the projector for presenting cinema events such as first-run movies stored on a digital media storage device. Read through these pages before displaying cinema for the first time. A good understanding of all cinema functions and how to access them will help you to run an event smoothly and easily. **NOTE:** *Before attempting cinema use, the projector must be properly installed, aligned and configured by a qualified service technician as described in* 2.4 Installation Instructions, on page 2-2.

### 3.9.1 Compatible Cinema Sources

Make sure a digital media storage device or cinema server is connected to one of the 292A or 292B input ports. These connections are typically made at the time of projector installation. Refer to **Figure 2-27**. For a list of standard single-link SMPTE 292M Formats, refer to *Section 6 Specifications*.

### 3.9.2 Image Formats

Two standard types of cinema displays, flat and scope, differ in their width-to-height aspect ratio (**Figure 3-77**). Achieving either of these displays from a wide variety of incoming source material depends on proper settings in the projector as well as certain theatre conditions.
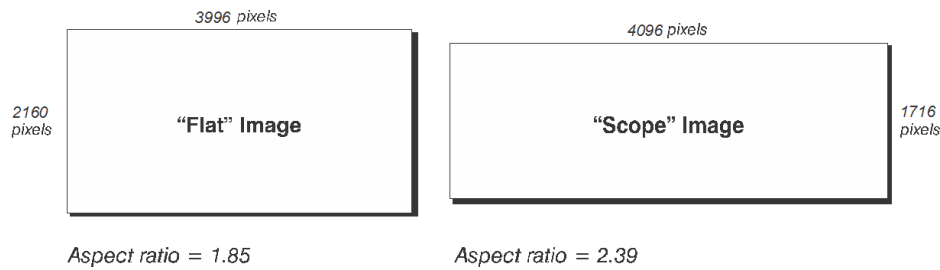


**Figure 3-77 Standard Cinema Formats**

### Projector Variables: Using an Anamorphic Lens

Because the native resolution / format of the projector closely matches the flat aspect ratio (the native resolution being only slightly wider, at 1.89), the projector can essentially show incoming "flat" images through its standard zoom lens. Using an optional anamorphic lens, "scope" source material can be resized electronically to fill the DMD where the pixels are horizontally stretched so that the full 2.39 image width appears on-screen.
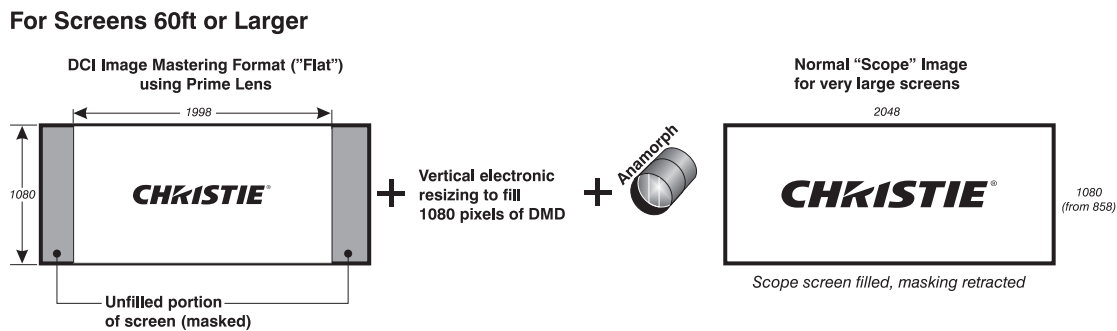


**Figure 3-78 Using Anamorphic Lens to Achieve "Scope" for Large Screens**

## Projector Variables: Using a Wide Converter Lens

The optional Wide Converter Lens (WCL) acts similar to a zoom lens. It magnifies a "flat" image format of 1.85:1 to a "scope" image of 2.39:1, while maintaining the full resolution of the source material. The WCL simply mounts in front of a standard prime lens and expands the image just like a zoom of 1.26X, expanding the image to effectively decrease the throw ratio. The WCL magnifies both the horizontal and vertical image just like a large range zoom lens. Since the vertical and horizontal directions are both increased, an aspect ratio of 1:1 is maintained.
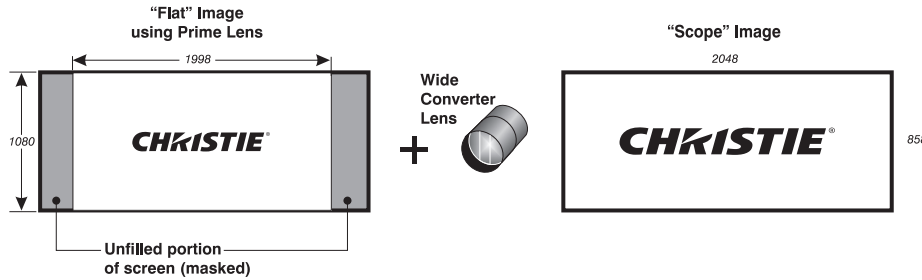


**Figure 3-79 Using Wide Converter Lens to Achieve "Scope" with No Resizing**

## Theatre Variables: Masking

In order to present either type of feature on a single screen, a theatre typically uses masking to conceal any unused edge(s) of the screen. These movable flat black panels, or black curtains, are most commonly installed along the top edge of the screen changing the height of the screen but not its width.

### Top Masking

• Add top masking for "scope"

• Raise top masking for "flat"



**Figure 3-80 Top Masking for Scope**

### Side Masking

Alternatively, curtains (masks) may be installed at each side of the screen in order to change the width of the screen but not its height.

• Bring in masking from sides for "flat"

• Open masks for "scope"

In some cases, a theatre has both side and top/bottom masking installed. This arrangement is the most flexible of all.

## 3.10 Non-Cinema Operation

To display alternative content originating from standard definition or high definition non-cinema sources such as a PC or other graphics devices, connect your non-cinema DVI source to the DVI-D A and DVI-D B ports on the faceplate. Each DVI port accepts and will auto-detect the progressive scan, digital RGB sources (**3.10.1**) displaying them in their original incoming format. Currently, DVI signals cannot be scaled to



**Figure 3-81 Side Masking for Flat**

a different size and/or aspect ratio. **NOTE**: *Each DVI port is a single-link port for a single-link cable/ connector only. Using this pair of ports as a higher-bandwidth dual-link or twin-link pair requires additional hardware and is not currently supported.* Refer to *Section 6 Specifications* for a list of compatible non-cinema DVI sources.

## 3.10.1 Selecting a Source

For any display, the projector interprets incoming signal data according to one of 64 user-selectable display files defined at the time of installation (or with each subsequent release of a new digital cinema feature) and stored in projector memory. Each file is essentially a collection of processing/display settings optimized for a particular cinema feature or non-cinema content, which enables consistent presentations with minimum further adjustment. Each file is represented by an assigned "channel button" selectable over several pages of the **Main** panel from the TPC. Depending on your installation, you may have 0-64 different non-cinema sources defined for use. For more information, refer to the *Administrator Setup: Preferred Channel Setup Window, on page 3-49*.

SELECT A NON-CINEMA SOURCE: With a non-cinema source connected to the projector, select the desired non-cinema channel button from the **Main** panel. If the button is not listed on the **Main** panel, click the **All Channels** button to the right of the nine buttons that display. Once selected, the projected display changes according to the corresponding file settings.

RETURN TO A CINEMA SOURCE: Select one of the channel buttons pre-configured for a cinema source input at port 292A or 292B from the **Main** panel—the projector now ignores the DVI ports and responds to the cinema source selected.

# 4  Maintenance

Installers, service trained operators and all other users must maintain a safe operating environment at all times. Read through this section in its entirety and understand all warnings and precautions before attempting to operate the projector.

## 4.1  Maintaining Proper Cooling

The CP4230 high-intensity lamp and electronics rely on a variety of cooling components to reduce internal operating temperatures. Regular inspection and maintenance of the entire cooling system is critical to prevent overheating and sudden projector failure and helps to ensure reliable operation of all projector components over time.

### 4.1.1  Ventilation

Vents and louvers in the projector covers provide ventilation, both for intake and exhaust. Never block or cover these openings. Do not install the projector near a radiator, heat register or within an enclosure. To ensure adequate airflow around the projector, keep a minimum clearance of 0.5m (19.69") on the left, right and rear sides of the projector from any walls or other obstructions.

### 4.1.2  Light Engine Air Filter

**CHECK: Monthly**

It is recommended the air filter (located on the right side of the projector near the input connection panel) is replaced whenever the lamp is replaced, or sooner in dusty or dirty environments. A clogged air filter reduces air flow and can lead to overheating and failure of the projector. Check monthly by inspecting its color through the side vent grille with a flashlight. A grey colored filter should be replaced. Refer to *4.2.8 Air Filter Replacement, on page 4-9* for instructions.

### 4.1.3  Liquid Cooling Air Filter

**CHECK: Monthly**

Located on the left/front side of the projector there is an air filter related to the liquid cooling system. Inspect the filter routinely and replace if it appears greyish in color. Refer to *4.2.8 Air Filter Replacement, on page 4-9* for instructions.

### 4.1.4  Liquid Cooler

**CHECK: Every 6 months**

The liquid cooler system circulates liquid to and from the DMD heatsinks in the CP4230 reducing the DMD operating temperature to an acceptable level. Check the coolant level every 6 months, by removing the top projector lid. Make sure the level of coolant remains above the minimum level indicator. If the liquid cooling system should fail, an over-temperature alarm window will display. If an over-temperature state remains for more than one minute, the lamp will turn OFF.

### Filling the Coolant Reservoir

⚠ **DANGER** HAZARDOUS SUBSTANCE - The coolant used in this product contains ethylene glycol. Use caution when handling. Do not ingest. Wash hands after servicing the coolant reservoir.

⚠ **WARNING** Do not use coolants other than that specified by Christie with your projector. Using unapproved coolant can result in projector damage and will also void projector warranty.

Top up the coolant with the Christie approved coolant Jeffcool E105. Use the refill bottle (with the nozzle) provided in the Liquid Coolant Fill Service Kit (#003-001837-xx).

When refilling, use caution not to spill or let any of the coolant drip on or near the electronics. Do not allow the level of coolant to fall below the *Minimum Fill Line*. **NOTE:** *After filling the reservoir, check the coolant hoses for kinks which may restrict fluid flow*. DO NOT OVERFILL.

**TIP**: In the event coolant drips on any electronics or other nearby components, blot the affected area using a dust-free optical grade tissue. It is recommended you blot a few times, discard the tissue and use a new tissue to blot the area again. Keep repeating this cycle until the coolant is cleaned up. Then lightly moisten a new tissue with de-ionized water and blot the area again. Use a dry tissue to dry the area off. Repeatedly using clean tissue and blotting the area should successfully remove coolant spills.

## 4.1.5 Exhaust Duct and Lamp Fan Interlocks

### CHECK: Every 6 months

Check and maintain the projector's two vane switches every 6 months. One is located in the exhaust duct and the other is near the lamp blower. Check operation as follows:

1. Turn power to the projector ON, but do not turn lamp on.

2. Turn OFF extractor fan.

3. Confirm that the extractor vane switch has indicated an extractor status light error on the TPC Status page. Turn extractor fan back on.

4. Block the air intake at the rear of the projector.

5. Confirm that the lamp blower vane switch has indicated a "blower error". Clear the air intake to correct the issue.

**NOTE**: *If the exhaust duct becomes significantly blocked, or if a fan fails, the projector's airflow sensor should trigger a shutdown before the projector becomes overheated or unsafe. Regardless, <u>check the airflow periodically</u>.*

## 4.2 Maintenance and Cleaning

To help ensure optimized performance and reliability, regularly check electrical, optical and other components as described below.

⚠ **DANGER** Electrical SHOCK HAZARD. Disconnect from AC when servicing. Ensure the proper protective clothing is worn during maintenance.

### 4.2.1 Lamp

**CHECK: Every 60 days or 500 hours**

Do the following (always disconnecting from AC first, and wearing authorized protective safety gear):

• Check the contact surfaces of anode (positive) and cathode (negative) connections for cleanliness.

• Clean electrical contact surfaces as necessary to prevent contact resistance from scorching connectors. Use appropriate contact cleaner.

• Verify that all electrical and lamp connections are tight.

### 4.2.2 Optical

Unnecessary cleaning of optics can be more harmful than helpful, increasing the risk of degrading delicate coatings and surfaces. In this projector, check only the <u>lens and lamp reflector</u>. Maintenance of other optical components requires a qualified service technician. Check these components periodically in a clean, dust-free environment using a high-intensity light source or flashlight. Clean them only when dust, dirt, oil, fingerprints or other marks are obvious. Never touch an optical surface with your bare hands. Always wear latex lab gloves.

**Optical Component Cleaning Supplies**

• Soft camel-hair brush

• Dust-free blower - filtered dry nitrogen blown through an anti-static nozzle

• Dust-free lens tissue such as Melles Griot Kodak tissues (18LAB020), Optowipes (18LAB022), Kim Wipes or equivalent

• *For lens only.* Lens cleaning solution such as Melles Griot Optics Cleaning Fluid 18LAB011 or equivalent

• *For reflector only.* Methanol

• Cotton swabs with wooden stems only

• Lens cleaning cloth/microfibre such as Melles Griot 18LAB024 or equivalent

## 4.2.3 Cleaning the Lens

### CHECK: Periodically

A small amount of dust or dirt on the lens has minimal effect on image quality. To avoid the risk of scratching the lens, <u>clean only if absolutely necessary</u>.

<u>Dust:</u>

1. Brush most of the dust off the lens with a camel-hair brush and/or blow dust away with compressed air.

2. Fold a microfibre cloth smooth and gently wipe remaining dust particles off the lens. Make sure to wipe evenly with the smooth portion of the cloth that has no folds or creases. <u>Do not apply pressure with your fingers</u> - use the tension in the folded cloth itself to collect dust.

3. If significant dust is still bound to the surface, dampen a clean microfibre cloth with coated optics cleaning solution (damp, not dripping). Wipe gently until clean.

<u>Fingerprints, smudges, or oil present:</u>

1. Brush most of the dust off with a camel-hair brush and/or blow dust away with compressed air.

2. Roll a lens tissue around a swab and soak it in the coated optics cleaning solution. Tissue should be damp but not dripping.

3. Gently wipe the surface using a figure eight motion. Repeat this motion until the blemish is removed.

## 4.2.4 Cleaning the Lamp Reflector

### CHECK: Check during each lamp replacement

Inspect the mirror surface (reflector) for cleanliness only during a lamp replacement when the lamp is already removed. Wear protective clothing while inspecting or cleaning. It is normal for the color on the reflector surface to vary.

<u>Dusty:</u>

1. Brush most of the dust off the lens with a camel-hair brush and/or blow dust away with compressed air.

2. If some dust remains, leave as is. Since the air circulating at the lamp is unfiltered, some dust is inevitable. Avoid unnecessary cleaning.

<u>Fingerprints, smudges, or oil is present:</u>

1. Brush most dust off the lens with a camel-hair brush and/or blow dust away with compressed air.

2. Fold a clean microfibre cloth and dampen with methanol. Make sure to wipe evenly with the smooth portion of the cloth that has no folds or creases. <u>Do not apply pressure with your fingers.</u> Use the solution in the cloth to collect the dirt.

## 4.2.5 Other Components

In a normal operating environment check, clean and treat the components listed below every 6 months or so to help ensure proper lamp and projector function.

### Lamp Blower

**⚠ WARNING** **Do not bend the impeller blades or loosen the balancing weights.**

A clogged lamp blower impeller or motor can reduce air flow leading to possible overheating and lamp failure of the lamp.

1. Vacuum loose dirt from the lamp blower impeller.

2. If necessary, use a brush with hot water and suitable detergent.

### Igniter

Clean the high voltage terminal and insulator to remove accumulated dust or dirt.

### Airflow Interlocks

The CP4230 uses two airflow interlocks; a lamp blower vane switch and an extractor vane switch.

The lamp blower vane switch is located within the lamp cooling compartment. The extractor vane switch is located just inside the top duct on the projector lid. Check and clean the switches to remove accumulated dust or dirt that could impede movement if necessary. Within the exhaust duct connected at the top of the projector, adequate airflow must be maintained and routed outside of the building. Inspect regularly and confirm that 1) there are no obstructions or "kinks" within the ducting, 2) all air intake areas are unobstructed, and 3) exhaust airflow is at least 450 CFM* (measured at the rigid end of the duct when not connected to the projector). Refer to *4.1 Maintaining Proper Cooling, on page 4-1*.

 **\* 600 CFM is required in projection rooms with ambient temperature above 25°C or elevation (above sea level) greater than 3000 feet.**

### Laminar Airflow Device (LAD)

### CHECK: Every 6 months

The LAD filter is located in the light engine compartment. It is secured to the light engine assembly handle. The LAD filter should be nearly white in color. If it appears a dark gray color (rare) it will require replacement by a qualified technician only. Contact Christie or your dealer.

## 4.2.6 Lamp Replacement

⚠️ **DANGER** 1) **Lamp replacement must be performed by a qualified service technician only. 2) EXPLOSION HAZARD. Wear authorized protective clothing whenever the lamp door is open and when handling the lamp. Never twist or bend the quartz lamp body. Use the correct wattage lamp supplied by Christie. 3) Ensure those within the vicinity of the projector are also wearing protective safety gear. 4) Never attempt to remove the lamp when it is hot. The lamp is under a great deal of pressure when hot and may explode, causing personal injury or death and/or property damage. Allow lamp to cool completely.**

### STEP 1: Turn OFF Main AC

Click ⏻ on the TPC Main panel to turn the lamp and main AC OFF. Allow the internal cooling fans to run for at least 10 minutes to cool the lamp.

### STEP 2: Unplug the Projector

When the cooling fans stop, unplug the projector.

### STEP 3: Open the Lamp Door

Wearing authorized protective safety gear, unlock and open the lamp door. If desired, release the latch mechanism to remove the door entirely.

### STEP 4: Remove the Old Lamp and Inspect the Reflector

a. Remove the front lamp duct to reveal the cathode end (-) of the lamp.

b. Loosen set screws from negative/cathode and positive/anode lamp connectors. Make sure to apply minimal torque and DO NOT STRESS the quartz tube. (Figure 4-1).
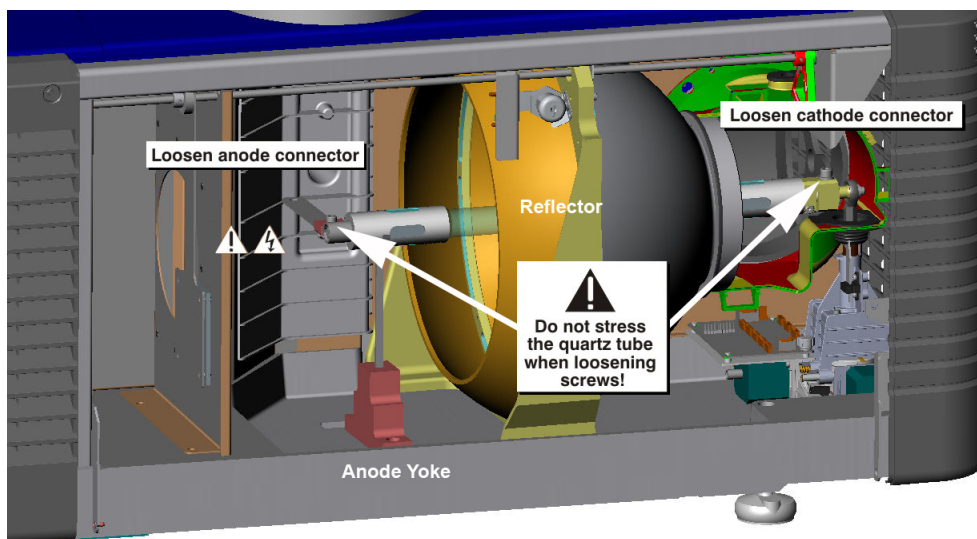


**Figure 4-1 Remove Old Lamp**

c. Carefully slip the positive anode connector off the front of the lamp.

d. Handling by the cathode end only, unscrew the lamp from the cathode connector. Carefully remove the lamp from the projector and immediately place it inside the protective cover or original packaging. **Caution!** *Handle the lamp by the cathode/anode end shafts only, never the glass.*

e. Place the lamp on the floor where it cannot fall or be bumped. **Warning!** *Handle box with extreme caution - the lamp is hazardous even when packaged. Dispose of lamp box according to safety regulations for your area.*

f. With the lamp removed, visually inspect the reflector for dust. Clean the reflector if necessary as described earlier in *4.2.4 Cleaning the Lamp Reflector, on page 4-4*.

### STEP 5: Remove the Protective Cover from the New Lamp

Remove tape, knurled nut and locking star washer securing the lamp within its cover.

### STEP 6: Install New Lamp

a. If you are installing a different type of lamp from the original, ensure the correct position of the anode yoke. Refer to *Section 2: Installation Instructions: STEP 8 - Install First Lamp, on page 2-12*

b. Insert the threaded cathode (-) end of the lamp into the negative lamp connector nut located in the rear of the lamp compartment. (Figure 4-2) Using both hands, hand-tighten this end into the threaded nut. **Caution! 1)** *Handle the lamp by the cathode/anode end shafts only, never the glass. DO NOT over-tighten. DO NOT stress the glass in any way.* **2)** *Check leads. Make sure the anode (+) lead between the lamp and igniter is well away from any projector metal such as the reflector or firewall.*

c. Rest the anode (+) end of the lamp on the anode yoke and slip the positive lamp connector over the bulb end. (Figure 4-2) Using the 5mm Allen key, squeeze together with the anode clamp making sure not to place any torque on the lamp quartz tube. **Important!** *Ensure that the "flat" part of the anode end of the lamp facing up.* **Warning!** *Explosion hazard - Do not apply torque to the anode end of the lamp.*

d. Tighten screws in both negative and positive lamp connectors. **Important!** *Proper electrical contact prevents resistance in the lamp connectors.* **Caution! 1)** *Handle the lamp by the cathode/anode end shafts only, never the glass. DO NOT over-tighten. DO NOT stress the glass in any way.* **2)** *Check leads. Make sure the anode (+) lead between the lamp and igniter is well away from any projector metal such as the reflector or firewall.*
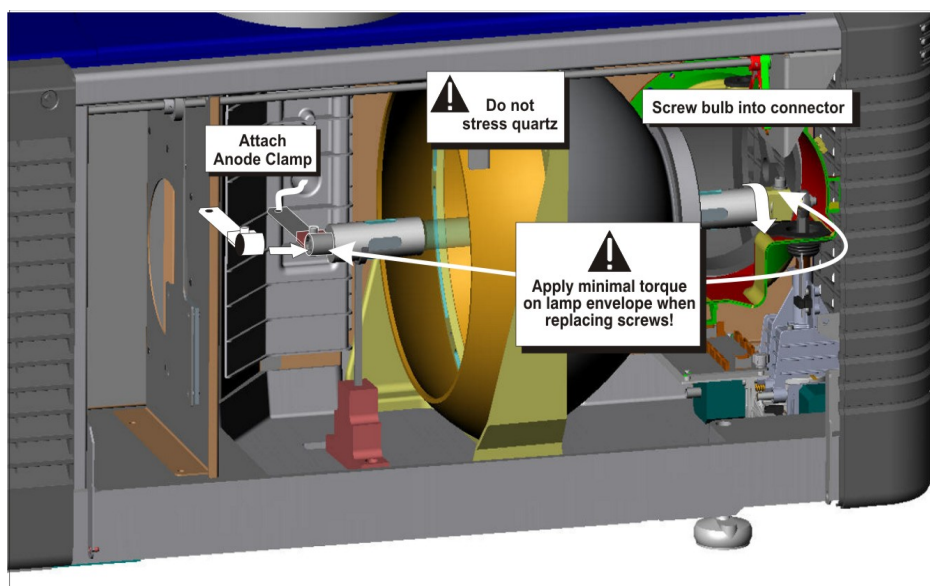


**Figure 4-2  Install New Lamp**

### STEP 7: Re-install the Front Lamp Cover

Once the front and rear lamp covers are mated, pull up on the tabs until a "CLICK" sound is heard indicating the front cover is securely in place.
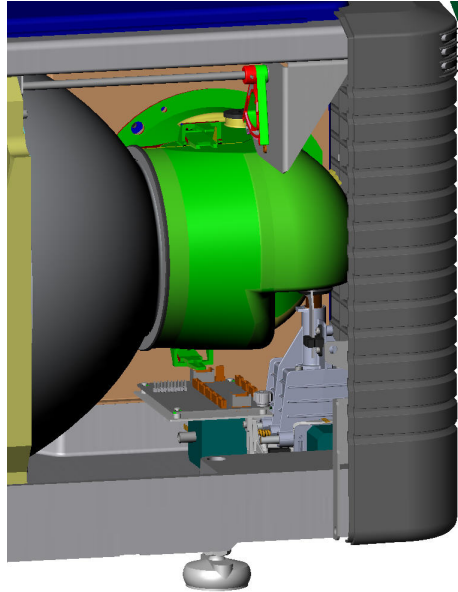


**Figure 4-3  Re-install Lamp Cover**

### STEP 8: Close Lamp Door

### STEP 9: Turn Wall Circuit ON

### STEP 10: Software Adjustments

In the Advanced Setup: Lamp History window, click the Add Lamp button and record lamp type, serial number, reason for change and number of the hours logged on to the lamp. If the lamp has not been previously used, enter 0. Click Save to save the data entered. (Figure 4-4)

### STEP 11: Turn Lamp ON

Click  from the TPC Main panel to turn the lamp on.

### STEP 12: Adjust LampLOC™

Immediately adjust lamp position (LampLOC™) via Advanced Setup: LampLOC window. By adjusting lamp position, you can achieve optimized light output by centering the lamp with the reflector and obtaining correct distancing from the center of the illumination system.
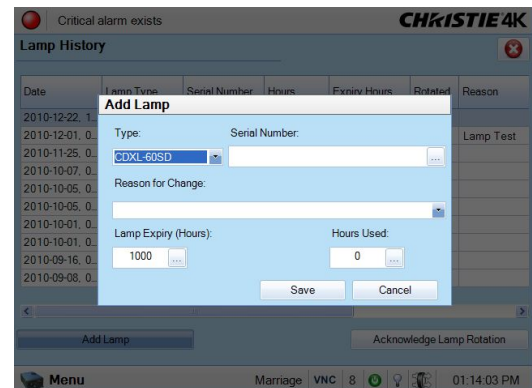


**Figure 4-4  Add Lamp Window**

## 4.2.7 Rotating the Lamp

⚠ **DANGER** **1) Lamp replacement must be performed by a qualified service technician only. 2) EXPLOSION HAZARD. Wear authorized protective clothing whenever the lamp door is open and when handling the lamp. Never twist or bend the quartz lamp body. Use the correct wattage lamp supplied by Christie. 3) Ensure those within the vicinity of the projector are also wearing protective safety gear. 4) Never attempt to remove the lamp when it is hot. The lamp is under a great deal of pressure when hot and may explode, causing personal injury or death and/or property damage. Allow lamp to cool completely.**

When a lamp reaches mid-life it is recommended that it be physically rotated 180° to ensure an even burn of the lamp; thus improving performance and life expectancy. An alarm window will appear on the TPC which will require an acknowledgement once lamp rotation is complete.

To rotate the lamp,

1.  Follow the same safety precautions as indicated in *4.2.6 Lamp Replacement, on page 4-6* above.

2.  Remove the cathode cable and rotate the lamp 180°. Replace cathode cable.

3.  In the Advanced Setup: Lamp History window, select the Acknowledge Lamp Rotation button.

## 4.2.8 Air Filter Replacement

⚠ **CAUTION** **Use only special, high efficiency Christie approved filters. Never operate the projector without the filter installed.**

⚠ **CAUTION** **Always discard used air filters.**

### Light Engine Air Filter

Replace the light engine air filter whenever the lamp module is replaced or sooner if operating the projector in a dusty or dirty environment. Check monthly in all cases. The filter is located on the right side of the projector behind the air filter cover. To replace:

1.  Release two tabs on the air filter cover and remove.

2.  Slide the air filter out and discard. Insert the new air filter with the airflow indicator facing toward the projector. **NOTE**: *Never reuse an old air filter. The air filters in this product cannot be cleaned thoroughly enough for reuse and can lead to the contamination of optical components.*

3.  Install the air filter cover by inserting the two bottom tabs into place and then snapping the door closed.

### Liquid Cooling Air Filter Replacement
### CHECK: Monthly

The radiator air filter is located on left/front side of the projector behind a small air filter cover. To replace:

1.  Release a single tab on the air filter cover and remove.

2.  Slide the air filter out and discard. Insert the new air filter with the air flow indicator facing toward the projector. **NOTE**: *Never reuse an old air filter. The air filters in this product cannot be cleaned thoroughly enough for reuse and can lead to the contamination of optical components.*

3.  Install the air filter cover by inserting the bottom tabs into place and then snapping the door closed.

## 4.3 Lens Replacement

A variety of primary lenses can accommodate different throw distances and specific types of installations. These are listed in *Section 6 Specifications.*

To replace a lens in the projector, do the following:

1. Remove the shroud.

2. Turn the lens clamp to the OPEN/UP position.

3. Release the lens locking lever (UP position).

4. Pull out the lens and replace it with a different high-brightness lens. **NOTE***: Always install the lens with "UP" label in the top position. This will assist in achieving consistent boresight alignment each time the lens is replaced.* Refer to *2.4 Installation Instructions, on page 2-2.*

5. Secure the lens with the lens locking lever (DOWN position).

6. Calibrate the lens.

7. Install the shroud.

# 5 Troubleshooting

If the projector does not appear to be operating properly, note the symptoms and use this section as a guide. If the problem can not be resolved, contact your dealer for assistance. **NOTE:** *A qualified service technician is required when opening an enclosure to diagnose any "probable cause".*

## 5.1 Power

### 5.1.1 Projector Does Not Power ON

1. Check the wall circuit breaker to see if it's ON. If there is a problem with the wall circuit breaker "tripping" OFF, have a certified electrician investigate any electrical problem.

2. Check the status of the LEDs on the rear corners of the projector. (Figure 5-1). If there is no activity, see #3.

3. Verify power by looking through the rear, right side grill. One LED should be present in the upper right. This indicates the LVPS has power. Another LED should be seen in the lower left indicating Main input. (Figure 5-2)
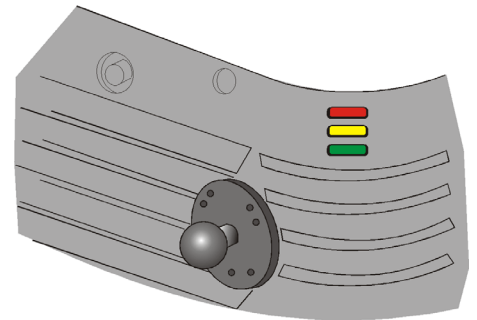


**Figure 5-1 Projector Status LEDs**



**Main Input LED**            **LVPS Power LED**
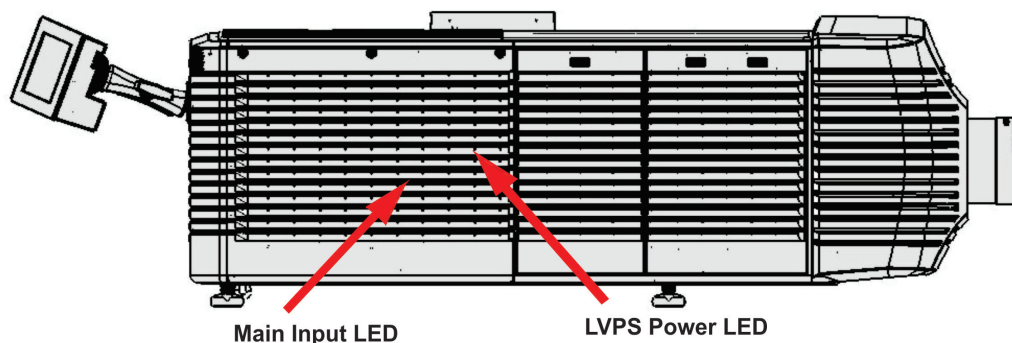
**Figure 5-2 View Power Status LEDs**

4. On the TPC, verify in the Operational Status region of the Main panel that there is no failure with PIB communication (PIB Status).

## 5.2 Lamp

### 5.2.1 Lamp Does Not Ignite

1. Verify the hours currently on the lamp. If the hours are close to the typical lamp life, replace the lamp.

2. Check for interlock failures. From the Main panel on the TPC, click the LED in the top, left corner to open the Status window. (Figure 5-3). Alternatively, click the **Menu** button and select Status. With the Status window open, click Interlocks. If a failure is shown, interlock needs to be cleared before the lamp will light.

3. For EVB communication failures, re-boot and try again.

4. If the All Alarms field of the Status window shows a ballast communication problem, re-boot the projector and try turning the lamp ON again.

**Figure 5-3 TPC LED**

5. Check for an alarm condition. From the Main panel, click the LED in the top, left corner to open the Status window. Click Temperatures. If a DMD temperature is too high, the lamp will not ignite. Cool the projector and try again. Ensure there is proper ventilation, air filters are not blocked and liquid cooling reservoir has coolant and is circulating.

6. Listen for a "clicking" noise to indicate the lamp power supply (LPS) is attempting to strike the lamp. If the lamp does not ignite after the second attempt, check the power level of the lamp in the Advanced Setup: Lamp Power/LiteLOC Setup window. The lamp power may be too low, especially if the bulb is old. If the lamp power is acceptable, replace the lamp. For more information, refer to *4.2.6 Lamp Replacement, on page 4-6*. Alternatively, if you hear a brief "click", but no light appears, the lamp likely needs replacement. If you do not hear anything, it may indicate a problem with the ballast (Christie-trained service required).

7. Check the Ballast Voltage switch.
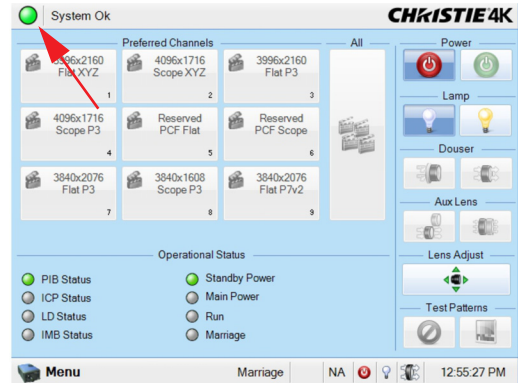
### 5.2.2 Lamp Suddenly Goes OFF

1. Check the lamp power in the Advanced Setup: Lamp Power/LiteLOC Setup window. Try increasing the lamp power. **NOTE:** *Older lamps may not reliably operate at significantly lower than rated power.*

2. An interlock may be interrupting lamp function. From the Main panel, click the LED in the top, left corner to open the Status window. Click Interlocks. If a failure is shown, interlock needs to be cleared before the lamp will light.

3. If EVB errors occur, check the door interlock.

4. The DMDs may be overheated. Check for an alarm condition. From the Main panel, click the LED in the top, left corner to open the Status window. Click Temperatures. If a DMD temperature is too high, the lamp will not ignite. Cool the projector and try again. Ensure there is proper ventilation, air filters are not blocked and liquid cooling reservoir has coolant and is circulating.

5. Replace the lamp. For more information, refer to *4.2.6 Lamp Replacement, on page 4-6*.

### 5.2.3 Flicker, Shadows Or Dimness

1. Ensure the douser is OPEN completely.

2. LampLOC™ may need re-adjustment.

3. LampLOC™ may be in the middle of its adjustment. Wait until LampLOC™ completes.

4. Adjust LampLOC™. In the Advanced Setup: LampLOC Setup window, click the **Do Auto** button.

5. Check the lamp power in the Advanced Setup: Lamp Power / LiteLOC Setup window to see if the power is consistent or varying. Try to increase lamp power, if possible. Lamps which are near end of life may not operate reliably at lowest power range.

6. Fold mirror misalignment (Christie service required).

7. Integrator rod misalignment (Christie service required).

### 5.2.4 LampLOC™ Does Not Seem to Work

1. If the Do Auto button of the LampLOC™ function does not work in the Advanced Setup: LampLOC Setup window, try adjusting the lamp position manually by clicking the **up/down/left/right/in/out** buttons in the LampLOC region. Watch the light level for changes indicating lamp movement, both on the TPC readout and on screen with a white test pattern.

2. If the motors do not respond, you can position the lamp manually. UV danger. Qualified service technician only. Turn OFF and cool down the lamp completely. Open the door with the proper safety equipment and then manually adjust the motors to ensure that they are free and moving smoothly.

3. If the lamp runs dim or the image displays poor uniform brightness, do the following:

   • Check that the anode yoke (lamp yoke) is in the correct position. (Figure 5-4)

   • Check that the flat part of the anode end of the lamp (if applicable) faces up in the anode yoke. For CDXL-20 and CDXL-30 lamps, the flat part of the anode end of the lamp should be positioned at the 2 or 10 o'clock position.
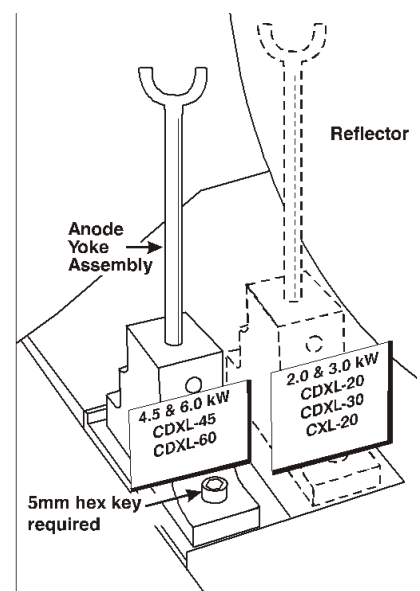


**Figure 5-4 Lamp Yoke Position**

### 5.2.5 LiteLOC™ Does Not Seem to Work

1. In the Advanced Setup: Lamp Power/LiteLOC™ Setup window, ensure LiteLOC™ is enabled.

2. If the lamp power has increased to its maximum in order to maintain a LiteLOC™ setting, LiteLOC™ is automatically terminated. If the values shown in the Advanced Setup: Lamp Power/LiteLOC™ Setup window indicate that the lamp power has reached this "over-drive" state, either reduce your LiteLOC™ setting or install a new lamp.

## 5.3 TPC

1.  If the TPC fails to initialize, re-boot the projector.

2.  A failed TPC usually indicates a system failure requiring service.

3.  If the TPC display is blank, touch the display screen to disable the screen saver. If the display screen is still blank, ensure the TPC is on by opening the flap at the back of the TPC and verify the grey button in the bottom left corner is ON. Also ensure that the connector is securely plugged into the back of the projector.

4.  If the locations of button presses on the screen seem to be misinterpreted, the TPC screen may need recalibrating. In the Administrator Setup: Preferences window, click the **Calibrate Screen** button and follow the onscreen instructions.

## 5.4 Ethernet

### 5.4.1 Trouble Establishing Communication with Projector

Ensure Ethernet settings are valid for the site. All devices should have the same subnet mask yet unique IP addresses.

## 5.5 Displays

Some of the following troubleshooting entries assume the use of a third-party input source for displaying alternative "non-cinema" material. Before proceeding, ensure to consult the documentation supplied with the external equipment.

### 5.5.1 Blank Screen, No Display of Cinema Image

1.  Ensure the lens cap is not on either end of the lens.

2.  Ensure the lamp is ON.

3.  Confirm all power connections are still OK.

4.  Ensure the douser is OPEN by verifying the state of the douser on Main panel as well as the state of the douser switch at the back of the projector in the top, left corner.

5.  Ensure any test pattern other than the full black test pattern displays properly.

6.  Is the correct display file selected?

7.  Is the correct cinema port connected for this display file (i.e., 292-A or 292-B)?
    Check connections.

### 5.5.2 Severe Motion Artifacts

Most likely there is a synchronization problem with reversed 3-2 pull-down in 60 Hz-to-24 Hz film-to-digital conversion in your source. The display file needs correction.

### 5.5.3 Image Appears Vertically Stretched or 'Squeezed' into Center of Screen

Source data converted from film and "pre-squeezed" for the CP4230 display format may require use of an anamorphic lens (or resizing) to regain full "scope" image width and proper proportions. Verify the Resolution and Aspect Ratio settings in the Advanced Setup: Source File Setup window as well as the Lens Factor in the Advanced Setup: Screen File Setup window.

### 5.5.4 No Image, Just Pink Snow

This problem is due to link encrypted cinema content not receiving the appropriate cryptographic key information from the source cinema server.

1. Ensure the projectors security lid is not unlocked or opened. A warning will display on the TPC. In the event it is, close and lock the lid, and pause or stop the show on the server. Then, press Play on the server and wait several seconds for the projector to receive the set of decrypting keys (from the server). If after 30 seconds the projector does not recover, pause or stop the show and try playing again. If this doesn't work, try resetting the server.

2. Check the Status window on the TPC for a tamper warning. If the lamp door is closed, the tamper switch may be faulty.

3. Ensure the IP octets for the projector and the server match. Change if necessary.

If you are running Cinema content, make sure the LD Bypass check box on the Channel Setup page is selected for the specific channel you are using.

### 5.5.5 Colors in the Display are Inaccurate

The color, tint, color space and/or color temperature settings may require adjustment at your input source or in the Channel Setup: Config 2 window. Ensure the correct PCF, TCGD and Color Space file for the source are used.

### 5.5.6  Display is Not Rectangular

1. Check the leveling of the projector. Ensure the lens surface and screen are parallel to one another.

2. Check the vertical offset. Adjust as necessary using the vertical offset knob or ILS.

3. Check that the anamorphic lens is straight. Rotate to orient aperture correctly.

4. Check the screen file. For more information, refer to *Advanced Setup: Screen File Setup Window, on page 3-43*.

### 5.5.7  Display is "Noisy"

1. Display adjustment at your input source may be required. From a DVD player or an input module setting, adjust pixel tracking, phase and filter. Noise is particularly common on YPbPr signals from a DVD player.

2. The video input may not be terminated. Ensure the video input is terminated (75 ohms). If it is the last connection in a loop-through chain, the video input should be terminated at the last source input only.

3. The input signal and/or signal cables carrying the input signal may be of poor quality.

4. If the distance between the input source device and the projector is greater than 25 feet, signal amplification/conditioning may be required.

5. If the source is a VCR or off-air broadcast, detail may be set too high.

## 5.5.8 Display has Suddenly Frozen

If the screen blacks out inexplicably, it is possible that excessive voltage noise on the AC or ground input has interrupted the projector's ability to lock on to a signal. Power down the projector and then power back up again.

## 5.5.9 Data is Cropped from Edges

To display the missing material, reduce image size to fill the display area available in the projector, then stretch vertically to fill the screen from top to bottom. Add the anamorphic lens to regain image width. Cropping could also be due to the screen file selected that has cropping configured. In both scenarios, refer to *Advanced Setup: Screen File Setup Window, on page 3-43* for more information.

## 5.5.10 The Projector is ON, but There is No Image

1. Ensure AC power is connected.

2. Make sure the lens cover is removed from the lens.

3. Make sure the douser is OPEN.

4. If the lamp is not ignited, click the **LAMP ON** button. If the lamp does not strike, refer to *5.2.1 Lamp Does Not Ignite, on page 5-2*.

5. Ensure the correct channel is selected with the appropriate configurations in the Channel Setup: Config 1 window.

6. Ensure an active source is connected properly. Check the cable connections and make sure the alternative source is selected.

7. Can you access test patterns? If so, check your source connections again.

## 5.5.11 The Display is Jittery or Unstable

1. If the non-cinema display is jittery or blinking erratically, ensure that the source is properly connected and is offering adequate quality for detection. With a poor quality or improperly connected source, the projector will repeatedly attempt to display an image, however briefly.

2. The horizontal or vertical scan frequency of the input signal may be out of range for the projector. Refer to *Section 6 Specifications* for scan frequency ranges.

3. The sync signal may be inadequate. Correct the source problem.

## 5.5.12 The Display is Faint

1. The source may be double terminated. Ensure the source is terminated only once.

2. The source (if non-video) may need sync tip clamping.

## 5.5.13 The Upper Portion of the Display is Waving, Tearing or Jittering

This can occur with video or VCR sources. Check your source.

## 5.5.14 Portions of the Display are Cut OFF or Warped to the Opposite Edge

Resizing may need adjustment. Adjust until entire image is visible and centered. For more information, refer to *Advanced Setup: Screen File Setup Window, on page 3-43*.

## 5.5.15 Display Appears Compressed (Vertically Stretched)

1. The frequency of the pixel sampling clock is incorrect for the current source.

2. Sizing and positioning options may be adjusted poorly for the incoming source signal.

3. Use an anamorphic lens for typical HDTV and anamorphic DVD sources that have been re-sized and vertically stretched, via 3rd-party software.

## 5.5.16 Display Quality Appears to Drift from Good to Bad, Bad to Good

1. The source input signal may be of low quality.

2. The H or V frequency of the input may have changed at the source end.

# 6 Specifications

*Due to continuing research, specifications are subject to change without notice.*

## 6.1 Display

### 6.1.1 Panel Resolution and Refresh Rate

Pixel format (H  x V square pixels)          2048 x 1080/4096 x 2160

Processing path          23.97 - 120Hz

3D (24 fps per eye input, DLP Cinema®

Processing), Full Image (2048 x 1080)          144 Hz (frame tripled)

### 6.1.2 Achievable Brightness (Measured at Screen Center)

|  | Nominal | Maximum |
|---|---|---|
| 2.0 kW (CDXL-20) | 8,000 lumens | 10,000 lumens |
| 3.0 kW (CDXL-30) | 14,000 lumens | 16,000 lumens |
| 4.5 kW (CDXL-45) | 20,000 lumens | 23,000 lumens |
| 6.0 kW (CDXL-60) | 30,000 lumens | 32,500 lumens |

**NOTES**: **1)** *Center point measurement only, with new lamp running at rated nomial power, except CDXL-60 lamps being run at 6.6kW.* **2)** *Color corrected per TI's DLP Cinema® Trademark Guideline (2503068).*

### 6.1.3 Achievable Contrast Ratio

450:1 ANSI, 1850:1 Full Frame ON/OFF

### 6.1.4 Color and Grayscale Resolution

Displayable colors          35.2 trillion

Grayscale resolution          45 bits total linear, 15 bits per RGB component

### 6.1.5 White Point

Theatres:          $x = 0.314 \pm 0.002$

Nominal White *(full white, after calibration to Telecine mode)*          $y = 0.351 \pm 0.002$

Review Rooms:          $x = 0.314 \pm 0.002$

Nominal White *(full white, after calibration to Telecine mode)*          $y = 0.351 \pm 0.002$

### 6.1.6 Gamma

| | |
|---|---|
| Theater (nominal) | $2.6 \pm 5\%$ |
| Review Rooms (nominal) | $2.6 \pm 2\%$ |

## 6.2 Source Signal Compatibility

### 6.2.1 Cinema Inputs

- Number of inputs     2
- Standard supported     SMPTE 292M bit-serial
- Connector type     BNC

**Table 6.1 Standard Single-link SMPTE 292M Formats**

| Source Standard | Original Source Resolution | Vertical Frequency (Hz) | Scan Type | Display Frame Rate (Hz) |
|---|---|---|---|---|
| | 640x 480 | up to 60 | Progressive | up to 60 |
| | 720 x 525 | up to 60 | Interlaced | up to 60 |
| SMPTE 296M | 1280 x 720 | 23.98 / 24 | Progressive | 23.98 / 24 |
| SMPTE 296M | 1280 x 720 | 25 | Progressive | 25 |
| SMPTE 296M | 1280 x 720 | 29.97 / 30 | Progressive | 29.97 / 30 |
| SMPTE 296M | 1280 x 720 | 48 | Progressive | 48 |
| SMPTE 296M | 1280 x 720 | 50 | Progressive | 50 |
| SMPTE 296M | 1280 x 720 | 59.94 / 60 | Progressive | 59.94 / 60 |
| SMPTE 274M | 1920 x 1080 | 23.98 / 24 | Progressive | 23.98 / 24 |
| SMPTE 274M | 1920 x 1080 | 25 | Progressive | 25 |
| SMPTE 274M | 1920 x 1080 | 29.97 / 30 | Progressive | 29.97 / 30 |
| SMPTE 295M | 1920 x 1080 | 50 | Interlaced | 25 |
| SMPTE 274M | 1920 x 1080 | 50 | Interlaced | 25 |
| SMPTE 274M | 1920 x 1080 | 59.94/60 | Interlaced | 29.97/30 |
| SMPTE RP 211 | 1920 x 1080 | 23.98/24 | Progressive (sF) | 23.98/24 |
| SMPTE RP 211 | 1920 x 1080 | 25 | Progressive (sF) | 25 |
| SMPTE RP 211 | 1920 x 1080 | 29.97/30 | Progressive (sF) | 29.97/30 |
| SMPTE RP 428-9 | 2048 x 1080 | 24 | Progressive | 24 |
| SMPTE RP 428-9 | 2048 x 1080 | 24 | Progressive (sF) | 24 |
| SMPTE RP 428-19 | 2048 x 1080 | 25 | Progressive | 25 |
| SMPTE RP 428-19 | 2048 x 1080 | 25 | Progressive (sF) | 25 |
| SMPTE RP 428-19 | 2048 x 1080 | 30 | Progressive | 30 |
| SMPTE RP 428-19 | 2048 x 1080 | 30 | Progressive (sF) | 30 |

**Table 6.2  Dual-link SMPTE 372M Formats**

| Source Standard | Original Source Resolution | Vertical Frequency (Hz) | Scan Type | Display Frame Rate (Hz) |
|---|---|---|---|---|
| | 640x 480 | up to 60 | Progressive | up to 60 |
| | 720 x 525 | up to 60 | Interlaced | up to 60 |
| **SMPTE 296M** | 1280 x 720 | 23.98 / 24 | Progressive | 23.98 / 24 |
| **SMPTE 296M** | 1280 x 720 | 25 | Progressive | 25 |
| **SMPTE 296M** | 1280 x 720 | 29.97 / 30 | Progressive | 29.97 / 30 |
| **SMPTE 296M** | 1280 x 720 | 48 | Progressive | 48 |
| **SMPTE 296M** | 1280 x 720 | 50 | Progressive | 50 |
| **SMPTE 296M** | 1280 x 720 | 59.94 / 60 | Progressive | 59.94 / 60 |
| **SMPTE 274M** | 1920 x 1080 | 23.98 / 24 | Progressive | 23.98 / 24 |
| **SMPTE 274M** | 1920 x 1080 | 25 | Progressive | 25 |
| **SMPTE 274M** | 1920 x 1080 | 29.97 / 30 | Progressive | 29.97 / 30 |
| **SMPTE 295M** | 1920 x 1080 | 50 | Interlaced | 25 |
| **SMPTE 274M** | 1920 x 1080 | 50 | Interlaced | 25 |
| **SMPTE 274M** | 1920 x 1080 | 59.94/60 | Interlaced | 29.97/30 |
| **SMPTE RP 211** | 1920 x 1080 | 23.98/24 | Progressive (sF) | 23.98/24 |
| **SMPTE RP 211** | 1920 x 1080 | 25 | Progressive (sF) | 25 |
| **SMPTE RP 211** | 1920 x 1080 | 29.97/30 | Progressive (sF) | 29.97/30 |
| **SMPTE RP 428-9** | 2048 x 1080 | 24 | Progressive | 24 |
| **SMPTE RP 428-9** | 2048 x 1080 | 24 | Progressive (sF) | 24 |
| **SMPTE RP 428-19** | 2048 x 1080 | 25 | Progressive | 25 |
| **SMPTE RP 428-19** | 2048 x 1080 | 25 | Progressive (sF) | 25 |
| **SMPTE RP 428-19** | 2048 x 1080 | 30 | Progressive | 30 |
| **SMPTE RP 428-19** | 2048 x 1080 | 30 | Progressive (sF) | 30 |
| **SMPTE 292 x 2** | 2048 x 1080 | 24 x 2 | Progressive | 96 or 144 |

**NOTES: 1)** *All formats supported at 10 bit 4:2:2 YCbCr or lower. ** DCI formats (SMPTE 428-9) are supported at 12 bit 4:4:4 XYZ.* **2)** *When both SMPTE 292M inputs are used together in a dual-link configuration they will support all the formats listed in Table 6.1 in 4:4:4 YCbCr or RGB format with 10 or 12 bits per component. Also supported is 4:2:2 YCbCr progressive input with 10 or 12 bits per component and a pixel format of 1920 x 1080 at 47.96 or 48 fps.* **3)** *For 3D content, the supported format is 4:2:2 YCbCr 10 bit per eye.*

## 6.2.2 Non-Cinema DVI Inputs (for Alternate Content)

- Number of inputs                              2
- Standard supported                          VESA Digital Visual Interface (DVI-D)
- Connector type                                24-pin female DVI-D

**Table 6.3 Format for Generic Inputs to DVI-D Ports, Single-Link**

**NOTE**: *All formats listed are 4:4:4 RGB.*

| Source Pixel Format | Bits / Comp | Vertical Rates |
|---|---|---|
| **640 x 480** | 8 | 59.94 / 60 Hz |
| **1280 x 720** | 8 | 59.94 / 60 Hz |
| **1920 x 1080** | 8 | 59.94 / 60 Hz |
| **720 x 480** | 8 | 59.94 / 60 Hz |
| **1280 x 720** | 8 | 50 Hz |
| **1920 x 1080** | 8 | 50 Hz |
| **1440 x 480** | 8 | 59.94 / 60 Hz |
| **1920 x 1080** | 8 | 59.94 / 60 Hz |
| **1440 x 576** | 8 | 50 Hz |
| **1920 x 1080** | 8 | 23.98 / 24 Hz |
| **1920 x 1080** | 8 | 25 Hz |
| **1920 x 1080** | 8 | 29.97 / 30 Hz |

**Table 6.4 Format for Generic Inputs to DVI-D Ports, Twin Link**

**NOTE**: *All formats listed are 4:4:4 RGB.*

| Source Pixel Format | Bits / Comp | Vertical Rates |
|---|---|---|
| **640 x 480** | 10 | 59.94 / 60 Hz |
| **1280 x 720** | 10 | 59.94 / 60 Hz |
| **1920 x 1080** | 10 | 59.94 / 60 Hz |
| **1280 x 720** | 10 | 50 Hz |
| **1920x1080** | 10 | 50 Hz |
| **1440 x 480** | 10 | 59.94 / 60 Hz |
| **1920 x 1080** | 10 | 59.94 / 60 Hz |
| **1440 x 576** | 10 | 50 Hz |
| **1920 x 1080** | 10 | 50 Hz |
| **1920 x 1080** | 10 | 23.98 / 24 Hz |
| **1920 x 1080** | 10 | 25 Hz |
| **1920 x 1080** | 10 | 29.97 / 30 Hz |

## 6.3 Control Signal Compatibility

### 6.3.1 Ethernet Port

| | |
|---|---|
| Interface | 10Base-T/100-Base-TX |
| Connector | Female RJ-45 |
| Bit Rate | 100 Mbps |

### 6.3.2 RS232-PIB

| | |
|---|---|
| Interface | TIA-232 |
| Connector | 9-pin subminiature D, female |
| Bit Rate | 115,200 bps |
| Data Format | 1 start bit, 8 data bits, 1 stop bit, no parity |
| Communication Protocol | Christie Serial Protocol |

### 6.3.3 RS232-ICP

| | |
|---|---|
| Interface | TIA-232 |
| Connector | 9-pin subminiature D, female |
| Bit Rate | 38,400 (default); 57,600; 115,200 bps not auto-detected |
| Flow Control | Hardware (RTS/CTS) |
| Data Format | 1 start bit, 8 data bits, 1 stop bit, parity odd |

### 6.3.4 GPIO Port

| | |
|---|---|
| Interface | Opto-LED inputs, transistor outputs |
| Connector | 37-pin subminiature D, female |
| Number of I/O Lines | 16 - 8 inputs, 8 outputs including 1 health signal output |
| Type of Connection | Opto-isolated |
| Input Current | 5mA nominal, 50mA maximum |
| Output Current | 50mA maximum |
| Input Forward Voltage Drop | 1.1V nominal, 1.4V maximum (@5mA) |

### 6.3.5 Simple Contact Closure Interface (SCCI) Port

| | |
|---|---|
| Interface | Opto-LED inputs, TTL voltage outputs |
| Connector | 9-pin subminiature D, female |
| Number and type of I/O | Input 1 - Lamp Off |
| | Input 2 - Lamp On |
| | Input 3 - Douser Open |
| | Input 4 - Douser Closed |
| | Output 1 - Projector Health (high = health ok) |
| Input Current | 5mA nominal, 50mA maximum |
| Input forward voltage drop | 1.1V nominal, 1.4V maximum (@5mA) |

### 6.3.6 3D Port

| | |
|---|---|
| Interface | Proprietary 3D connector |
| Connector | 15-pin subminiature D, female |
| Bit Rate | 1,200 bps |
| Flow Control | Software |
| Data Format | 1 start bit, 8 data bits, 1 stop bit, no parity |
| Communication Protocol | RS232 and GPIO |

### 6.3.7 Lamp Power Supply (LPS)

**Control Port**

| | |
|---|---|
| Interface | RS232 |
| Connector at Lamp Power Supply End | 9-pin subminiature D, male |

**Interlock Port**

| | |
|---|---|
| Interface | +5V TTL-compatible, opto-isolated at LPS end |
| Connector at Lamp Power Supply End | 9-pin subminiature D, female |
| Number and Type of Signals | 1 - lamp enable (low = enable lamp) |
| | 3 - safety interlock (high = disable lamp) |
| | 1 - +5V to power opto-isolation interface |

### 6.3.8 MALM (located on Auxiliary Input Panel)

| | |
|---|---|
| Interface | 3.3V CMOS |
| Connector | 9-pin subminiature D, female |
| Number of I/O Lines | 4 GPIO |

## 6.4    Touch Panel Controller (660E)

| | |
|---|---|
| Type of Display | Color VGA TFT LCD, backlit |
| Display Size | 144.8 mm (5.7 inches) diagonal |
| Display Resolution (H x V pixels) | 640 x 480 |
| Maximum Dimensions (W x H x D) | 195 mm x 148 mm x 44.4 mm |
| Integrated Operating System | Microsoft Windows® XPe |
| Communication Interface with Projector | 10/100BaseT Ethernet |
| Power Requirement | 1.02 A maximum at 24VDC ± 10% |
| Interface Connector | 12-pin Circular connector (push-pull) |

## 6.5    Touch Panel Controller (650H)

| | |
|---|---|
| Type of Display | Color VGA TFT LCD, backlit |
| Display Size | 144.8 mm (5.7 inches) diagonal |
| Display Resolution (H x V pixels) | 640 x 480 |
| Maximum Dimensions (W x H x D) | 195 mm x 148 mm x 58 mm |
| Integrated Operating System | Microsoft Windows® XPe |
| Communication Interface with Projector | 10/100/1000 BaseT Ethernet |
| Power Requirement | 0.71A maximum at 24VDC ± 10% |
| Interface Connector | 12-pin Circular connector (push-pull) |

## 6.6    Power Requirements

### 6.6.1   Projection Head

**AC Input**

| | |
|---|---|
| Voltage Range | 200 - 240 VAC |
| Line Frequency | 50 Hz - 60 Hz nominal |
| Inrush Current | 70 A maximum |
| Current Consumption | 6 A maximum (at 200 VAC) |
| Power Consumption | 120 W maximum |
| Current Rating of AC Input | 10-15 A maximum (Specified Wall Breaker) |

**Lamp (DC)**

| | |
|---|---|
| Operating Voltage Range | 18-46 VDC |
| Start-up Voltage (Open Current) | 135-175 VDC |
| Operating Current Range | 50-180 A |
| Connector Type | Field Wireable Lugs |

## 6.6.2 7kW Lamp Power Supply

| | |
|---|---|
| Nominal Voltage Range | Low line: 200-230 VAC |
| | High line: 380-415 VAC |
| Operating Voltage Range | Low line: 180-253 VAC |
| | High line: 342-456 VAC |
| Number of Phases | 3 |
| Line Frequency | 50-60Hz nominal |
| Inrush current | 120 A max. |
| Current per Phase | Low line: 35 A max. |
| | High line: 23 A max. |
| Power Consumption | 8.8 kW max. (at max. output for 6kW lamp plus head) |
| Current Rating of 3Phase AC Input | 37A |

### Lamp Power Supply Output to Projection Head

| | |
|---|---|
| Operating Voltage Range | 18-46 VDC |
| Start-up Voltage (Open Current) | 125-155 VDC |
| Operating Current Range | 50-180 A |
| Ripple | 1% max (at 25°C, rated input and rated output) |
| Connector Type | Field Wireable Lugs |

### Lamp Power Supply Power Receptacle Output

| | |
|---|---|
| Operating Voltage Range | 200-230 VAC |
| Operating Current Range - Projection Head | 6 A |
| Operating Current Range - Heat Extractor | 1 A |
| Current Rating of Input | Both run from 15 A breaker (internal) |

## 6.6.3 UPS AC Input

| | |
|---|---|
| Voltage Range | 100 - 240 VAC |
| Line Frequency | 50 Hz - 60 Hz nominal |
| Inrush Current | 70 A maximum |
| Current Consumption | 12 A maximum at 100 VAC |
| Power Consumption | 1200 W maximum |
| Current Rating of AC Input | 15 A maximum (Specified Wall Breaker) |

## 6.7 Lamp

| | |
|---|---|
| Type: | Xenon bubble |

Power (software adjustable):

| | |
|---|---|
| CDXL-20 | 1000W min., 2000W nom., 2200W max. |
| CDXL-30 | 1800W min., 3000W nom., 3300W max. |
| CDXL-45 | 2700W min., 4500W nom., 4950W max. |
| CDXL-60 | 3600W min., 6000W nom., 6600W max. |

**NOTES**: **1)** *The lamp power supply is current regulated to a maximum of 180 A.. Therefore the maximum power specification for a given lamp may not be achievable until the lamp has aged, since lamp voltage increases with hours of use.*
**2)** *The maximum power of the lamp power supply is restricted to 7000W ± 100W.*

Average Life:

| | |
|---|---|
| CDXL-20 | 3500 hours |
| CDXL-30 | 2500 hours |
| CDXL-45 | 900 hours |
| CDXL-60 | 1000 hours |

| | |
|---|---|
| Wait time between lamp strikes: | 2 minutes min. |

**NOTE**: *Projectors typically force a 10 minute cool down period. Ensure you do not re-strike the lamp any sooner than 2 minutes into this cool down period since hot re-strikes reduce lamp life.*

Other lamps with bulb diameters not exceeding 70mm may also be used, however the projector may not meet its specified light output rating. Such lamps include the following:

| | |
|---|---|
| CXL-20 | (2.0kW Xenolite® bulb) |

**NOTE**: *CXL-20 lamp requires lamp adaptor kit listed below in Section 6.11.2 Accessories (sold separately)*

| | |
|---|---|
| CXL-30 | (3.0kW Xenolite® bulb) |

## 6.8 Physical Specifications

| | |
|---|---|
| Overall Size (L x W x H): | 1211 mm (47.7 inches) x 635 mm (25.0 inches) x 483 mm |
| *(including lens mount, stack and feet)* | (19.0 inches) |

Weight:

| | |
|---|---|
| As installed with lens | 111 kg (245 lbs) |
| Shipping (includes packaging) | 143 kg (315 lbs) |

Operating Position:

| | |
|---|---|
| Rotation about projection axis | ± 15 degrees maximum |
| Tilt of projection axis from horizontal | ± 15 degrees maximum |

## 6.9    Regulatory

This product conforms to the following requlations related to product safety, environmental requirements and electromagnetic compatibility (EMC):

### 6.9.1  Safety

CAN/CSA C22.2 No. 60950-1-07, 2007

UL 60950-1, 2nd Edition

IEC 60950-1:2005, 2nd Edition

EN60950:2006+A11:2009

### 6.9.2  Electro-Magnetic Compatibility

**Emissions**

FCC CFR47, Part 15, Subpart B, Class A - Unintentional Radiators

CISPR 22:2008-09/EN 55022:2006+A1:2007, Class A - Information Technology Equipment

**Immunity**

CISPR 24:1997 (Modified) +A1:2001+A2:2002/ EN55024: 1998+A1:2001+A2:2003 EMC

 Requirements - Information Technology Equipment

**Environmental**

EU Directive (2002/95/EC) on the retriction of the uses of certain hazardous substances (RoHS) in electrical and electronic equipment and the applicable official amendment(s)

EU Directive (2002/96/EC) on waste and electical and electronic equipment (WEEE) and the applicable official amendment(s)

Japanese industrial standard (JIS C 0950:2005) on marking for the presence of specific chemical substances for electrical and electronic equipment.

China Ministry of Information Industry Order No.39 (02/2006) on the control of pollution caused by electronic information products, hazardous substances concentration limits (SJ/T11363-2006), and the applicable product marking requirements (SJ/T11364-2006)

## 6.10   Environment

### 6.10.1 Operating Environment

| | |
|---|---|
| Temperature | 10°C to 35°C (50°F to 95°F) |
| Humidity (non-condensing) | 20% to 80% |
| Altitude | 0 - 3000 meters |
| Maximum ambient temperature | 35°C |

### 6.10.2 Non-Operating Environment

| | |
|---|---|
| Temperature | -25°C to 65°C (-13°F to 149°F) |
| Humidity (non-condensing) | 0% to 95% |

## 6.11 Accessories

### 6.11.1 Standard (Included with product)

Touch Panel Controller (TPC) with interface cable

User Manual and Setup Guide

Interconnect Diagram

Lens Mount Cover

Motors and Zoom kit for motorized lens mount

Light Engine removal tool

Convergence tool

### 6.11.2 Accessories (sold separately)

• Lenses (prime and auxiliary)

<u>High Brightness Prime Zoom Lenses</u>

• 1.25-1.45 DLPCine HB Zoom Lens (108-274101-01)
• 1.25-1.83 DLPCine HB Zoom Lens (108-342100-01)
• 1.45-2.05 DLPCine HB Zoom Lens (108-335102-01)
• 1.6-2.4 DLPCine HB Zoom Lens (108-336103-01)
• 1.8-3.0 DLPCine HB Zoom Lens (108-337104-01)
• 2.15-3.6 DLPCine HB Zoom Lens (108-338105-01)
• 3.0-4.3 DLPCine HB Zoom Lens (108-278101-01)
• 4.3-6.0 DLPCine HB Zoom Lens (108-279101-01)
• 5.5-8.0 DLPCine HB Zoom Lens (108-280101-01)

<u>High Contrast Prime Zoom Lenses</u>

• 1.25-1.45 DLPCine HC Zoom Lens (38-809079-51)
• 1.45-1.8 DLPCine HC Zoom Lens (38-809061-51)
• 1.8 - 2.4 DLPCine HC Zoom Lens (38-809052-01)
• 2.2-3.0 DLPCine HC Zoom Lens (38-809053-01)
• 3.0-4.3 DLPCine HC Zoom Lens (38-809069-01)
• 4.3-6.1 DLPCine HC Zoom Lens (38-809081-01)
• 5.5-8.5 DLPCine HC Zoom Lens (38-809080-01)

Auxiliary Lenses

- 1.25x Anamorphic Lens (38-809054-01, 38-809054-51)
- 1.26x Wide Converter Lens (108-281101-01)

    **NOTE**: *Use of the Anamorphic or Wide Converter Lens requires the Motorized Auxiliary Lens Mount (MALM).*

- Motorized Auxiliary Lens Mount (108-111101-xx & 108-111102-xx)
- Rack Stand (108-282101-02)
- Bracket Foot Lock *used with optional Rack Stand* (116-100101-01)
- High-contrast Internal Aperture Kit (38-813028-51)
- Service Manual *(available online)*
- Replacement Lamps
    - 03-000695-01P CDXL-20
    - 03-000696-01P CDXL-30
    - 003-000600-02 CDXL-45
    - 003-000601-02 CDXL-60
    - 108-306101-01 CDXL-60SD
- Replacement Air Filters
    - 003-001184-01 Light Engine Filter (5-pack)
    - 003-003082-01 Liquid Cooling Radiator Filter
    - 03-001982-51P LAD Filter (3-pack)
- DLP Cinema™ Firmware Installation Program
- Liquid Cooling Kit (003-001837-xx)
- TPC Remote Cable (003-111169-01)
- Lamp Adaptor Kit for CXL-20 (003-001728-01)
- Link Decryptor (003-120535-01)

# Appendix A: Intelligent Lens System

## A.1 Intelligent Lens System

The Intelligent Lens System (ILS) automates the process of adjusting the Focus, Horizontal (X) and Vertical (Y) Offset, and Zoom in real-time using a motorized lens mount. ILS settings are saved in a file called ILS Flat, ILS Scope, or a user-defined file(s) where each channel specifies the ILS file to use. For more information on channel settings, refer to *Channel Setup: Config 1 Window, on page 3-22*.
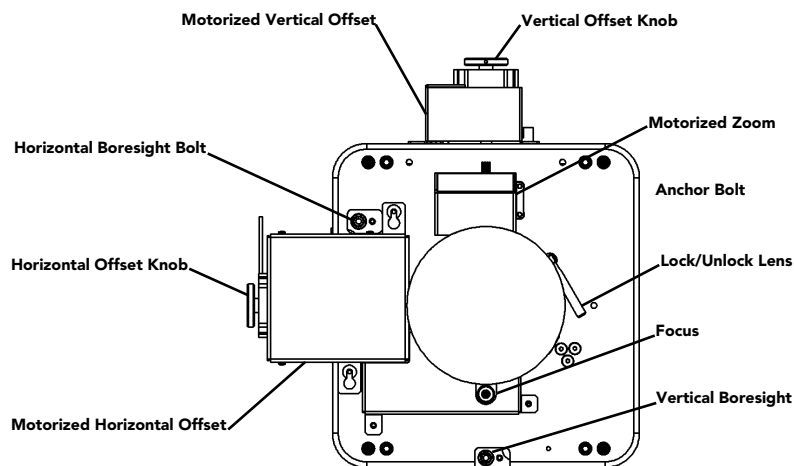


**Figure A-1 Anatomy of the Lens Mount**

When the ILS is installed (**ILS Installed** check box in the Advanced Setup: Lens Setup window is selected), you can choose if you want to move the lens when the channel changes or have the lens remain in the current position regardless if the channel changes. Ensure the projector is fully assembled and powered up in its final location before making any ILS adjustments. Also, ensure the proper lens type is selected from the Advanced Setup: Lens Setup window.

### Enable Automatic ILS Selected

When the **Enable Automatic ILS** check box is selected, the ILS adjusts each motor for the focus, offset, and zoom to automatically move the lens based on the settings in the selected ILS file. Changing channels will change the position of the lens, assuming the new channel uses a different ILS file. To make adjustments to an ILS file, use the motorized lens mount adjustment features in the Advanced Setup: ILS File Setup window or Lens Adjust window from the Main panel to adjust the focus, zoom and offset values. For more information, refer to *Advanced Setup: ILS File Setup Window, on page 3-37* and *Lens Adjust, on page 3-5*. **NOTE:** *Any changes made to the focus, offset and zoom values will overwrite the current values in the ILS file, therefore these changes will affect every channel that uses this ILS file.*

### Enable Automatic ILS NOT Selected

When the **Enable Automatic ILS** check box is NOT selected, the lens does not move unless you make adjustments to the focus, offset and zoom from the Lens Adjust window launched from the Main panel (the ILS File Setup window is not available when the **Enable Automatic ILS** check box is not seleted). These settings will NOT overwrite the ILS values and changing channels will not affect the position of the lens.

The following table provides an example of what happens to the lens position and saved ILS Flat values when you adjust the focus, zoom, and offset in both states of the Enable Automatic ILS feature.

**Table A.1 Example - ILS Flat Values and Lens Position with Enable Automatic ILS**

| | Starting Position | Adjust ILS Flat Values with Enabled Automatic ILS Selected | | | Adjust ILS Flat Values with Enabled Automatic ILS NOT Selected | | |
|---|---|---|---|---|---|---|---|
| | **Original ILS Flat Values** | Adjusted Lens Position | **ILS Flat Values** (New positions are saved to the ILS file) | Change to a Channel with ILS Scope Values (Changing channels changes the lens position) | Adjusted Lens Position | Lens Position **ILS Flat Values** (New positions are not saved to the ILS file) | Change to a Channel with ILS Scope Values (Changing channels does not change the lens position) |
| Focus | -155 | -200 | -200 | 0 | -200 | -155 | -200 |
| Zoom | 100 | 125 | 125 | 25 | 125 | 100 | 125 |
| Horizontal Offset (x) | 0 | 35 | 35 | 15 | 35 | 0 | 35 |
| Vertical Offset (y) | 256 | 375 | 375 | 200 | 375 | 256 | 375 |

Using the offset, focus, and zoom knobs on the lens mount does not save the settings to the ILS file. These settings will be lost once the **Enable Automatic ILS** check box is selected in the Advanced Setup: Lens Adjust window.

## A.1.1 Lens Mount Functions

⚠ **WARNING** 1) If present, move the Motorized Auxiliary Lens Mount (MALM) to the OUT position before performing any lens calibrate or reset functions on the Motorized Primary Lens Mount to prevent collision between the projection lens and the MALM. 2) Hazardous moving parts. Keep fingers and other body parts away. Remotely operated motors may start to spin without warning. Keep clear of rotating parts and avoid long hair, jewelry, and loose clothing exposure to the knobs during manual adjustment.

**NOTES: 1)** *In case of emergency, unplug the interface cable at the top left corner above the lens mount to immediately halt movement of the lens mount.* **2)** *Only Advanced users can modify channel settings.* **2)** *The* **ILS Installed** *check box in the Advanced Setup: Lens Setup window must be selected for all ILS adjustments.*
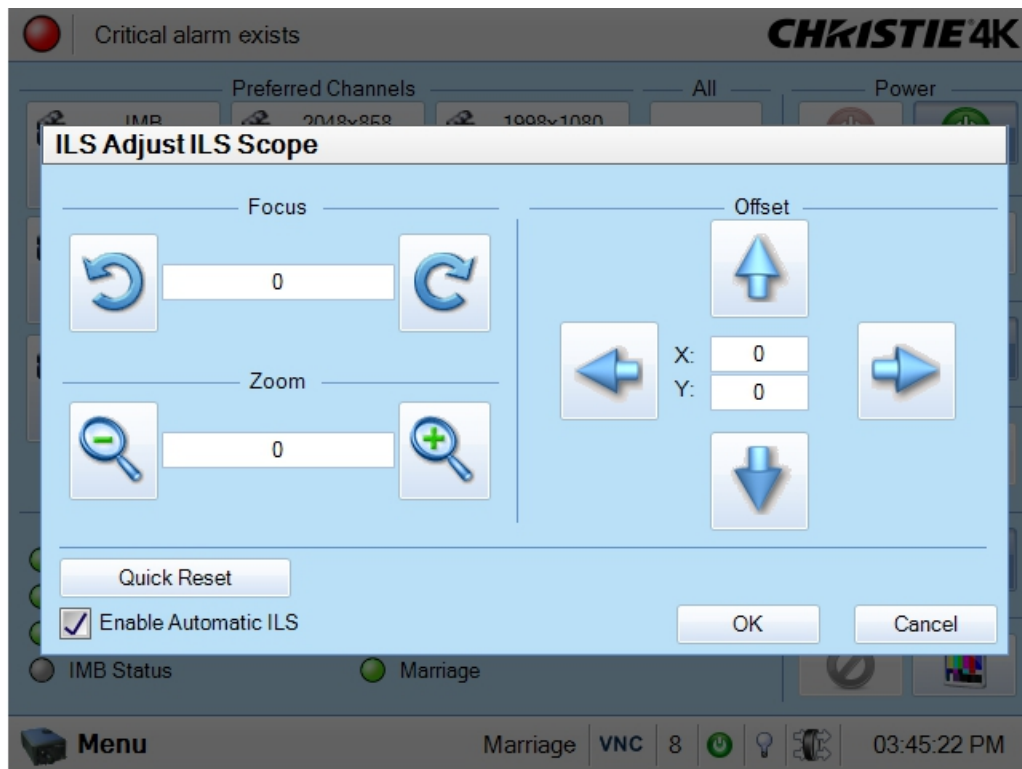


**Figure A-2 Intelligent Lens System**

**Access the ILS**

- From the Main panel, click the **Lens Adjust** button.
- From the Advanced Setup window, select the ILS File Setup window.

**Enable ILS Per Channel**

The ILS adjusts each motor for the Zoom, Offset, and Focus based on the ILS settings of the selected channel when ILS is enabled.

1. From the Main panel, select one of the available channels.

2. Click the **Test Patterns** button from the Main panel and select a test pattern.

3. Click the **Lens Adjust** button from the Main panel to launch the ILS Adjust window.

4. Select the **Enable Automatic ILS** check box to automatically apply the active channel settings.

**Permanently Alter the Active ILS Settings**

1. Ensure the **Enable Automatic ILS** check box is selected.

2. Adjust the focus, Horizontal (X) and Vertical (Y) offset or zoom by clicking the applicable button. Adjustments can take place one step at a time or via continuous movement by holding the button down. **NOTE**: *This over-writes the ILS settings.*

**Maintain Lens Position Regardless of Selected Channel**

1. Clear the **Enable Automatic ILS** checkbox. **NOTE**: **1)** *When the* **Enable Automatic ILS** *check box is NOT selected, ILS adjustments can only be made from the ILS Adjust window which is launched by clicking the* **Lens Adjust** *button from the Main panel.*

2. Adjust the focus, Horizontal (X) and Vertical (Y) offset, and zoom by clicking the applicable button. **NOTE**: *This does not over-write the system settings for the ILS. If* **Enabled Automatic ILS** *is selected again, the ILS will position the lens to the saved channel settings.*

3. If the **Quick Reset** or **Lens Calibration** buttons are clicked in the Advanced Setup: Lens Setup window, the lens returns to this remembered location. Also, this setting is remembered across system resets and reboots.

**Focus**

Click the left (retract) /right (extend) buttons as necessary for overall focus improvements.

**Zoom**

Click the left (zoom out) / right (zoom in) buttons to enlarge or shrink the image in each direction as necessary.

**Offsets**

Click the **up/down/left/right** buttons as necessary to center the image within the screen. For best results, avoid extreme tilts or offsets. Corner vignettes on a white test pattern indicates extreme offset that should be avoided. If you need more vertical offset range, you can mechanically adjust tilt to help compensate for significant differences in screen and lens height.

## A.1.2 Reset the ILS

The ILS must be reset when:

- the lens has been physically bumped or moved
- manual adjustments have been made to zoom or focus
- a power outage or brown-out occurred during a channel change
- ILS settings are drifting within a short period of time

To reset the ILS, click the **Quick Reset** button from the Advanced Setup: Lens Setup window. **NOTE**: *If the* **Quick Reset** *button is selected when* **Enable Automatic ILS** *is NOT selected, the lens will return to the remembered setting.*

## A.1.3 Calibrate the ILS

The ILS must be calibrated when:

- a new lens has been installed
- the zoom ring has been adjusted

To calibrate the ILS, click the **Full Calibration** button. **NOTE**: *If the* **Full Calibration** *button is selected when* **Enable Automatic ILS** *is NOT selected, the lens will return to the remembered setting.*

# Appendix B: Serial API

| Auxiliary Motorized Lens (AML) | |
|---|---|
| Control the motorized auxiliary lens (anamorphic or converter lens). Reset all preference and configuration settings in the device to their default values. The value of 111 must be sent with each of the sub codes as well as the default. The number 111 helps prevent accidental use of this control. Select data packing format for selected input. | |
| **SUBCODE** | **DESCRIPTION OF USE** |
| **CALI\*** | 1, send command to find the center position of the sensor for MALM. |
| **Cxxx** | Replace xxx with channel number. Valid range is 101 - 164. |
| **INST** | 0-1, the flag to indicate if MALM is installed. |
| **LENI\*** | The number of steps to move MALM to lens in position where (AML1) is set |
| **LENO\*** | The steps to move MALM to lens out position where (AML0) is set |
| **NONE** | Set auxiliary lens position:<br>0 - lens removed from optical path,<br>1 - lens inserted in optical path |
| **POSI\*** | Returns where MALM is located. Read-only command. |
| \* command not applicable on all projectors<br>EXAMPLES:<br>(AML?) Get the current status of auxiliary lens.<br>(AML+C108 1) Use auxiliary lens on channel 108.<br>(AML+C108?) Query auxiliary lens setting for channel 108.<br>(AML+C108!001) Response from previous query.<br>(AML+INST 1) Set flag for using MALM, otherwise MALM is ignored<br>(AML+LENI -300) Move lens to -300 for lens in position<br>(AML+LENO 6000) Move lens to 6000 for lens out position<br>(AML+POSI ?) Query where the lens is | |

| Automatic Scan Type Detection (ASD) | |
|---|---|
| Set the Automatic Scan Type Detection ON or OFF for the current channel. | |
| **SUBCODE** | **DESCRIPTION OF USE** |
| **Cxxx** | Replace xxx with channel number. Valid range is 101 - 164. |
| **NONE** | Select use Automatic Scan Type Detection for the current channel. |
| EXAMPLES:<br>(ASD?) Get the current status of Automatic Scan Type Detection on the current active channel.<br>(ASD+C108?) Get the current status of Automatic Scan Type Detection on the provided channel.<br>(ASD+C108 1) Use Automatic Scan Type Detection on channel 108.<br>(ASD+C108 0) Do not use Automatic Scan Type Detection on channel 108. | |

| Baud Rate (BDR) | |
|---|---|
| Set the baud rate for a serial communications port. | |
| SUBCODE | DESCRIPTION OF USE |
| **PRTA** | Set the baud rate on port A. Rates can be 1200, 2400, 9600, 19200, 38400, 57600, or 115200. |
| EXAMPLES:<br>(BDR+PRTA6) Set baud rate on port A to 115200 bits per second<br>(BDR+PRTA?) Get baud rate (BDR+PRTA!006 "115200) | |

| Channel (CHA) | |
|---|---|
| Select Channel configuration to use. Channel range is 101 to 164. Channel configuration sets the input routing and image processing options for input signals. | |
| SUBCODE | DESCRIPTION OF USE |
| **NONE** | Select Channel. Valid range 101 - 164 |
| EXAMPLES:<br>(CHA?) Get current active channel<br>(CHA 108) Set channel 108 as active channel | |

| Channel Icon (CHI) | |
|---|---|
| Set icon file name and path for the specified channel. This selects the icon to be displayed on the Web UI for the channel button. | |
| SUBCODE | DESCRIPTION OF USE |
| **Cxxx** | Replace xxx with the channel number. Valid range is 101 - 164. |
| **NONE** | Select icon for the current channel. |
| EXAMPLES:<br>(CHI+C108 "/etc/data/icons/ch108.ico") Use ch 108.ico for channel 108.<br>(CHI+C108 ?) Get icon file name and path for channel 108.<br>(CHI?L) List all available channel icon entries. | |

| Color Space (CSP) | |
|---|---|
| Color space control, color space file will be set when PCF in Use (PIU) is OFF. This control describes the source colorimetry information. Can use index or text string to set control. | |
| SUBCODE | DESCRIPTION OF USE |
| **Cxxx** | Replace xxx with the channel number. Valid range is 101 - 164. |
| **NONE** | Select color space for the current channel |
| EXAMPLES:<br>(CSP+C108 "RGB Unity") Use file "RGB Unity" on channel 108<br>(CSP+C108?) Get color space file name on channel 108<br>(CSP?L) List all entries of color space control | |

| Defaults (DEF) |
|---|

This control will reset all preference and configuration settings in the device to their default values. The value of 111 must be sent with each of the sub codes as well as the default. The number 111 helps prevent accidental use of this control. Select data packing format for selected input.

| SUBCODE | DESCRIPTION OF USE |
|---|---|
| **CHAN** | Restore default channel settings for specified channel. 0 defaults all channels. |
| **CONF** | Restore default configuration settings. |
| **PREF** | Restore default preferences. |
| **UNSV** | Restore unsaved controls. |
| **USER** | Clears all users and restores the factory default user. |
| **NONE** | Restore channel, config, preferences, and users. |

EXAMPLES:
(DEF 111) Restore all preference, configuration, and user controls to default.
(DEF+USER 111) Clear all users and restore factory default user
(DEF+CONF 111) Reset all configuration controls
(DEF+PREF 111) Reset all preference controls
(DEF+CHAN 101) Restore Channel 101
(DEF+CHAN 0) Restore all channels

| Data Logging (DLG) |
|---|

Set/get the lowest log level to write to the engineering log, also extract data from log in text format.

Levels are:

0 = Trace: Level test output, threading info, protocol.

1 = Debug: Debug messages.

2 = Info: Informational messages.

3 = Notices: Event of importance

4 = Warning: Warnings

5 = Error: An error has occurred

6 = Clear: An error has been cleared

| SUBCODE | DESCRIPTION OF USE |
|---|---|
| **NONE** | Set/get the minimum log level to write to the log. |
| **EXLG** | Extract entries from log files. Requires 3 parameters: "startdate", "enddate", "logtype". The data parameters require the date in the format "yyyymmdd". The logtype parameter can have the following values: "ENG" (engineering), "SEC" (security), "OPR" (operational), "MAI" (maintenance), "EVE" (event), "SYS" (system), "ALL". |

EXAMPLES:
(DLG "20091108" "20091110" "ALL")
(DLG+EXLG!"Log data extracted to filename 'logextract.txt' on FTP root")
(DLG 2) Set current logging level to 2
(DLG?) Get current logging level. Response is (LDG!00002 "Info")

| Data Format (DTF) | |
|---|---|
| Select data packing format for selected input. Available data formats depends on current input port (as selected by SIN). | |
| **SUBCODE** | **DESCRIPTION OF USE** |
| **Cxxx** | Replace xxx with the channel number. Valid range is 101 - 164. |
| **NONE** | Select data format for current channel |
| EXAMPLES:<br>(DTF?) Get current data format<br>(DTF?L) Show entries on the list<br>(DTF 1) Set current data format to 1 (292: 422 Packed 12Bit)<br>(DTF+C108?) Get data format on channel 108<br>(DTF+C108 20) Use data format 20 (DVI: Unpacked 8Bit) on channel 108 | |

| Enable Error Messages (EME) | |
|---|---|
| Enable broadcasting error messages. | |
| **SUBCODE** | **DESCRIPTION OF USE** |
| **FANF** | 0 - No Fan Fail warning will be generated,<br>1 - Fan Fail warning will be generated. |
| **NONE** | 0 - Disable broadcast,<br>1 - Enable broadcast of error messages to all connected serial ports and telnet sessions. |
| **TEMP** | 0 - No Over Temperature warning will be generated,<br>1 - Over Temperature warning will be generated. |
| EXAMPLES:<br>(EME 1) Enable broadcasting error messages<br>(EME+FANF 0) Disable fan fail alarm warnings<br>(EME?) Requests current state of broadcast. Example response is (EME!001) | |

| Focus Lens Position Adjustment (FCS) | |
|---|---|
| Adjust lens to specific focus position with a specified direction. **NOTE**: *This command can only be used to update the current ILS file. Changing the focus for the current channel will change the focus for any channel using the same ILS file.*<br><br>Use command without subcode:<br>    • If ILS is ON, motor will move to specified steps, and save data to the active channel.<br>    • If ILS is OFF, motor will move to specified steps. Do not save data to the active channel. | |
| **SUBCODE** | **DESCRIPTION OF USE** |
| **BACN** | Motor backlash in negative direction. Read-only. |
| **BACP** | Motor backlash in positive direction. Read-only. |
| **CALB** | Calibrate travel range and backlash on specified. Only valid parameter for this command is 1. SET only command. |
| **Cxxx** | Replace Cxxx with the channel number. Valid range is 101-164. |
| **NONE** | Moving lens mount to a specified vertical position with a specified direction. |
| **RNGN** | Motor moving range in negative direction. Read-only. |

| Focus Lens Position Adjustment (FCS) *(Continued)* | |
|---|---|
| **RNGP** | Motor moving range in positive direction. Read-only. |
| **RSET** | Move motor to the center flag then move back to current position. Only valid parameter for this command is 1. SET only command. |
| **STRT** | Start motor moving in specified direction, where direction can be (-1, 1). Write-only for v1.3 or newer. |
| **STOP** | STops the motor. Write-only for v1.3 or newer. |
| **MOVR** | Moves the motor a given number of steps based on the current location. Write-only for v1.3 or newer. |

EXAMPLES:
(FCS 500 1) Move lens to position 500 at focus motor with positive approach
(FCS 500 -1) Move lens to position 500 at focus motor with negative approach
(FCS+C101 -500 1) Set lens focus position for channel 1 to -500 with positive approach
(FCS ?) Return current motor position
(FCS+CALB 1) Calibrate the focus axis
(FCS+RSET 1) Reset the focus axis
(FCS+STRT 1) Starts motor moving in positive direction
(FCS+STOP) Stops motor
(FCS+MOVR -100) Move motor 100 steps in negative direction
(FCS+MOVR 200) Move motor 200 steps in positive direction

| Gamma Control (GAM) | |
|---|---|
| Gamma control, gamma file will be set when PCF in Use (PIU) i s off. This control describes the gamma response curve for the source signal. | |
| SUBCODE | DESCRIPTION OF USE |
| **Cxxx** | Replace xxx with the channel number. Valid range is 101 - 164. |
| **NONE** | Select gamma for the current channel. |

EXAMPLES:
(GAM+C108 "gamma 2.6") Use file "gamma 2.6" on channel 108
(GAM+C108?) Get gamma file name on channel 108
(GAM?L) List all entries of gamma control

---

Lamp History (HIS)

Retrieve the history of installed lamp entries, including the current lamp. There is an individual entry for each lamp in the history. The format for each entry is: (HIS!AAA "BBBB/BB/BB" "C" "D" EEE FFF GGG HHH III JJJ KKK).

A = Lamp Number
B = Date Installed
C = Serial Number
D = Type
E = Strikes
F = Failed Strikes
G = Failed Restrikes
H = Unexpected Lamp Off
I = Pre-installed Hours (will always return "00000")
J = Lamp Hours
K = Lamp Rotation

| SUBCODE | DESCRIPTION OF USE |
|---|---|
| **NONE** | None |

EXAMPLES:
(HIS?)
(HIS!000 "N/A" "N/A" "N/A" 000 000 000 000 000 000 000)
(HIS!001 "2007/05/21" "qa-1" "CDXL-30" 000 000 000 000 020 020 001)
(HIS!002 "2007/05/21" "qa-2" "Other-30" 000 000 000 000 015 015 000)
(HIS!003 "2007/05/21" "qa-3" "Other-20" 000 000 000 000 000 000 001)

---

Serial Help (HLP)

Get help on serial commands.

| SUBCODE | DESCRIPTION OF USE |
|---|---|
| **NONE** | Request entire command help listing or list for a single command |

EXAMPLES:
(HLP?) Retrieve entire command help listing
(HLP? "DLG") Retrieve all subcodes/descriptions for DLG control

---

ILS File  (ILF)

Set or get the current ILS file for the current or a specific channel.

| SUBCODE | DESCRIPTION OF USE |
|---|---|
| **C1xx** | Set or get the current ILS file for a specific channel. |
| **NONE** | Select the ILS file for a current channel. |

EXAMPLES:
(ILF+C101 "ILS Flat") Set ILS file for channel 1 to file "ILS Flat"
(ILF?L) List all available ILS files
(ILF 1) Set ILS file for current channel to index 1 in file list

---

| Intelligent Light System Config (ILS) | |
|---|---|
| Enable/disable the Intelligent Lens System for each channel. | |
| SUBCODE | DESCRIPTION OF USE |
| **ACLB** | Enable/disable the Auto Lens Mount and Lens reset feature. Once ACLB is turned on, lens mount and lens system will be reset automatically when system is powered on. |
| **CALB** | Calibrate travel range and backlash on specified. Only valid parameter for this command is 5. SET only command. |
| **CSTS** | Motor calibration status (0-100%) |
| **INST** | Sets ILS to installed |
| **NONE** | Enable/Disable the Intelligent Lens System for each channel. (1/0) |
| **RSET** | Move motor to center flag and then move back to current position. Only valid parameter for this command is 5. SET only command. |
| **RSTS** | Motor reset status (0-100%) |
| EXAMPLES:<br>(ILS 1) Enable ILS, lens will be moved to the position in each channel<br>(ILS 0) Disable ILS, position data in each channel will not be used. Moving lens will not affect any channel setting<br>(ILS+CALB 5) Calibrate all axes of the lens. Set only command<br>(ILS+RSET 5) Reset all axes of the lens<br>(ILS+ACLB 1) Reset lens automatically when power on | |

| Internal Media Block Installed/Device Type (IMB) | |
|---|---|
| **Access Level:** Advanced<br>**Min Power Level:** Power Down<br>Used to set or query whether an IMB is installed or not. Use the DEVT subcode to set the device type. | |
| SUBCODE | DESCRIPTION OF USE |
| **DEVT** | Set device type from the list of devices. |
| **None** | Set or query installed state of IMB. |
| EXAMPLES:<br>(IMI 1) Set to IMB installed.<br>(IMI+DEVT?L) List valid device types.<br>(IMI+DEVT?) Query current device type. | |

| Start Interrogator, check interrogator status (INT) | |
|---|---|
| SUBCODE | DESCRIPTION OF USE |
| BASC | Start a basic interrogation (set only) |
| ENHA | Start an enhanced interrogation (set only) |
| STAT | Responds with 2 values: currently running (1 if running) and result file. |

EXAMPLES:
(INST+BASC 1) Run a basic interrogation (set only)
(INT+STAT?) Querry interrogator status. Returns (INT+STAT!00100 00000 "Interrogator_Enhanced_20101103194849.7z"), which means the interrogator is 100% finished, not currently running and the latest interrogator file that was generated is named "Interrogator_Enhanced_201001103194849.7z" and can be found on the projector's FTP server.

| Internal Test Pattern (ITP) | |
|---|---|
| List and select internal test patterns. This command also creates the customized test pattern list from the internal test patterns. The list of available test patterns is determined by what files are loaded on the TI cinema electronics. | |
| SUBCODE | DESCRIPTION OF USE |
| **FULL** | Set(1)/Reset(0) full screen size |
| **KEEP** | When KEEP=1, don't disable test pattern when changing channels |
| **NOCR** | NOCR set non-correction test patterns for measured color. Valid range is 0 to 6 |
| **NONE** | Select test pattern from full list of defined test patterns |
| **STUP** | Add test pattern from full list of defined test patterns to the user list |
| **USER** | Select test pattern from user defined test pattern list |

EXAMPLES:
(ITP ?) Get current test pattern, 0 means no test pattern is used.
(ITP 4) or (ITP " ") Use number or string to set test pattern
(ITP+USER 4) or (ITP+USER " ") Use number or string to set test pattern from user's test pattern list.
(ITP+FULL 1) Use full screen size
(ITP+FULL 0) Use active channel screen file
(ITP+NOCR 1) Set non-correction test patterns for measured color you can use
(ITP+STUP "DC2K Framing Green, DC2K Framing Red") Add these two test patterns to the user list
(ITP+STUP 1 3) Add these two test patterns indexed in the ITP list to the user list

| Lamp Intensity Calibration (LCA) | |
|---|---|
| This control is used to calibrate (correlate) the intensity feedback mechanism to footlamberts. Note the minimum/ maximum power are used to pick two points on the curve. These points will not stay consistent over the life of the lamp, but the conversion algorithm will extrapolate the conversion beyond the range of the two end points. Footlamberts for minimum/maximum power are converted to integer by multiplying 100 because serial command protocol does not support floating point number. **NOTE**: *Changing the lamp or lamp alignment will require recalibration.* | |
| SUBCODE | DESCRIPTION OF USE |
| **MAXF** | Set footlamberts at maximum lamp power, the value should be (footlamberts * 100) |
| **MAXS** | Set sensor value at maximum lamp power |
| **MINF** | Set footlamberts at minimum lamp power, the value should be (footlamberts * 100) |

| Lamp Intensity Calibration (LCA) *(Continued)* | |
|---|---|
| **MINS** | Set sensor value at minimum lamp power |
| **NONE** | Not available |
| EXAMPLES:<br>(LCA+MINF 10) Set 10 footlamberts as measured brightness at minimum lamp power<br>(LCA+MINF?) Get footlamberts on minimum lamp power<br>(LCA+MINS 5000) Set 5000 as reading value from the light sensor at minimum lamp power<br>(LCA+MAXF 17) Set 17 footlamberts as measured brightness as maximum lamp power<br>(LCA+MAXF?) Get footlamberts at maximum lamp power<br>(LCA+MAXS 15000) Set 15000 as reading value from the light sensor on maximum lamp power | |

| LUT CLUT Control (LCT) | |
|---|---|
| Set Look up Table (LUT) Color Look Up Table (CLUT) file for the specified channel. The CLUT is used during color processing in the cinema electronics. | |
| SUBCODE | DESCRIPTION OF USE |
| **Cxxx** | Replace xxx with the channel number. Valid range is 101 - 164. |
| **NONE** | Select CUT for the current channel. |
| EXAMPLES:<br>(LCT+C108 "9x9x9") Use PCF file "9x9x9" on channel 108<br>(LCT+C108?) Get LUT-CLUT file name on channel 108<br>(LCT?L) List all entries of LUT-CLUT control | |

| Link Decryptor Bypass (LDB) | |
|---|---|
| Setting LD bypass to TRUE (1) will bypass the link decryptor (LD). Only use if marriage is broken and content being played is not CineLink 2 encrypted (non D-Cinema content). | |
| SUBCODE | DESCRIPTION OF USE |
| **Cxxx** | Replace xxx with the channel number. Valid range is 101 - 164. |
| **NONE** | Set to 1 to bypass and 0 to not bypass. |
| EXAMPLES:<br>(LDB+C108 1) Bypass link decryptor on channel 108.<br>(LCT 0) Use link decryptor on current channel (i.e. do not bypass).<br>(LCT+C108?) Get value for LDB on channel 108. | |

| Link Decryptor Installed (LDI) | |
|---|---|
| **Access Level:** Advanced<br>**Min Power Level:** Power Down<br>Set LD to installed or not installed. | |
| SUBCODE | DESCRIPTION OF USE |
| **None** | Set to 1 to installed and 0 to not installed. |
| EXAMPLES:<br>(LDI 1) Set LD installed. | |

| Lamp Intensity Calibration (LEN) | |
| --- | --- |
| Define model and serial number for primary installed lens and auxiliary lens. | |
| SUBCODE | DESCRIPTION OF USE |
| **AMOD** | Auxiliary lens model |
| **ASER** | Auxiliary lens serial number |
| **MMOD** | Main lens model |
| **MSER** | Main lens serial number |
| **NONE** | Not available |
| EXAMPLES:<br>(LEN+MMOD?L) List supported lens model<br>(LEN+AMOD?L) List supported auxiliary lens model<br>(LEN+MMOD 1 Set lens model<br>(LEN+MSER "xxxx") Set lens serial number | |

| Lens Horizontal Position Adjustment (LHO) | |
| --- | --- |
| Adjust lens offset to specific horizontal position with a specified direction. **NOTE**: *This command can only be used to update the current ILS file. Changing the horizontal offset for the current channel will change the horizontal offset for any channel using the same ILS file.*<br>Use command without subcode:<br>　　•　If ILS is ON, motor will move to specified steps and save data to the active channel.<br>　　•　If ILS is OFF, motor will move to specified steps, do not save data to the active channel. | |
| SUBCODE | DESCRIPTION OF USE |
| **BACN** | Motor backlash in negative direction. Read-only. |
| **BACP** | Motor backlash in positive direction. Read-only. |
| **CALB** | Calibrate travel range and backlash on specified. Only valid parameter for this command is 1. Set only command. |
| **Cxxx** | Replace xxx with the channel number. Valid range is 101-164. |
| **NONE** | Moving lens mount to a specified horizontal position with a specified direction. |
| **RNGN** | Motor moving range in negative direction. Read-only. |
| **RNGP** | Motor moving range in positive direction. Read-only. |
| **RSET** | Move motor to the center flag then move back to current position. Only valid parameter for this command is 1. Set only command |
| **STRT** | Start motor moving in specified direction, where direction can be (-1, 1). Write-only for v1.3 or newer. |

| Lens Horizontal Position Adjustment (LHO) *(Continued)* | |
|---|---|
| **STOP** | STops the motor. Write-only for v1.3 or newer. |
| **MOVR** | Moves the motor a given number of steps based on the current location. Write-only for v1.3 or newer. |

EXAMPLES:
(LHO 500 1) Move lens to position 500 along horizontal axis with positive approach
(LHO 500 -1) Move lens to position 500 along horizontal axis with negative approach
(LHO+C101 -500 1) Set lens horizontal position for channel 1 to -500 with positive approach
(LHO ?) Return current motor position along horizontal axis and direction (-1 or 1)
(LHO+CALB 1) Calibrate the horizontal axis
(LHO+RSET 1) Reset the horizontal axis
(LHO+STRT 1) Starts motor moving in positive direction
(LHO+STOP) Stops motor
(LHO+MOVR -100) Move motor 100 steps in negative direction
(LHO+MOVR 200) Move motor 200 steps in positive direction

| Lamp ID (Type) (LID) | |
|---|---|
| Get lamp type (ID) for the currently installed lamp. Supports readback of the list of supported lamp types. | |
| SUBCODE | DESCRIPTION OF USE |
| **NONE** | Get Lamp ID for current lamp. This is a readonly control. Lamp ID can be changed with LPC (lamp change) command only. |

EXAMPLES:
(LID?L) List supported lamp IDs
(LID?) Get the lamp ID for installed lamp

| LampLOC™ Module (LLM) | |
|---|---|
| Allows adjustment of lamp position to optimize intensity and uniformity of the optical system. This is referred to as the LampLOC™ feature and can be done automatically or manually. | |
| SUBCODE | DESCRIPTION OF USE |
| **AUTO** | Set to 1 to do LampLOC™ automatically. It will do calibration first, then move the X, Y, Z-motors to find the maximum brightness. Set to 0 to cancel auto adjustment and restore the previous position. Reset to 0 when it has finished. |
| **CALI** | Calibrate LampLOC motors. |
| **MTRX** | Moving X-axis motor manually. Data range from ±250. |
| **MTRY** | Moving Y-axis motor manually. Data range from ±250. |
| **MTRZ** | Moving Z-axis motor manually. Data range from ±175. |
| **NONE** | Not Available |
| **STAT** | Provides feedback (status) on the progress of the Auto mode. Read-only command. Data range from 0 to 100, where 100 indicates the LampLOC™ is finished. |

EXAMPLES:
(LLM+MTRX 100) Move motor X to position 100
(LLM+AUTO 1) Do LampLOC™ automatically
(LLM+AUTO 0) Abort LampLOC™. It will restore the motors to previous position automatically
(LLM+AUTO?) Get running status. (LLM+AUTO!000) indicates finished, (LLM+AUTO!001) indicates running
(LLM+STAT ?) Get the progress feedback of the Auto mode (0-100%)

| Adjust All Lens Position Parameters Simultaneously (LMV) | |
|---|---|
| Adjust all lens position parameters simultaneously. | |
| SUBCODE | DESCRIPTION OF USE |
| **NONE** | (LMV <lho><lvo><zom><fcs><lhodir><lvodir><zomdir><fcsdir>) <br> where <lhodir>, <lvodir>, <zomdir>, and <fcsdir> represent the horizontal, vertical, zoom, and focus position information. Valid values for direction are 1 and -1. |
| EXAMPLES: <br> (LMV 1000 1500 500 -500 -1 -1 1 1) | |

| Local Settings (LOC) | |
|---|---|
| Set the time format and display options for temperature units. | |
| SUBCODE | DESCRIPTION OF USE |
| **LANG** | Set the current language of the user interface. |
| **TEMP** | Set the temperature units. 0 - Celsius. 1 - Fahrenheit. |
| **TIME** | Set Time format. 0 - 24 hour, 1 - 12 hour. |
| EXAMPLES: <br> (LOC+TIME 1) Set time zone to standard 12 hour <br> (LOC+TIME?1) Get list of formats <br> (LOC+TIME?)(LOC+TIME!001) Get time format | |

| Lamp Changed (LPC) | |
|---|---|
| Record current lamp information into the lamp history, then start a new entry. Set lamp information of a new lamp type ID, serial number, and pre-used hours. When the values are set, use the (LPC 1) command to add the record. | |
| SUBCODE | DESCRIPTION OF USE |
| **LPID** | Set lamp type ID for the new lamp |
| **NONE** | Save lamp information to lamp history |
| **PREV** | Set lamp previous lamp hours for the new lamp |
| **SERL** | Set lamp serial number for the new lamp |
| EXAMPLES: <br> (LPC+LPID 2) Set lamp type ID <br> (LPC+SERL "CDX30-001") Set lamp serial number <br> (LPC 1) Save information to lamp history. Consecutive lamp changes require a 5 - 10 second time difference as writing to EEPROM is involved. | |

| Lamp File (LPF) | |
|---|---|
| Set or get the current lamp file for the current or a specific channel. | |
| SUBCODE | DESCRIPTION OF USE |

| Lamp File (LPF) *(Continued)* | |
|---|---|
| **Cxxx** | Set or get the current lamp file for a specific channel |
| **NONE** | Set lamp file for current channel |
| EXAMPLES:<br>(LPF+C101 "Default") Set lamp file for channel 1 to file "Default"<br>(LPF?L) List all available lamp files<br>(LPF 1) Set lamp file for current channel to index 1 in file list | |

| Lamp Hours (LPH) | |
|---|---|
| Get information on installed lamp. Read only control. | |
| SUBCODE | DESCRIPTION OF USE |
| **FLSK** | Return total failed lamp strikes on the installed lamp |
| **FRSK** | Return total failed lamp restrikes on the installed lamp |
| **LPOF** | Return total lamp unexpected off times on the installed lamp |
| **NONE** | Return lamp usage for current lamp in hours. |
| **TLSK** | Return total lamp strikes on the installed lamp |
| EXAMPLES:<br>(LPH?) Get usage in hours<br>(LPH+FLSK?) Get lamp strikes | |

| Lamp Intensity (LPI) | |
|---|---|
| Set lamp intensity setpoint. The value is used when lamp mode is set to LiteLOC™. The projector will adjust the Lamp Power to maintain this intensity. **NOTE**: *This command can only be used to update the current lamp file. Changing the lamp intensity for the current channel will change the lamp intensity for any channel using the same lamp file.* | |
| SUBCODE | DESCRIPTION OF USE |
| **Cxxx** | Replace Cxxx with the channel number. Valid range is 101-164. |
| **NONE** | Set lamp intensity for the current channel. |
| EXAMPLES:<br>(LPI 4500) Set lamp intensity to 4500 for current channel<br>(LPI+C103 4000) Set the lamp intensity to 4000 for channel 3<br>(LPI?) Get lamp intensity for the active channel | |

| Lamp Life (LPL) | |
|---|---|
| Set/get expected lamp life in hours. The default hours will be used if lamp life is 'not set'. Lamp expiry message will be sent out when lamp usage is over the lamp life. | |
| SUBCODE | DESCRIPTION OF USE |
| **LIFE** | 0 - No warning will be generated.<br>1 - Lamp Life Expiry Warning will be generated when lamp hours extends past lamp life. Warning will be reported in SST. Warning will be cleared by extending lamp life or changing the lamp. |

| Lamp Life (LPL) *(Continued)* | |
|---|---|
| **NONE** | Set or get expected lamp life. |
| **ROTA** | Set to 1 acknowledge the Lamp Rotation Warning. Will auto clear at lamp life or on lamp change. |
| **ROTW** | 0 - No warning will be generated.<br>1 - Lamp Rotation Warning will be generated when lamp hours extends past 1/2 lamp life. Warning will be reported in SST. Warning will be cleared by LPL+ROTA or changing the lamp. |
| EXAMPLES:<br>(LPL 1500) Set lamp life limit to 500 hours.<br>(LPL 0) Set lamp life limit to default hours based on the lamp type.<br>(LPL ?) Get lamp life limit.<br>(LPL+LIFE 1) Enable lamp expired message.<br>(LPL+LIFE 0) Disable lamp expired message.<br>(LPL+ROTW 1) Enable lamp rotation message.<br>(LPL+ROTA 1) Acknowledge that lamp was rotated. | |

# Appendix C: SCCI Port

The SCCI port (Simple Contact Closure Port) is a DB-9 (male) connector located on the PIB Faceplate board and is used to control a limited set of projector functionality through contact closures. The following table lists the control functions available through the SCCI.

**Table C.1  SCCI Connector Pinouts**

| PIN | SIGNAL NAME | DIRECTION | DESCRIPTION |
|---|---|---|---|
| 1 | +5V Standby | Out | Current limited 5VDC supply |
| 2 | Lamp ON | In | Projector at Power ON mode, lamp is ON |
| 3 | +5V Standby | Out | Current limited 5VDC supply |
| 4 | Lamp OFF | In | Projector at full power, lamp is OFF |
| 5 | +5V Standby | Out | Current limited 5VDC supply |
| 6 | Douser Closed | In | Close douser |
| 7 | Douser Open | In | Douser open |
| 8 | Health Output | Out | Open Collector Low when one of the following interlocks is tripped or conditions present:<br>• Lamp Door<br>• Lamp Blower<br>• Extractor<br>• Tamper<br>• Marriage<br>• Ballast Communication<br><br>The show will not be able to play. Open Collector High when all interlocks relevant to CineLink and Lamp are not tripped. The show is able to play. |
| 9 | Ground | Out | Ground |

**NOTE**: *All SCCI inputs require a pulse input of 50ms to several seconds to operate reliably. Inputs are 5V resistor current limited LED's inside of optocouplers.*

A "Health Output" on this connector is also provided for locations that require a projector Health Output. The output is an open-collector circuit which only draws power when the projector is deemed to be "un-healthy". The primary use of the Projector Health Output is to ensure that patrons are not left in a dark theatre due to projector fault. Therefore, any fault that results in the movie playback stopping should cause this circuit to draw power and indicate an un-healthy state. The projector is always considered to be "healthy" in Standby Mode since there is no fear of projector fault causing an impact to patrons, and there should be no patrons in the theatre at that time.

# Appendix D: GPIO Port

The GPIO port is a 37-pin D-sub connector (female) located on the PIB Board and provides 8 input and 7 output signals for interfacing a wide range of external devices to the projector. The pins that are configurable on this connector are done through the Administrator Setup: GPIO Setup window (Figure D-1).
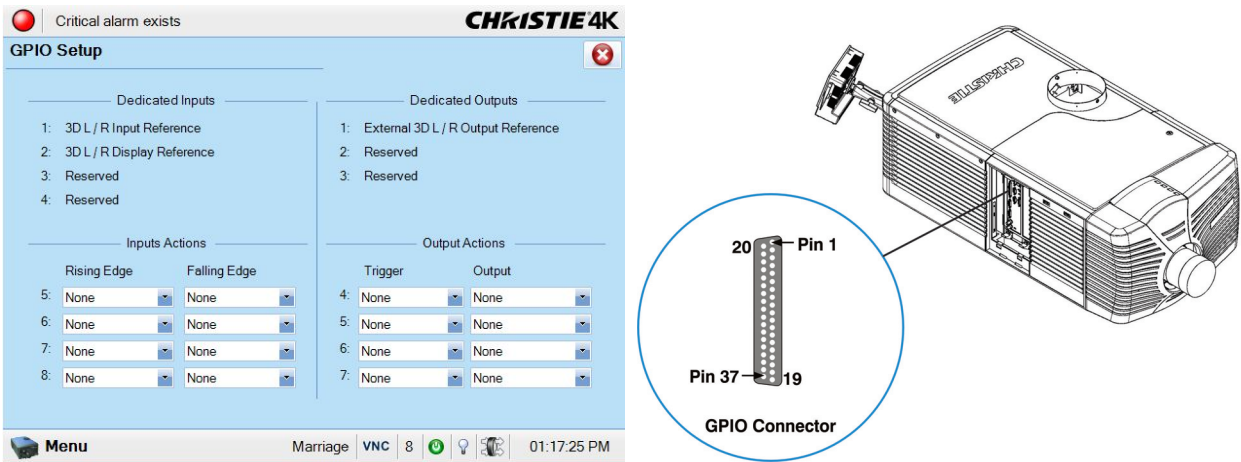


**Figure D-1 Admin: GPIO Setup Window and GPIO Port Location on Projector**

As shown below, each available pairing of pins (+/–) is defined as either an *input* or *output*. Four inputs and three outputs have already been predefined. Configure a pin as an input if you want the projector to respond to an incoming signal, or as an output if you want an external device to respond to the projector.

| Inputs | Positive | Negative | Description |
|---|---|---|---|
| GPIN #1 | Pin 1 | Pin 20 | 3-D L/R Input Reference |
| GPIN #2 | Pin 2 | Pin 21 | 3-D L/R Display Reference |
| GPIN #3 | Pin 3 | Pin 22 | Reserved |
| GPIN #4 | Pin 4 | Pin 23 | Reserved |
| GPIN #5 | Pin 5 | Pin 24 | Input |
| GPIN #6 | Pin 6 | Pin 25 | Input |
| GPIN #7 | Pin 7 | Pin 26 | Input |
| GPIN #8 | Pin 8 | Pin 27 | Input |

| Outputs | Positive | Negative | Description |
|---|---|---|---|
| GPOUT #1 | Pin 9 | Pin 28 | External 3-D L/R Output Reference |
| GPOUT #2 | Pin 10 | Pin 29 | Reserved |
| GPOUT #3 | Pin 11 | Pin 30 | Reserved |
| GPOUT #4 | Pin 12 | Pin 31 | Output |
| GPOUT #5 | Pin 13 | Pin 32 | Output |
| GPOUT #6 | Pin 14 | Pin 33 | Output |
| GPOUT #7 | Pin 15 | Pin 34 | Output |
| PROJ_GOOD | Pin 16 | Pin 35 | Projector Good |

If you are wiring your own GPIO cable for use with a server or 3D device such as an IR emitter or a polarizer, follow the circuit diagram Figure D-2.
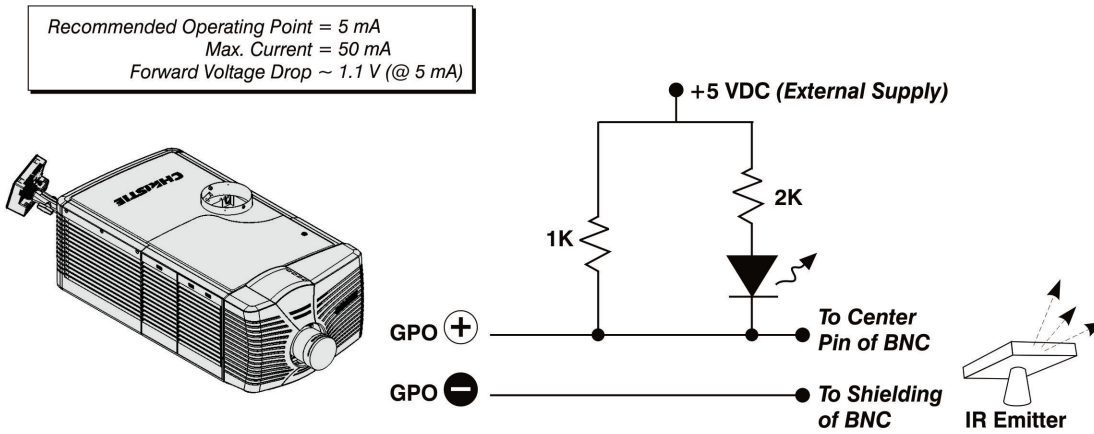


**Figure D-2 GPIO Circuit Diagram**

# Appendix E: 3D Connector

The 3D connector is a 15-pin D-sub connector (female) located on the PIB Board. The following table lists the control functions available through the 3D connector.

| PIN | SIGNAL NAME | DIRECTION | DESCRIPTION |
|-----|-------------|-----------|-------------|
| 1 | +12V | Out | Power to 3D device. Maximum 1A (total between both +12V pins). |
| 2 | GND | / | Ground |
| 3 | GND | / | Ground |
| 4 | RS232_RX | In | Data to projector from 3D device. 1200 Baud, 8 bits, no parity. Currently unsupported. |
| 5 | RS232_TX | Out | Data to projector from 3D device. 1200 Baud, 8 bits, no parity. Currently unsupported. |
| 6 | CONN_3D_MODE+ | Out | SYNC from projector. To projector GPO collector. Compatible with current projector GPIO requirements and restrictions. (24VDC max, 50mA max) 3D ON = Hi logic level = O/P transistor ON 3D OFF = Low logic level = O/P transistor OFF |
| 7 | CONN_SYNC+ | Out | SYNC from projector. To projector GPO collector. Compatible with current projector GPIO requirements and restrictions. (24VDC max, 50mA max) |
| 8 | 3D_INPUT_REFRERENCE+ | In | 3D L/R Input Reference (P) (Voltage Limit: 1.4VDC to 12VDC) |
| 9 | +12V | Out | Power to 3D system. Maximum 1A (Total between both +12V pins) |
| 10 | 3D_INPUT_REFRERENCE- | In | 3D L/R Input Reference (N) (Voltage limit: 1.4VDC to 12VDC) |
| 11 | 3D_DISPLAY_REFERENCE+ | In | 3D L/R Input Reference (P) (Voltage limit: 1.4VDC to 12VDC) |
| 12 | 3D_DISPLAY_REFERENCE- | In | 3D L/R Input Reference (P) (Voltage limit: 1.4VDC to 12VDC) |
| 13 | CONN_3D_MODE- | Out | 3D mode state from projector. From projector GPO emitter. Compatible with current projector GPIO requirements and restrictions. (24VDC max, 50mA max) |
| 14 | CONN_SYNC- | Out | SYNC from projector. From projector GPO emitter. Compatible with current projector GPIO requirements and restrictions. (24DC max, 50mA max) |
| 15 | Not connected | | |

## Corporate offices

USA – Cypress
ph: 714-236-8610

Canada – Kitchener
ph: 519-744-8005

## Worldwide offices

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Germany
ph: +49 2161 664540

France
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Hungary/Eastern Europe
ph: +36 (0) 1 47 48 100

Singapore
ph: +65 6877 8737

Shanghai
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Beijing
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Korea
ph: +82 2 702 1601

Japan
ph: +81 3 3599 7481

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