

CP2220

Service Manual

020-100472-07

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NOTICES

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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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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.

GENERAL WARRANTY STATEMENTS

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.

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1 Introduction

⚠ WARNING To prevent physical injury or equipment damage it is important **Section 2 Service Guidelines** is read in its entirety before performing any service procedure.

This manual provides technical information for assisting qualified Christie authorized service technicians in the servicing and repair of all CP2220 projectors.

Disclaimer: Every effort has been made to ensure the information in this manual is accurate and complete. However, due to continuing research all information is subject to change without notice. Christie assumes no responsibility for omissions or inaccuracies.

1.1 Labels and Marking

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 Optical and Electrical System

The two largest and most complex systems in the projector are the optical and electrical systems. A basic understanding of each of these systems and the relationship between their components can improve troubleshooting efforts.

1.2.1 The Light Path and Optical Components

All optical components reside in the front portion of the projector, with the lamp and reflectors physically separated from the optics by a firewall. This wall segregates those components generating the greatest heat and EMI emissions. A UV-filtered opening in the wall allows light from the lamp to pass to the rest of the optical system, and a precisely machined cast baseplate ensures proper alignment between the lamp and the illumination optics system (IOS). Alignment between other optical components are also critical, requiring tight tolerances in their IOS holder, as well as thermal stability throughout the front compartment of the projector.

Lamp-to-Integrator

Bright light is generated by the internal lamp (2.0kW or 3.0kW Xenon). Dual front/rear glass reflectors direct light from the lamp through a UV filter to the integrator where its internal silica rod distributes the slightly irregular intensity of the light beam equally across a rectangular field, then passes this light to the first lens in the IOS.

Integrator-to-Illumination Optics System (IOS)

At the entrance of the IOS, light from the integrator passes through the first lens and vignetting aperture. This aperture controls the $f\#$ in the corners of the image and directs the light onto the adjacent cold mirror, which

removes any extra IR and folds the remaining light down 45° through the f/# aperture. This aperture controls the f/# of the light in the system and directs the appropriate amount of light into a series of three more lenses. Light from the lenses then strikes the fold mirror at the bottom of the IOS, where the light beam folds once more, angling 45° up through the yellow notch filter, final lens, and into the entrance of the prism.

1.2.2 The Electrical System

The overall electrical system includes subsystems for Input Processing, Control, Cooling, and Power.

Input Processing

The input processing system on the Projector Intelligence Board (PIB) accepts two SMPTE 292M digital video inputs selectively decrypted by the Link Decrypter (LD) and forwarded to the DLP Cinema® processing circuits in the ICP image processing electronics. The two inputs can also be configured as dual-link for DCI 12 bit color compatibility. These serial digital signals are generated from a server or a decoder box such as the Doremi, QuBit, Avica, EVS or other systems. These inputs can be configured to accept 3D signals for display as well. Normally the left eye image is connected to one 292 input, and the right eye to the other.

Non-cinema signals are input via two DVI ports that are compatible with the optional Cine/IPM 2K™ or any other third party scaler. These inputs can also decode HDCP signals so copy protected alternative content can be displayed. All processing is done in the digital domain and proprietary color correction is performed by manual measurement of the image on site and entering this data into the projector to obtain precise colorimetry. For DLP Cinema® presentations, contrast and brightness (black level) are preset and cannot be adjusted in use. But post-production houses may use the advanced TPC menus to create custom color TCGD files or gamma settings.

Sources

Incoming source data determines the continuous ON/OFF states of the DMD pixels. The CP2220 accepts two SMPTE 292M digital video inputs intended for the DLP Cinema™ inputs. These signals can be generated by a server or a decoder box (e.g., QuBit, Avica, EVS). Other "non-cinema" or "alternative" signal types connect to a DVI port. Depending on the site, source equipment is either external to the projector or rack-mounted within the optional rack stand. In all cases, sources connect to the input panel on the operator's side of the projector. For details about connecting sources, refer to the *CP2220 User Manual (P/N: 020-100420-xx)*.

Cardcage Electronics

The cardcage contains all main processing PCBs: Integrated Cinema Processor (ICP), Projector Intelligence Board (PIB) and the Backplane on which all vertical boards sit. Any of the vertical boards can easily be removed/replaced once the security ring is removed. The security ring and tamper switch is an added feature for DCI security compliance to ensure all access to the projector electronics is detected. The cardcage also provides two exhaust cooling fans at the bottom and two intake fans at the top, to ensure the critical components of the PCBs do not overheat.

Light Engine

The light engine, the heart of the imaging system, resides in the lockable front compartment of the projector. All processing is done in the digital domain, controlling the position of the DMD mirrors as ON/OFF in response to the incoming signal. Contrast and brightness (black level) are preset for DLP Cinema™ presentations and cannot be adjusted. Service access to the projector requires keyed entry-with the proper panels removed, all convergence adjustment screws can be accessed from the top and operator's side. The gap

between the DMD and prism allows clean laminar airflow through the space to help maintain DMD cooling and prevent dust from settling.

Color Calibration

As part of every installation, the projector's color processing is calibrated to achieve the required proprietary digital cinema color performance standards - called Target Color Gamut Data (TCGD) - in the new environment. This calibration procedure takes into account the various environmental factors; such as type of port window, screen, ambient light, etc., and must be repeated if there is a change in any of these variables.

1.2.3 Control

External control signals, whether local or remote, are physically routed to the source and communication panel on the operator's side of the projector.

Touch Panel Controller (TPC)

The TPC is the local user interface, and provides a complete Windows XPe-based graphical user interface. It provides an easy-to-use, intuitive, local user-interface for operation and status monitoring of the projector while viewing the screen through the port window. The TPC mounts on the rear of the projector and can be adjusted to virtually any angle using the included double ball joint mount to allow convenient viewing and flexible operation in various installation configurations.

PC/Laptops or Servers

Almost all TPC projector functions can be initiated remotely from a controller in the form of simple bi-directional ASCII messaging. Whether from a stand-alone computer, server, or an existing Ethernet network, the equipment connects to the projector via an Ethernet link. Alternatively, a PC or laptop can connect via a standard serial cable to the projector's "292 A" port instead -this may be required in order to determine the projector's IP address and subnet mask, for example, and can be used for downloading new software. RS232 cannot be used for ASCII messaging to and from the TPC (which requires Ethernet), and it is too slow for server use. In installations where the theatre server is also the controller, the projector may take its cues directly from the source material and/or the server-controller via an Ethernet link only. Qualcomm, Grass valley and Avica are examples of compatible servers/controllers that perform the necessary decryption and decompression of the signal. For complete details on controlling the projector via ASCII messaging instead of using the TPC screen, refer to [Section 8 Serial API](#).

Projector Intelligence Board (PIB)

The PIB is the main controller and primary video interface card in the cardcage. Its main function is to control the video path, monitor the environmental circuits and devices inside the projector, connect with communication interfaces and provide Dual HD-SDI and Twin DVI video input ports. The PIB is also responsible for the 37-pin GPIO, SCCI and RS232 type interfaces. Located on the PIB faceplate are a number of LEDs and buttons used for basic status and control. Four LEDs provide the general status of one of the PCBs in the cardcage (ICP, LD, and PIB), two LEDs indicate whether Standby and LVPS power is present, one LED for system heartbeat (indicates software is running on the PIB) and one to indicate Marriage status.

Lamp Power Supply (LPS) Interface Signals

Two communication/control cables link the digital lamp power supply to the rest of the projector. One cable carries RS232 (serial) signals for adjusting the LPS' output power and monitoring its operation, and the other carries a "lamp enable" signal and four interlock signals. Three of the interlock signals originate in the head (for the lamp door, lamp fan, and exhaust duct). The fourth interlock can be connected, if required, to the

theatre's fire alarm system - this would then shut the lamp OFF in the event of a fire, and is a safety requirement in certain countries. For sites in which the fourth interlock is not used, the jumper is closed. The LPS communication/control cables each route to their own 9-pin connector located on the operator's side of the LPS.

1.3 Cooling

1.3.1 Light Engine Area Cooling (Front of Projector)

- **Primary Air Intake (Fans 5,6,7,8):** The four intake fans, located on the right-hand side of the projector pull air through the high-efficiency filter before flowing across the critical components in the light engine area.
- **Cardcage (Fan 1,2 exhaust) (Fan 9,10 intake):** The cardcage is outfitted with two exhaust fans at the bottom and two additional intake fans at the top.
- **Laminar Airflow Device (Fan 4):** Mounted to the light engine handle, the Laminar Airflow Device (LAD) fan is mounted with its own filter and is responsible for circulating a separate supply of dust-free laminar (low-turbulence) airflow via tubing routed to each DMD aperture. The LAD air is drawn from the filtered air in the light engine area, thus it is double-filtered for use at the DMDs.
- **Liquid Cooling:** The liquid cooling system is the primary method for cooling the light engine DMDs. This system consists of small copper water blocks screwed to the three DMD mounting studs and daisy-chained together with PVC flexible tubing. Both ends of the chain connect to quick disconnect couplings located on the firewall between the IOS and light engine compartments, forming the cool "source" and warm "return" lines with the liquid cooler heat exchanger and pump. This liquid cooling loop circulates Christie approved coolant - JEFFCOOL E105. The level of fluid in the reservoir can only be seen if the projector top lid is opened.

1.3.2 Lamp Area (Rear of Projector)

NOTICE! *600 CFM is required in projection rooms with ambient temperatures above 25°C or elevations (above sea level) greater than 3000 feet.

The lamp and its dual reflectors, both located in the segregated lamp compartment, are the primary heat sources for the projector. Cooling for these components originates from a high-efficiency lamp blower. Its large output duct directs air axially along the lamp and between the rear reflector and its similarly shaped heat shield. As part of this system, an external heat extraction fan must be added to generate and maintain the required minimum airflow of 450 CFM* at the exhaust opening located at the top of the projection head. This exhaust must vent to the outside of the building at every site. Two vane switches - one at the blower intake and one at the exhaust opening monitor airflow, providing interlocks for safe operation of the projector. If a switch opens due to inadequate airflow, the lamp will shut OFF and a red alarm window will appear on the TPC.

NOTE: *Cooling in the rear of the projection head does not require filtered air.*

3kW Lamp Power Supply (LPS) and Low Voltage Power Supply (LVPS)

The power supplies each provide their own cooling. The lamp power supply is cooled by two internal field replaceable fans. Airflow from this device is ducted out of the enclosure. All diagnostics are routed back to the PIB through RS232 communications. The LVPS also has a small fan on one end for self cooling.

1.4 Power

1.4.1 3kW Lamp Power Supply (LPS)

The 3kW lamp power supply provides the main lamp power for the system. It is connected via the anode and cathode cables and two signal cables. One signal cable is for RS232 control and diagnostic feedback and the other carries hardware interlock signals to protect the projector if airflow or access panels are disrupted. It is wired into the power mains to a single phase power supply with a range from 200 VAC to 240 VAC. The electronics control the power output from 3kW down to 1kW depending on the lamp type and power level required. An IEC 320 connector is provided to optionally power the projector electronics (with the exception of the LPS) from an Uninterruptable Power Supply (UPS) – this allows the electronics to keep power during a power failure; the lamp will not run. Ultimately this enables a fast re-strike and play once power is back ON.

1.4.2 Low Voltage Power Supply (LVPS)

The LVPS provides all of the power to the projector in full power mode, with the exception of the TPC which is powered by the standby power supply.

- In full power mode the main rail supplies the Environmental Board (EVB), Intelligent Motor Control Boards (IMCBs) and the Projector Intelligence Board (PIB). **NOTE:** *In stand-by the PIB only allows communication and upgrades to occur without switching to Full Power.*
- The 12V main rail supplies the ICP, fans and pump and LPS opto-isolators.

1.4.3 Standby Power Supply

The standby power supply is a fanless 24V power supply that supplies power to the TPC, the UPS input (if wired this way) and the field wireable AC input. It also supplies a minimum amount of power to the IMCB for holding stepper motor positions.

1.4.4 Igniter

The igniter is located in the lamp compartment. It is powered by the 3kW lamp power supply located at the back of the projector. The lamp power supply connects to the igniter with an anode cable, which is routed along the baseplate of the projector closest to the lamp door.

1.5 Interlocks

The projector has a number of sensor and switches that detect when safety critical components of the projector fail. Many of these are linked into an interlock circuit so that if there is a malfunction or an error condition the projector's Lamp Power Supply (LPS) is turned OFF or unable to be turned ON if already powered OFF.

Table 1.1 Safety Interlock

Name	Description
Lamp Door	The lamp door interlock prevents the lamp from being ignited when the lamp door is open.
Lamp Exhaust	This sensor is mounted inside the exhaust duct to monitor the airflow velocity. If airflow is not detected, the lamp will not ignite or remain ON.
Lamp Blower	This sensor is located at the blower inlet to monitor airflow velocity from the blower before the air reaches the lamp or reflector. If airflow is not detected, the lamp will not ignite or remain ON.

There are a number of sensors used to indicate the projector is operating under stress and may soon shutdown. These warning sensors are not wired into the interlock circuit since they do not monitor safety critical areas of the projector.

Table 1.2 Fan, Temperature and Pump Sensors

Name	Description
Cooling Fans	The tachometer of each fan is monitored by the Environmental Board (EVB) to ensure it is turning at a minimum RPM. If any of the fans slow below a preset threshold the TPC will report a warning.
Temperature Sensors	Temperatures of each DMD, integrator, prism, filtered air intake, cardcage exhaust and lamp exhaust are tracked to ensure the projector is functioning normally. Only a severe over-temperature reading on the DMDs will result in an automatic shutdown.
Pump	If the pump speed falls below a preset threshold the TPC will report a warning.

1.6 Lamp

The Xenon arc lamp resides in the rear left hand side of the projector. Replacing a lamp requires the low-security key for unlocking the lamp door. The lamp is mounted so that its rear (cathode) end is free to move via an automatic adjustment mechanism, but its front (anode) end is stable. The front end of the lamp rests in a supporting "cradle" or yoke, which can be located approximately 1" forward or back to accommodate longer (2.0kW and 3.0kW CDXL) vs. shorter (3.0kW CDXL-30SD) lamps. An anode clamp secured to the end of the lamp protruding beyond this yoke conducts current from the igniter. Good contact between this clamping collar and the anode end of the lamp is essential for lamp ignition and performance, thus the materials and design resist deformation caused by the high voltages. With the simple yoke support at the front, the rear of the bulb is free to move up-and-down (Y-axis adjustment), side-to-side (X-axis adjustment) and forward-or-backward (Z-axis adjustment) within the necessary ranges for optimized lamp position. These motorized movements are controlled at the TPC using the LampLOC™ **Do Auto** feature in the **Advanced Setup>LampLOC Setup** window. Generally, the **Do Auto** positioning is adequate for all installations. Alternatively, individual arrow buttons in this same menu can be used to move the lamp in one direction (and along one axis).

1.6.1 LampLOC™ Module

The electro-mechanical LampLOC™ module or lamp adjuster adjusts the lamp along three axes to optimize the lamp position relative to the reflector. With the lamp "aimed" properly, the greatest amount of light will be collected by the reflectors and used in the optical system. All adjustments are motorized using three stepper motors on the LampLOC™ module controlled by the nearby Integrated Motor Control Board (IMCB) under command of TPC software. Feedback from the Light Sensor Module indicates where the light output is maximized, terminating the lamp movement. In case of an electronics failure, the motors can be controlled manually with thumbwheels (service technician required, as the rear panel of the projection head must be removed).

1.6.2 Lamp Reflectors

A pair of glass reflectors-elliptical (rear) and spherical (front)-work together to efficiently collect the lamp light output and direct it to the optics in the projector. Each reflector mounts to a single common cast and machined mounting plate using four stainless steel spring clips that minimize stress points. Reflector shapes and coatings are optimized for maximum brightness. A spun aluminum shield in the same basic shape as the rear reflector is mounted coaxially with it, essentially covering the outside surface of the reflector and providing a consistent gap for air flow. High temperature black paint on the inside of the shield absorbs the IR and UV light passed through by the reflector. Holes in the reflector mount allow cooling air to pass through to the inside of the front reflector and on to the lamp anode.

1.7 Lenses

1.7.1 Primary Lenses

⚠ WARNING Never apply power to the projector unless the primary lens is installed.

A primary lens inserts into the lens mount and is secured with a simple locking lever. It is important to remember that a primary lens seals the projector. If the lens is missing when power is supplied to the unit, unfiltered air will be drawn in through the lens opening and into the front area of the projection head, potentially depositing dust and dirt on components in the light engine and optics. The attachment of the three-plate lens mount is offset by jack screws spaced as far apart as possible to provide solid leverage and accurate adjustment of boresight. Good boresight ensures alignment of the primary lens to the light engine and prism. Refer to the *CP2220 User Manual (P/N: 020-100420-xx)* for all other primary lens installation details, the boresight adjustment procedure at the screen, and lens specifications.

1.7.2 Anamorphic Lens

The optional anamorphic lens (1.25x) can produce 2.39:1 "scope" images when used in combination with the primary lens. It is secured into a separate lens mount located adjacent to the lens opening and swings into place in front of the primary lens for scope images. To install the anamorphic lens mount and lens option, refer to the instructions provided with the anamorphic lens mount kit.

2 Service Guidelines

2.1 Before Servicing

⚠ CAUTION Static sensitive components. Adhere to appropriate static precautions during all servicing.

Read all instructions before servicing. Always take extra precautions to secure all harnessing properly, especially in the high voltage circuitry areas. Replace any wire that appears to have damaged insulation. Components must be replaced with exact equivalents. Failure to do so may result in unsafe operation.

2.2 Security Roles

Only Christie authorized service technicians should perform field repair and service to the unit. Marriage must also only be performed by Christie authorized service technicians. Theater personnel may only perform diagnostic functions, such as running Interrogator.

2.2.1 Lead Dress

Before servicing, always carefully observe the original lead dress. Take extra precautions to secure all harnessing properly, especially in the high voltage circuitry areas (such as lamp cables). Replace any wire that appears to have damaged insulation.

2.2.2 Ordering Parts

When ordering replacement parts, quote the part numbers of the items required as listed in [Section 5 Parts and Module Replacement](#). Also quote the projector model number, serial number, and date of manufacture, as indicated on the license label. **NOTE:** *Not all parts are available separately. In addition, some parts stocked as inventory are available only until the current supply lasts. All part numbers are subject-to-change.*

2.2.3 Replacing Modules

Check module markings, parts lists and the relevant disassembly/replacement procedures outlined in [Section 5 Parts and Module Replacement](#) to ensure you have the correct module for the projector and that the module is replaced correctly. Components must be replaced with exact equivalents. Failure to do so may result in unsafe operation.

2.2.4 Repair Cautions

- **DO NOT** short transistors or ICs during circuit checks.
- **DO NOT** short or remove bias resistors while the projector is operating.
- **DO NOT** operate with heat sinks removed.
- **DO NOT** overload transistors or ICs. Ensure the projector is disconnected from AC power before testing, removing, or installing modules.
- **DO NOT** operate the projector with any internal part removed. If, for testing purposes, you *must* operate the projector without the lid and/or lamp door, ensure you are wearing authorized protective clothing, such as

that included in the Christie Protective Clothing Safety Kit (P/N: 598900-095).

DANGER! NEVER strike the lamp or run the lamp with the lamp door removed.

2.3 Safety Warnings and Guidelines

2.3.1 Labels and Markings

- Observe and follow any warnings and instructions marked on the projector.
- The exclamation point within the equilateral triangle indicates related operating/maintenance instructions in the documentation accompanying the projector.
- The lightning flash and arrowhead symbol within the equilateral triangle indicates non-insulated “dangerous voltage” within the projector's enclosure that may be of sufficient magnitude to constitute a risk of electric shock.

2.3.2 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.**



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.**
- **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. 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 9 Specifications](#).

2.4 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

- **DO NOT** attempt operation if the AC supply is not within the specified voltage range.
- This product does not include a built in AC breaker. A 30-32A double pole, UL listed wall circuit breaker is required. It must be part of the building installation and easily accessible.
- **DO NOT** use a wall breaker greater than 32A. This could result in severe damage to the projector in the event of a failure.
- Protection from over-currents, short circuits and earth faults must be part of the building installation. A disconnect device (double pole switch or circuit breaker with minimum 3 mm contact gap) must be readily accessible within the projection room.
- Disconnect projector from AC before opening any enclosure.

CAUTION

- **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.
- **DO NOT** overload power outlets and extension cords as this can result in fire or shock hazards.
- Note that only Christie authorized service technicians are permitted to open any enclosure on the product and only if the AC has been fully disconnected from the product.

2.5 Lamp Precautions

DANGER



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

Any lamp used in the CP2220 is under high pressure and must be handled with great care at all times. Lamps may explode if dropped or mishandled.

2.5.1 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.*

2.5.2 Cool the Lamp Completely

DANGER



Lamp may explode causing bodily harm or death. Always wear protective clothing whenever lamp door is open or while handling lamp. 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 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 always wear protective clothing!

2.6 Cooling

The CP2220 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.

2.6.1 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.

2.6.2 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 [5.6.1 Light Engine Air Filter, on page 5-10](#) for instructions.

2.6.3 Liquid Cooling (Radiator) 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 [5.6.2 Radiator Air Filter, on page 5-11](#) for instructions.

2.6.4 Liquid Cooler

Check: Every 6 months

The liquid cooler system circulates liquid to and from the DMD heatsinks in the CP2220 reducing the DMD operating temperature to an acceptable level. Check the coolant level every six 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.

2.6.5 Filling the Coolant Reservoir

⚠ DANGER HAZARDOUS SUBSTANCE! The coolant used in this product contains ethylene glycol. Use caution when handling. **DO NOT** ingest.

⚠ 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 (P/N: 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.*



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.

2.6.6 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, check the airflow periodically.*

2.7 Maintenance and Cleaning

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

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

2.7.1 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.

2.7.2 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 lens and lamp reflector. Maintenance of other optical components requires a Christie authorized 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), Opto-Wipes (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/microfiber such as Melles Griot 18LAB024 or equivalent

2.7.3 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, clean only if absolutely necessary.

Dust:

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 microfiber 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. **Do not apply pressure with your fingers** - use the tension in the folded cloth itself to collect dust.
3. If significant dust is still bound to the surface, dampen a clean microfiber cloth with coated optics cleaning solution (damp, not dripping). Wipe gently until clean.

Fingerprints, smudges, or oil present:

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.

2.7.4 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.

Dust:

1. Brush most of the dust off the reflector 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.

Fingerprints, smudges, or oil is present:

1. Brush most dust off the reflector with a camel-hair brush and/or blow dust away with compressed air.
2. Fold a clean microfiber cloth and dampen with methanol. Make sure to wipe evenly with the smooth portion of the cloth that has no folds or creases. **DO NOT apply pressure with your fingers**. Use the solution in the cloth to collect the dirt.

2.7.5 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

⚠ CAUTION 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. Ensure loose dirt is vacuumed from the lamp blower impeller.

Igniter

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

Airflow Interlocks

The CP2220 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).

*** 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 Christie authorized service technician only. Contact Christie or your dealer.

2.8 Cleaning

⚠ WARNING ELECTRICAL SHOCK HAZARD! Disconnect from AC when servicing.

⚠ CAUTION Always wear gloves when handling internal components.

Maintaining the cleanliness of all internal components during any service procedure is critical. In particular, all of the projector's optics must remain free of contaminants in order to perform at the level specified for the projector. Even a small amount of dust or a fingerprint may degrade the image or cause a noticeable reduction of brightness. During servicing, take all necessary measures to avoid touching or contaminating optical surfaces. A **MINIMUM** amount of cleaning—hopefully none—should be required during and after servicing. If during servicing you notice that a component is dirty or dusty, or if you have accidentally contaminated a component, refer to **Table 2.1** to determine the appropriate cleaning action needed. **NOTE:** *It is critical the projector be powered OFF and disconnected from AC before the lens or any of the projection head covers/doors are loosened and removed.*

Table 2.1 Guidelines for Cleaning

Components	Preventative Measures	Cleaning Technique
Lamp	Wear protective gear approved by Christie, and handle by the ends only. Never grip the glass portion of the lamp. NOTE: <i>Any fingerprints will reduce output quality and shorten lamp life.</i>	Remove fingerprints or dirt with pure isopropyl alcohol and a clean lint-free cloth.
Lamp Reflector	Wear protective gear approved by Christie.	Remove fingerprints or dirt with methanol and clean, microfiber cloth such as Melles Griot 18LAB024 or equivalent.
Illumination Optics System, general	NEVER touch or blow on exposed components. Wear gloves (supplied).	Use ionized pneumatic guns only. Keep imaging components and yourself grounded at all times.
Integrator	NEVER disassemble the integrator module.	Blow off visible particles with clean, dry de-ionized air.
Illumination System, internal lenses/prisms	NEVER touch or blow on interior components. Wear gloves (supplied). NOTE: Normally the internal parts should not be accessed.	Blow off particles with clean, dry de-ionized air. Then, if necessary, wipe in a single direction with a clean high quality optical cloth.
Light Engine components	NEVER touch or blow on components. Use gloves.	Blow off particles with clean, dry de-ionized air. If necessary, use a split Q-tip with pure isopropyl alcohol on the glass surface. NEVER touch the imaging panels. Note that the green imaging panel has a glass behind it as well.
Light Engine, DMD panels	NEVER touch or blow on the panels.	Blow off particles with clean, dry de-ionized air.
Projection Lens	To avoid the risk of scratching the lens, only clean the lenses if absolutely required. A small amount of dust on the lenses will have very little effect on picture quality. The projection lens should be free of dust and fingerprints. If the lenses must be cleaned, use a DRY soft cotton cloth. Rub gently in a circular motion.	Use filtered compressed air to blow out dust. Remove fingerprints or dirt with Melles Griot Cleaning Fluid 18LAB011(or equivalent) and a clean lint-free cloth.
Radiator Filter		

3 Service Setup

This section describes special internal hardware and software adjustments and related details that may require the attention of a Christie authorized service technician, whether done periodically or after a specific module replacement. The following table lists the most common alignment procedures required after a specific part is replaced.

Table 3.1 Alignments/Procedures

Part Description	Required Alignments/Procedures
Ceramic Plate (on Douser blade)	• Adjust LampLOC™
Cold Mirror	• Adjust LampLOC™ • Recalibrate Measured Color Gamut Data (MCGD)
Douser Motor	• Adjust LampLOC™
Fold Mirror	• Adjust Fold Mirror alignment
Illumination Optics System (IOS)	• Adjust Yellow Notch Filter • Recalibrate color • Define footlamberts (<i>optional</i>)
Integrator Assembly	• Integrator alignment • Fold Mirror alignment
Lamp	• Adjust LampLOC™
Lamp Power Supply (LPS)	• Adjust LampLOC™
Lens Mount Kit (Motorized or Non-Motorized)	• Boresight adjustment
Light Engine	• Recalibrate color • Define footlamberts (<i>optional</i>)
Reflectors, 12" Glass	• Adjust LampLOC™
UV Filter	• Adjust LampLOC™
Vane Switch (Exhaust)	• Adjust LampLOC™
Yellow Notch Filter	• Adjust YNF screw for accurate green coordinates • Recalibrate color

3.1 Fold Mirror Alignment

When properly aligned, the fold mirror directs light from the integrator fully and precisely onto the DMD pixels. After moving or replacing the fold mirror, check for consistent light over-spill around the perimeter of a full white or black field—if the shadows vary or disappear completely along any edge or corner, the fold mirror is cropping light from the DMDs and must be realigned. When corrected, the shadows cast by the integrator edges form an even perimeter around the full active display area without interfering with the image and all of the image is displayed.

1. Adjust the two screws located on the base of the projector. (**Figure 3-1**)
2. To raise or lower the image, adjust the screw closest to the operator side (right-side when facing screen).
3. To move the image left or right, adjust the screw furthest from the operator side.

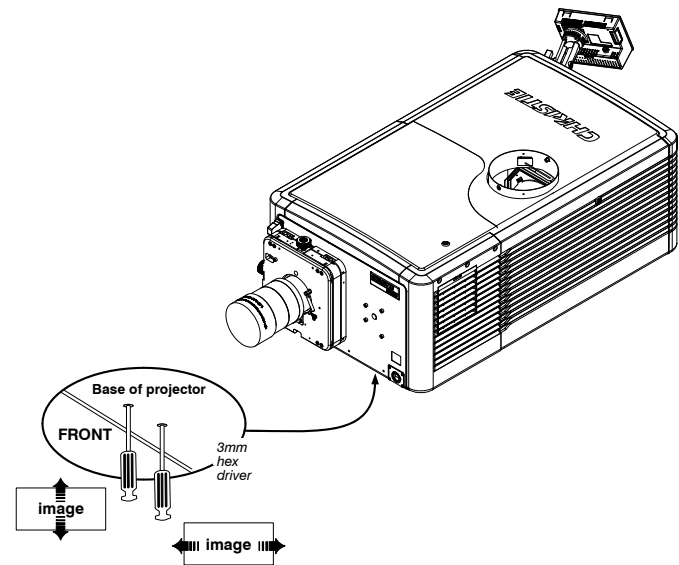


Figure 3-1 Fold Mirror Alignment

3.2 Integrator Alignment

⚠ WARNING UV goggles are required when operating the projector without covers.

The integrator module is located early in the light path, between the UV filter and cold mirror. Its chief component, the internal solid silica pipe, efficiently converts the initial round light beam supplied from the lamp into a uniform rectangle that passes through the remainder of the optical system and eventually illuminates the three DMDs at the opposite end of the light path. Therefore, whenever the integrator module is moved or replaced, its end-to-end position, as well as its rotation must be correct for proper focus and full illumination of the three DMDs.

1. Display a full white field.
2. Loosen integrator assembly so that it can be freely moved by hand.
3. **Focusing:** Corners should be equal in focus, although they may appear slightly blurry. As necessary, move the integrator forward or backward along its axis for an equal level of focus in all corners. For best results, double-check perimeter shadows with a full black field. (**Figure 3-2**)



Figure 3-2 Focusing the Integrator

4. **Centering:** Confirm that all shadowy edges cast by the integrator are projected OFF the screen, with the white field fully visible and centered between shadows. If necessary, use the fold mirror adjustment screws to precisely direct the white field between all edge shadows. Centering signifies that the rectangle of light passed from the integrator completely illuminates the DMDs. (**Figure 3-3**)

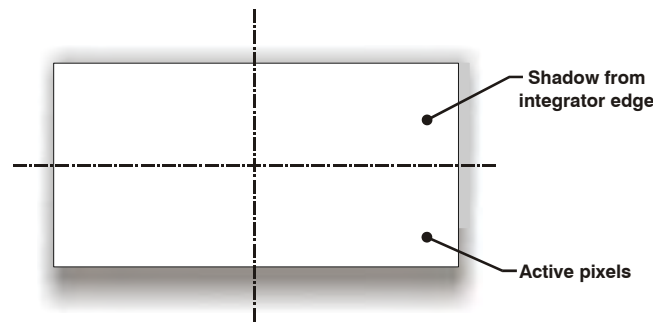


Figure 3-3 Centering the Integrator

3.3 Adjusting Lamp Position (LampLOC™)

LampLOC™ is a required adjustment after servicing the projector optical components. The adjustment can be performed Automatically or Manually from the **Advanced Setup: LampLOC Setup** window. Perform LampLOC™ to adjust the lamp position for optimal lamp performance and peak brightness at the screen for the life of the lamp. 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 extension nut is used with CDXL-30SD lamps only. **NOTE: DO NOT use the lamp extension nut with other lamp types, otherwise it can lead to extremely dim light output.**
- The lamp must be ON and the douser (shutter) is OPEN during adjustment. A 10-minute warm-up is recommended.
- Display a white test pattern. This is recommended to allow you to view LampLOC™ progress on-screen.

3.3.1 Automatically Adjusting the Lamp Position Using LampLOC™

Performing Automatic LampLOC™ activates a set of motors and sensors in the projector to precisely position the lamp for optimized performance and brightness. Once aligned, this LampLOC™ setting can be considered fairly stable for the life of the lamp.

1. Navigate to the **Advanced Setup: LampLOC Setup** window. (Figure 3-4)
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.



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.

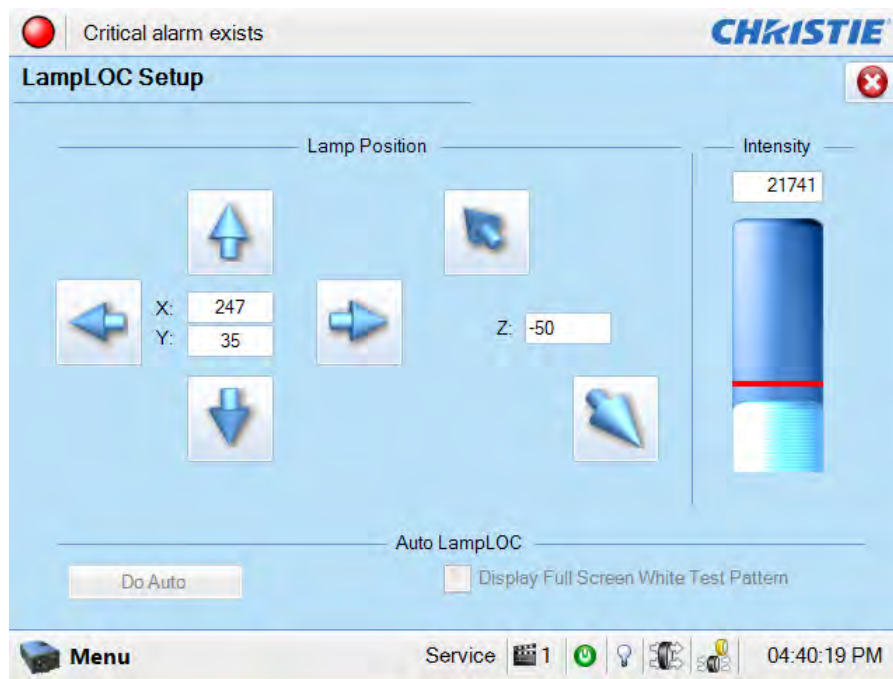


Figure 3-4 Adjust Lamp Position

3.3.2 Manually Adjusting the Lamp Position

The individual X-Y-Z 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.

3.4 Yellow Notch Filter (YNF) Alignment

⚠ WARNING UV goggles are required when operating the projector without covers.

The angle at which light passes through YNF affects the final color of light arriving at the light engine, which in turn affects color accuracy in projected images. By carefully adjusting the YNF angle while using a spectrophotometer to measure the CIE 1931 color coordinates of a full green image, you can obtain the precise green color coordinates that are crucial for producing accurate colors in the final display. Adjust the YNF whenever it is moved or replaced, or when a new IOS is installed.

1. Set up a spectrophotometer, such as the SpectraScan PR650, as the image in the theatre.
2. With the projector lid removed, display a full green field.
3. Measure the green coordinates.
4. Locate the adjustment screw on the center of the YNF frame and adjust until the following coordinates are reached: **X = 0.265 (+/-0.02), Y = 0.690 (+/- 0.02)**

3.5 DMD Convergence Procedure

⚠ CAUTION Always wear an ESD strap when replacing the light engine or any other circuit board; however, it is not recommended to wear a strap while converging a live unit, but to instead ensure frequent contact with the bare metal of the projector to prevent static build-up.

NOTICE: This document is written only as a supplement descriptive guideline for information on convergence. Personal tool preference, mechanical experience and individual techniques are all variables that make this document a subjective tool for use only by experienced professional technicians. For full Christie guidelines and company recommended tools, refer to *Using the Christie Convergence Tool Kit (P/N: 013-100074-xx)* and *Adjusting Convergence (P/N: 013-100139-xx)*.

The projector uses three separate DMD panels to produce three separate red, green and blue image components. To ensure the most accurate color representation across the whole image it is essential the three panels are perfectly aligned so that all pixels line up. The following convergence procedure outlines how to achieve this. Only Christie authorized service technicians should perform the following procedure. Read this entire section before adjusting convergence.

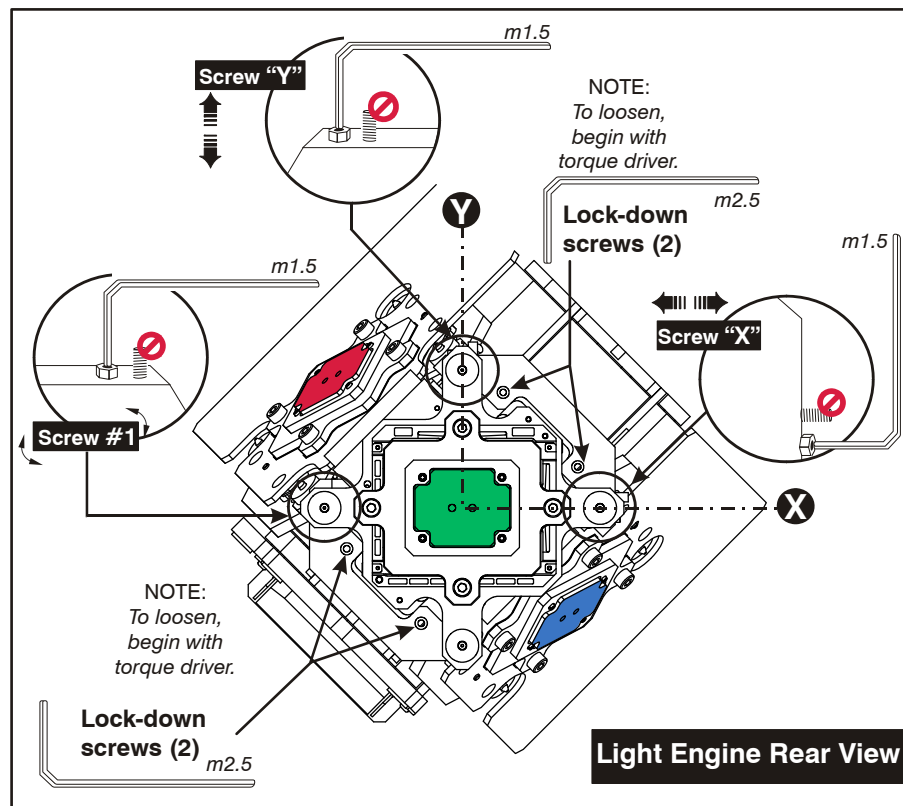


Figure 3-5 DMD Convergence

3.5.1 Before Performing Convergence

- Tap **Menu > Service Setup > Digital Convergence > Default** to reset the red, green, and blue digital micro-mirror device (DMD) values to their default settings.
- Ensure image-zoom and centering is complete before performing convergence.
For details, refer to [3.2 Integrator Alignment, on page 3-2](#).
- Ensure boresight procedures have been completed before performing convergence.
For details, refer to the *CP2220 User Manual (P/N: 020-100420-xx)*.
- Use only a prime lens when performing convergence. DO NOT use an anamorphic or Wide Converter Lens (WCL) lens.
- The projector should be set up to final maximum usable brightness for the installed application.
 - 14FL for Standard 2D
 - ~25-30FL for Single Projector 3D with a silver screen
 - 25FL per projector for Dual Projector 3D
- Once at the required power setting, the unit should be allowed to come “up to temperature” for at least 15 minutes. Note this nominal operating temperature for monitoring as you perform convergence.
- During convergence, the lid and/or filter side of the projector will be open, causing decreased prism cooling performance and possible shifts in convergence or DMD focus. The prism temperature should be monitored during the adjustment and kept within a few degrees of the nominal temperature achieved above by lowering the lamp power or periodically replacing the cover for a cool-down.
- If the procedure takes longer than an hour, watch for over-temperature alerts when running near 6000W. Cool-down periods with the shutter closed and cover on may be required.
- The active screen file should be **2048x1080 no crop** to prevent any scaling of your reference test pattern.
- Use insulated tools to prevent short circuits (**Figure 3-6**):
 - 2.5mm L-wrench with heat-shrink tubing
 - 1.5mm driver with heat-shrink tubing
 - Anti-static (ESD) grounding wrist strap

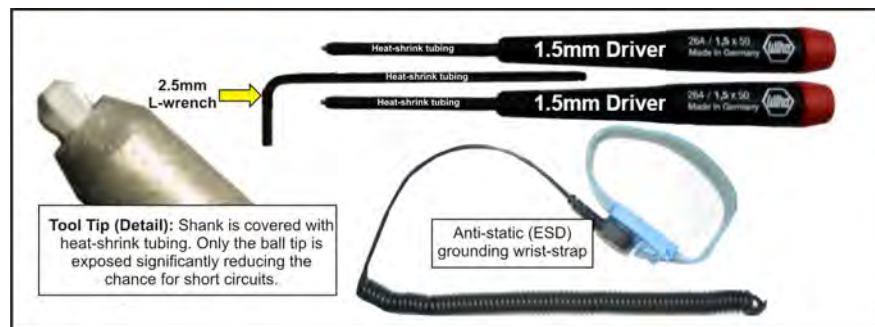
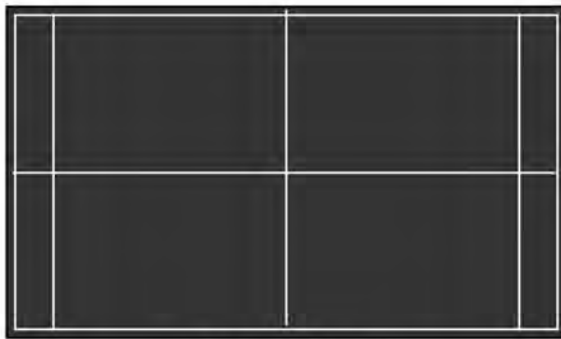


Figure 3-6 Convergence Tools

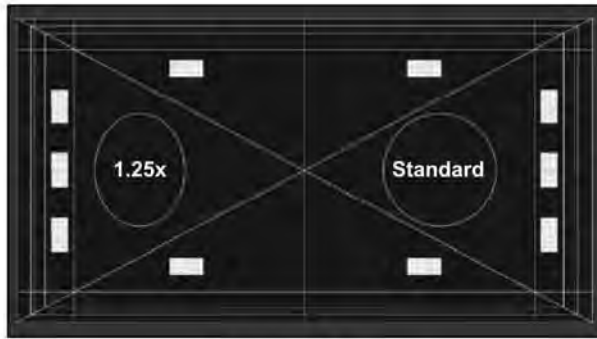
- Typically the green image component can be used as the fixed reference. It is easy to adjust, but very hard to lock down without causing misalignment.
- DO NOT adjust the spring plunger screws.
- If the assembly will not move when the adjustment screw is turned counter-clockwise:
 - Check that the lockdown screws are loosened properly.
 - Due to the bulk and tension of the cooling hoses, it may be necessary to help the spring plunger do its job by gently applying pressure to the edge of the formatter board to slide the assembly in the direction desired when turning the adjustment screws counter-clockwise.
 - Use extreme caution to not damage any components on the board.
 - DO NOT force the board, there is no reason it should not move easily with gentle pressure.

3.5.2 Evaluating Convergence

1. Display either the Alignment Pattern or the Framing Pattern. (**Figure 3-7**) **NOTE:** *The framing pattern may not be installed on the projector in some cases. Keep a copy of this pattern on your laptop and load it to the projector you are working on if it is not present.*
2. Zoom and focus the image so you can see the entire outer edge of the test pattern frame.



Alignment Pattern

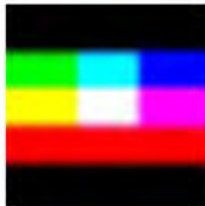


Framing Pattern

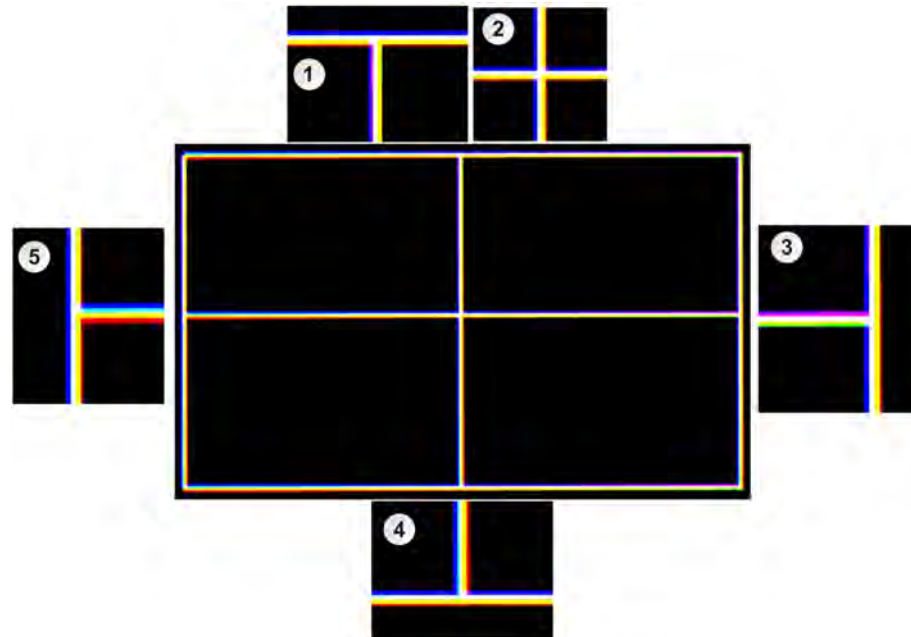
Figure 3-7 Alignment and Framing Pattern

3. Using the horizontal and vertical white lines, you should be able to judge the convergence issues. Look at one color at a time and remember that you can see a **possible 7 colors** to lead you to a valid conclusion. (**Figure 3-8**) The stripe pattern boxes along the outer frames can be very helpful as well.

Magenta=Blue+Red / **Yellow**=Green+Red / **Cyan**=Green+Blue / **White**=Red+Green+Blue


Figure 3-8 Seven Color Possibilities

4. Look for “twist” using the center vertical and horizontal lines – scan from one side of the screen to the other, observing any change in vertical position of the color in question relative to the point where you started. **Figure 3-9** is an example of a projector with two problems; Red is twisted counter-clockwise and Blue is high and to the left with no apparent twist.



1. **Top Center:** Note Yellow to the right, Magenta/Blue to the left and Yellow in the middle. This shows that Blue is separated from Green to the left. Blue above shows that Blue is higher than both Green and Red.
2. **Center:** Shows that Blue is high and to the left and Red is twisted.
3. **Right Side:** Note Blue to the left, Yellow to the right and White in the middle. This shows that Blue is separated from Green to the left. Compare to Left Side, where Magenta is to the top on the right, Red is on the Bottom to the left. This is evidence of counter-clockwise twist in Red and that Blue is high.
4. **Bottom Center:** Note Blue to left, Yellow/Red to the right, Cyan in the middle. This shows that Blue is separated from Green to the left and upward. Compare to Top Center where Red is to the right on the bottom, to the left on the top. This is evidence of counter-clockwise twist.
5. **Left Side:** Note Blue to the left, Yellow/Red to the right and White in the middle. This shows that Blue is separated from Green to the left. Compare to the Right Side where Red is to the bottom on the left, Magenta is on the top to the right. This is evidence of counter-clockwise twist in Red and that Blue is high.

Figure 3-9 Poor Convergence Example (pattern simplified)

3.5.3 Convergence Mechanism Description

⚠ CAUTION

- Remove all jewelry (rings, watches, necklaces, bracelets etc.) before adjusting convergence.
- The lockdown and adjustment screws are located underneath the formatter board. The access holes/areas are surrounded by electronic components that can easily be shorted out with your tools. Use extreme caution when adjusting!

Each of the three Formatter/DMD/Fly-In-Place plate assemblies are secured to the prism assembly with four 2.5mm lockdown screws. (Figure 3-10) Once those screws are loosened on a chosen assembly, the entire unit is free to be adjusted with the three 1.5mm adjustment screws. (Figure 3-11) The spring plunger has the job of pushing back against the adjustment screw head as it is loosened (counter-clockwise). The spring plunger will not have the force needed to push the unit back if the lockdown screws are left too tight. The spring plunger is adjustable; however, it is set to the middle of its travel and should not need to be adjusted in the field.

Turning an adjustment screw clockwise pulls the unit towards the fixed block and compresses the spring plunger. Turning it counter-clockwise allows the spring plunger to push back against the fixed block, moving it away from the block in the opposite direction. **NOTE:** Each adjustment screw's rotation and corresponding adjustment direction will be described in 3.5.4 Adjustment Procedure, on page 3-11 for the two types of formatter assemblies we will be adjusting.

⚠ The DMD cooling block was removed for clarity. DO NOT remove while performing adjustments.

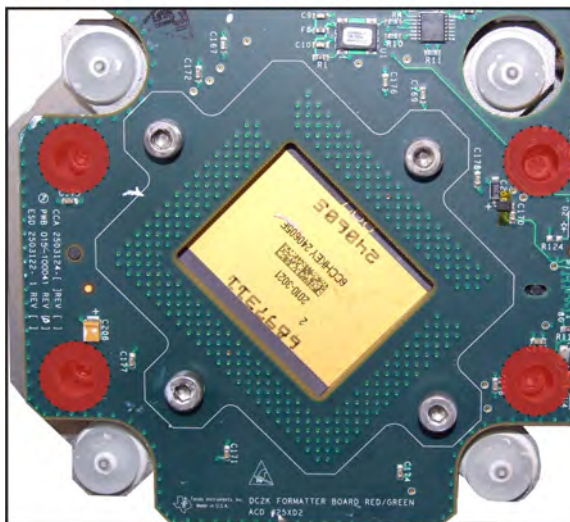


Figure 3-10 Lockdown Screws (2.5mm)

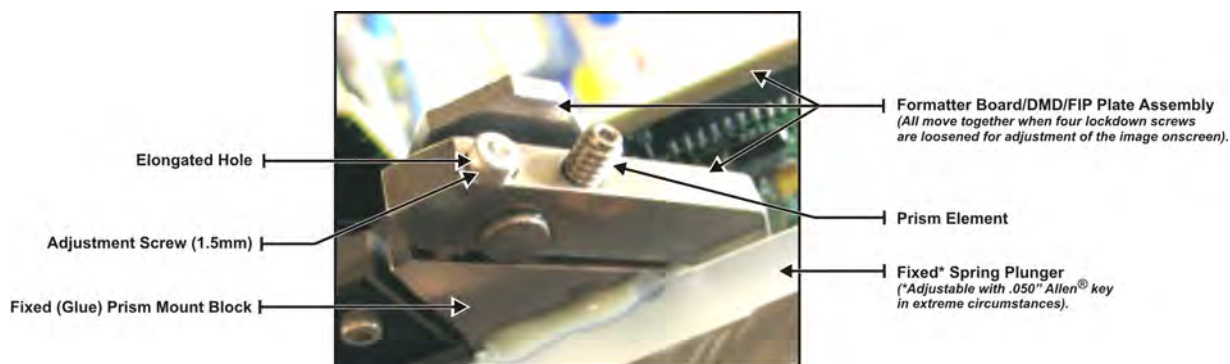



Figure 3-11 Convergence Mechanism Overview

3.5.4 Adjustment Procedure

1. Check that all three adjustment screws are not loose – gently turn them until they make contact with the FIP plate, but do not tighten them. This prevents the unit from springing farther out of adjustment when the lockdown screws are loosened.
2. “Break” a lockdown screw loose so that it feels loose (requires minimal and equal effort to turn in either direction) to the touch.
3. Turn the lockdown screw gently clockwise until you feel it make contact with the FIP plate again. You will be leaving it loose, but allowing minimal motion away from the prism.
4. Repeat Steps 1 to 3 for the other three screws. **This procedure is critical to allow the unit to move on the X/Y axes (Left/Right, Up/Down, Twist) but NOT the Z axis (Focus). NOTES: 1)** *Leaving these screws too tight will prevent the assembly from moving freely and possibly cause a cross-threaded adjustment screw. 2)* *Leaving these screws too loose will cause the DMD to drift away from the prism causing the color you are attempting to adjust to fall out of focus relative to the other two making it very hard to achieve convergence.*
5. Carefully converge the images to your reference color using the guidelines for the Red, Green, and Blue formatters. Refer to [3.5.5 Red/Green Formatter Convergence Adjustment Description, on page 3-12](#) and [3.5.6 Blue Formatter Convergence Adjustment, on page 3-14](#).
6. When satisfied with your adjustments (see [3.5.7 Final Convergence Assessment, on page 3-16](#)), carefully tighten the lockdown screws in a “torque pattern” using **Figure 3-12** as an example:
 - a. Start with the hardest to reach lockdown screw (**Figure 3-12/1**) to help keep your adjustments set.
 - b. “Snug” that screw approximately 1/16th of a turn, then move to the screw in the opposite corner (**Figure 3-12/2**) and snug it 1/16th of a turn as in **Figure 3-12**.
 - c. Continue the process by moving to the opposite side (**Figure 3-12/3**), 1/16th of a turn and so on, (**Figure 3-12/4**) repeating the pattern until the four screws are tight. Generally about a full 1/2 turn past the adjustment loosened position or around 8 inch/pounds of torque. **NOTE:** *If you are uncomfortable with the ability to achieve 8-inch/pounds of torque by feel; a torque driver should be used. An approved driver is included in the kit, outlined in Using the Christie Convergence Tool Kit (P/N: 013-100074-xx).*
- Be careful not to bump or flex any of the hoses or cables while tightening these screws as your adjustment may be adversely affected.
- No matter how careful you are, tightening the lockdown screws may throw your adjustments off slightly. Evaluate how it is moving and compensate before you lock it down. The more carefully and incrementally you tighten the lockdown screws, the less this is likely to happen.

 The DMD cooling block was removed for clarity. DO NOT remove while performing adjustments.

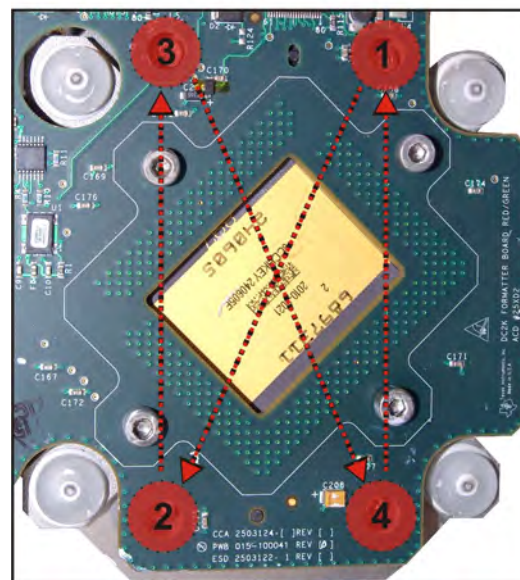


Figure 3-12 Torque Pattern

3.5.5 Red/Green Formatter Convergence Adjustment Description

The Red and Green Formatters are identical in physical layout and adjuster function. The vertical and twist adjustments interact with each other on the horizontal axis, as described in **Figure 3-13**.

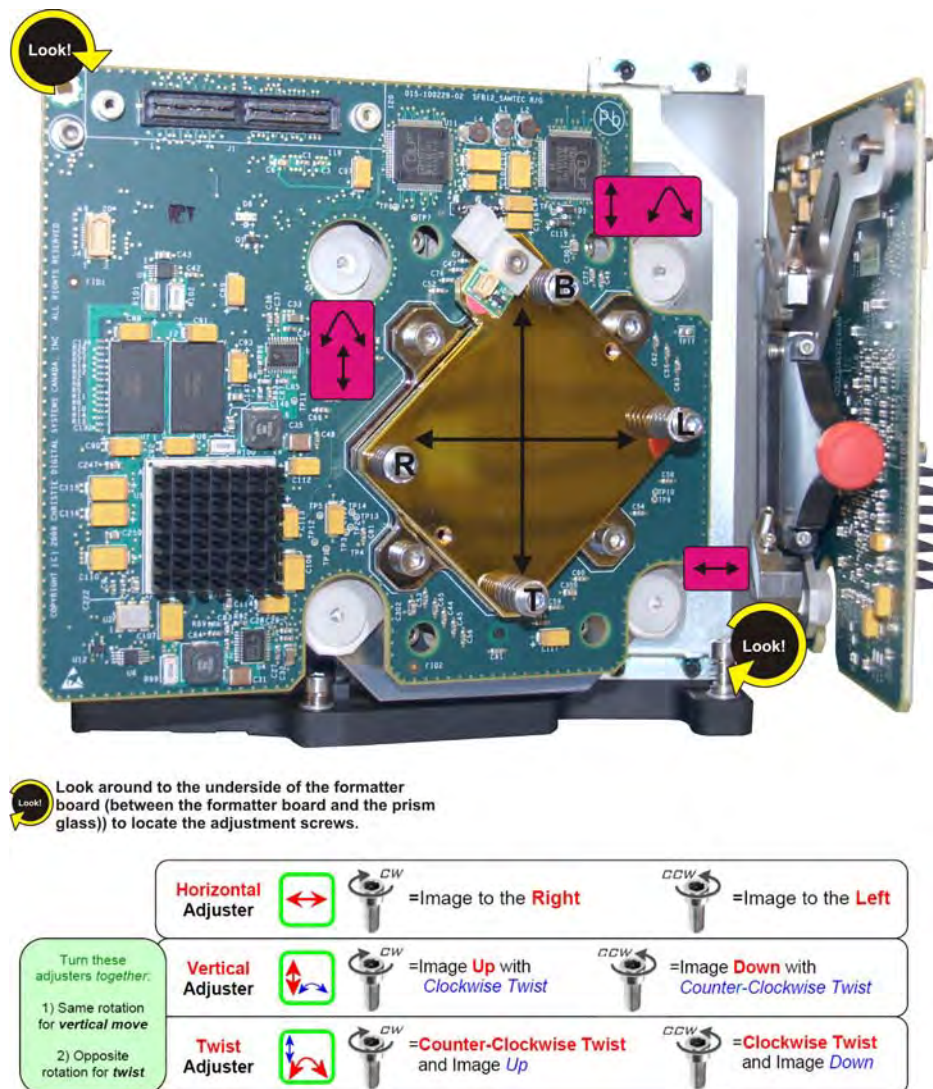


Figure 3-13 Red/Green Formatter Convergence Adjustment

The physical layout of the Red/Green Formatter boards dictates the behavior of the Twist and Vertical adjustments:

- The adjustment of the two is more like a “Twist with the left-side of the screen as a sliding hinge point to allow vertical travel”
- The vertical adjustment screw and twist adjustment screw interact with each other such that if one is turned in the opposite direction of the other, the twist is affected.
- If both screws are turned equal amounts in the same direction, the image moves vertically.

You do not always have to turn the screws simultaneously; however, adjusting one at a time will cause the need for an equal or equal and opposite turn on the other to prevent binding and achieve the adjustment desired.

If you are attempting to adjust the twist and encounter increased resistance on the twist adjustment screw:

- Double check the looseness of the four lockdown screws.
- Turn the horizontal adjustment screw counter-clockwise only enough to break it free - it may be binding. This will cause some lateral shift to the left, but this can be easily fixed after correcting the twist+vertical errors.

It is a good idea to locate the twist adjustment screw with the 1.5mm Allen® driver and leave it in place, resting against the lens mount/formatter board.

A second 1.5mm Allen® driver can be inserted and removed to adjust the vertical adjustment screw or the horizontal adjustment screw.

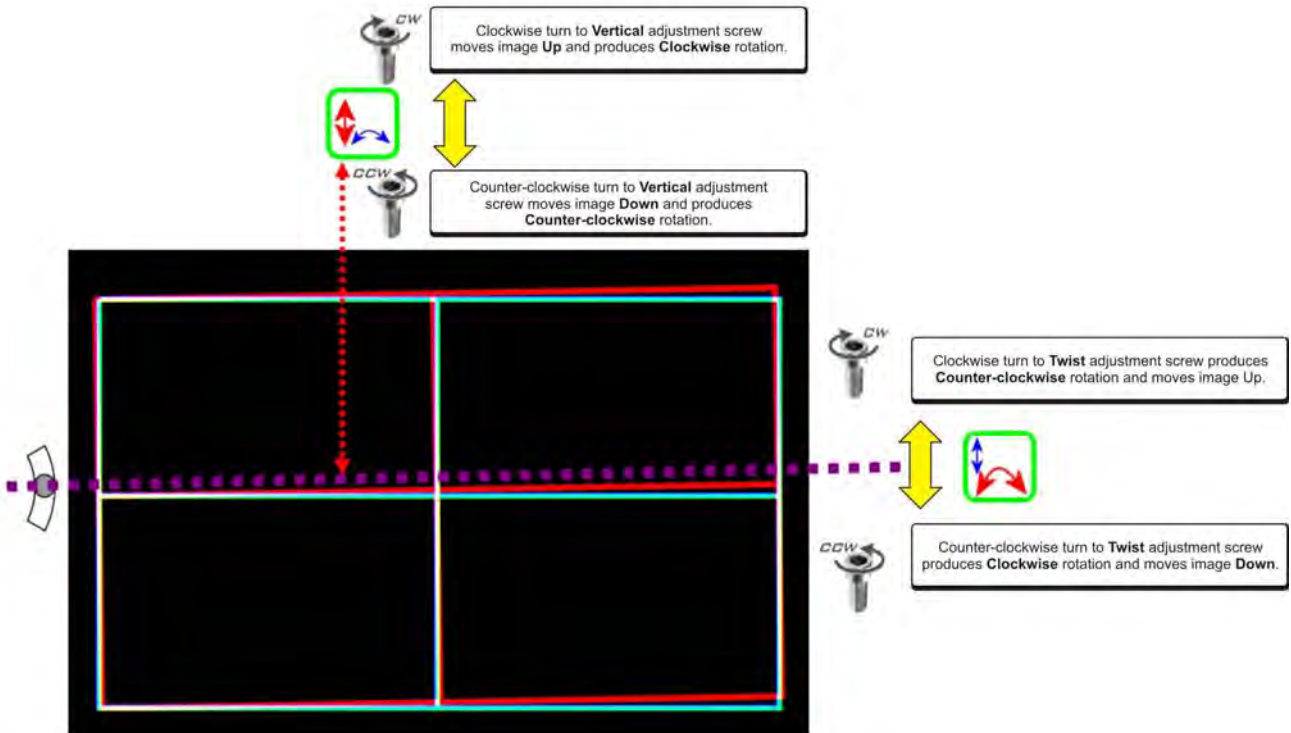


Figure 3-14 Red/Green Formatter Twist and Vertical Adjustments

3.5.6 Blue Formatter Convergence Adjustment

The Blue Formatter differs greatly in physical layout and adjuster function compared to the Red/Green Formatters. The biggest difference is that the horizontal and twist adjustments interact with each other because the twist functions on the vertical axis in Blue, as opposed to the horizontal axis with the Red/Green Formatter adjustments.

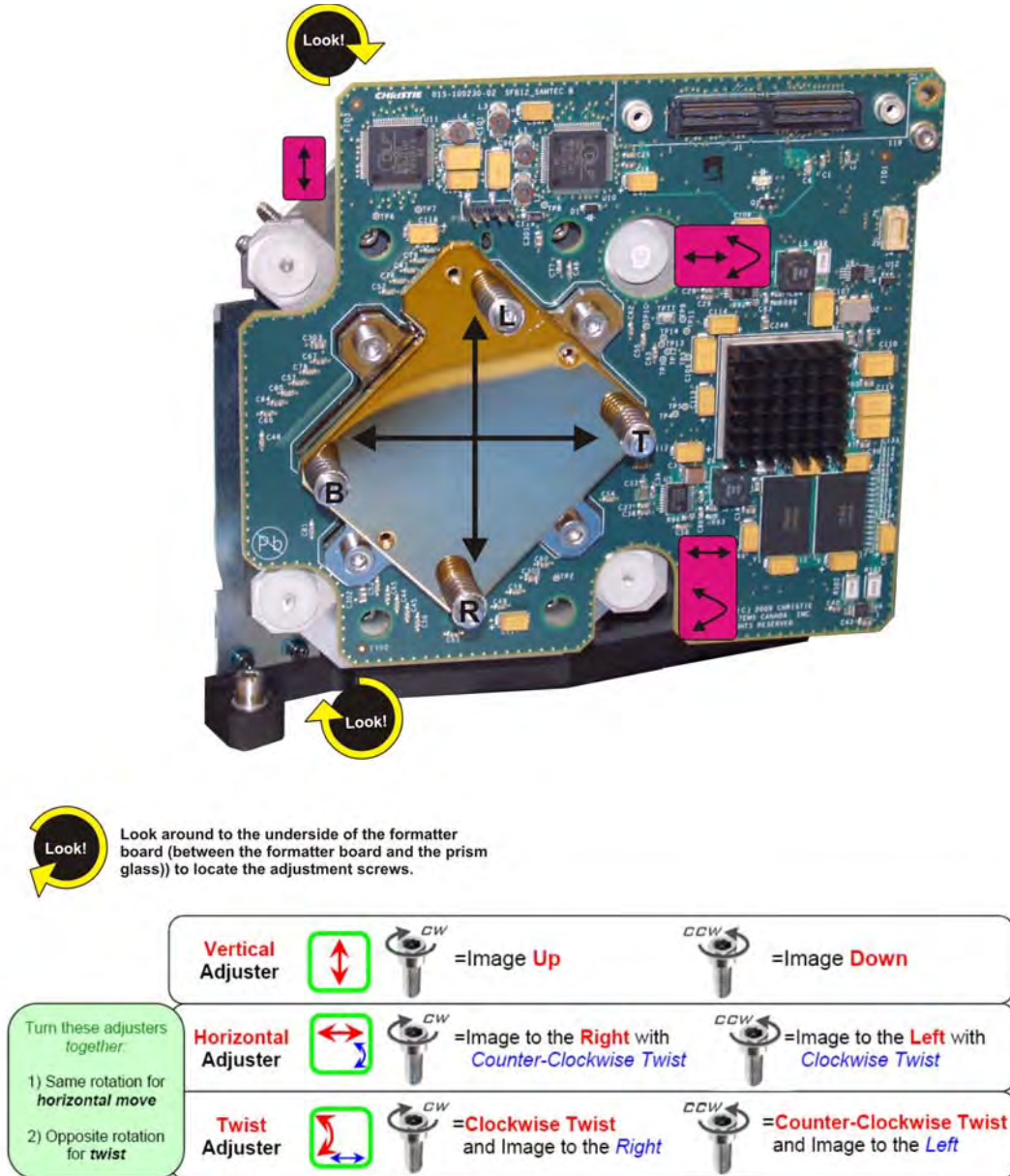


Figure 3-15 Blue Formatter Convergence Adjustment

The physical layout of the Blue Formatter board also dictates the behavior of the twist adjustment:

- The horizontal adjustment screw and twist adjustment screw interact with each other such that if one is turned in the opposite direction of the other, the twist is affected.
- If they are turned in opposite and equal amounts, the twist almost works as if it really was twisting: Pivoting from the center of the image.
- If both screws are turned equal amounts in the same direction, the image moves horizontally.

- You do not always have to turn the screws simultaneously. Adjusting one at a time will cause the need for an equal or equal and opposite turn on the other to prevent binding and achieve the adjustment desired.
- If you are attempting to adjust the twist and encounter increased resistance on the twist adjustment screw:
 - a. Double check the looseness of the four lockdown screws.
 - b. Turn the vertical adjustment screw counter-clockwise only enough to break it free - it may be binding. This will cause some vertical shift downward, but you can easily correct this after correcting the twist+horizontal errors.
- It is a good idea to locate the twist adjustment screw with the 1.5mm Allen® driver and leave it in place, resting against the lens mount/formatter board.
- A second 1.5mm Allen® driver can be inserted and removed to adjust the horizontal/twist adjustment screw or the vertical adjustment screw.

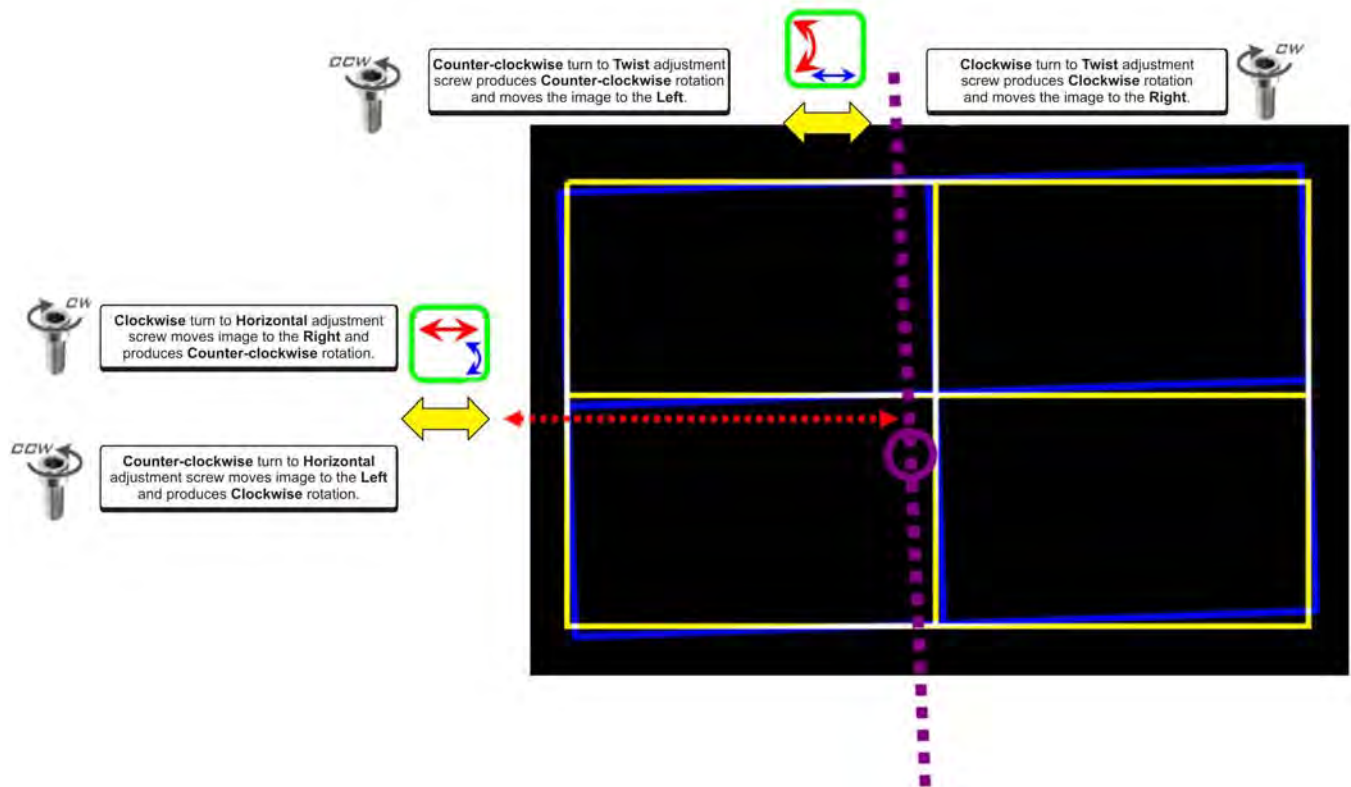


Figure 3-16 Blue Formatter Twist and Horizontal Adjustments

3.5.7 Final Convergence Assessment

When should you be satisfied with your adjustments? Read the following section before coming to a conclusion.

1. On the M25 Prisms, the Red image is slightly larger than the Blue and Green. The larger size is caused by the natural properties of Red light in that it is a “slow” wavelength compared to Blue and Green. The angle that light is traveling is affected by every medium it travels through, and in this case there are several pieces of glass between Red and the screen – the Red image is affected most noticeably as it ends up slightly larger.
 - a. This means that the best possible convergence would be described as follows: The center area highlighted in **Figure 3-17** should be perfectly aligned showing solid white pixels, as shown in the simplified diagram. (**Figure 3-17**)
 - b. The Red should be evenly $\frac{1}{4}$ to $\frac{1}{2}$ a pixel out all the way around the outer area not highlighted in **Figure 3-17**, showing cyan (green+blue) towards the center of the screen, as shown in the simplified diagram. (**Figure 3-17**)
 - c. Green and Blue should always be perfectly aligned to each-other (to within $\frac{1}{4}$ pixel total in one or a combination of directions.)

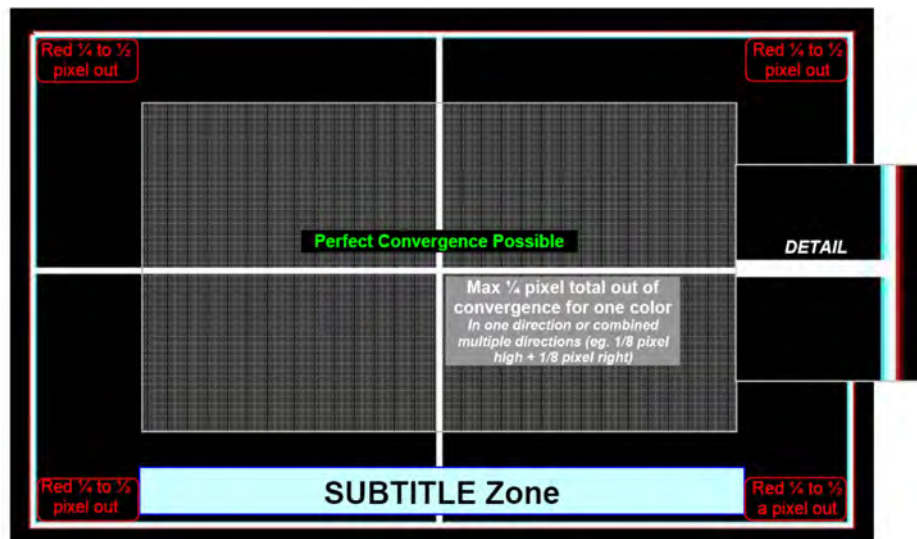


Figure 3-17 Best Possible Convergence

2. In certain circumstances, there may be further tolerance deficiencies in the prism assembly in combination with the projection lens that will cause the normal Red over-sizing to become slightly non-uniform.
 - a. In practice, this extra increase in size has generally appeared on the lower-right of the image, causing an apparent clockwise twist in the lower-right corner only – the upper left, right and lower-left all look OK.
 - b. The only way to deal with this will be to “Split the difference” pushing the rest of the image slightly twisted counter-clockwise to minimize the effect on the bottom of the screen, keeping the subtitle zone as converged as possible.
 - c. If the problem appears to be more than an extra $\frac{1}{2}$ of a pixel out of uniformity, a new lens/prism assembly may be the only solution.

3.6 Performing Marriage

NOTICE: Only Christie authorized service technicians should perform marriage.

Marriage is the engaging of the DCI physical interlocks that enable the display of secured materials. The **Marriage** window begins a series of panels that guides you through the sequence of steps required to activate marriage. The left column of the **Marriage** window shows which state you're currently at in the marriage process. (Figure 3-18) Click the **Next/Prev** buttons to navigate the series of steps. **NOTE:** Only Christie authorized service technicians can activate marriage. One of the key ideas behind marriage is that an authority figure examine 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 this, there is a marriage button on the PI Board panel which must be pressed in order for the marriage to complete. The following are the steps that must be followed for you to perform marriage on the projector.

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.
2. In the **Marriage Checklist** window (Figure 3-18), the wizard checks that all tamper switches are secure and it presents a list of items that you must check to ensure the projector is secure before proceeding. Click the **Next** button to proceed to the **Arming** window.

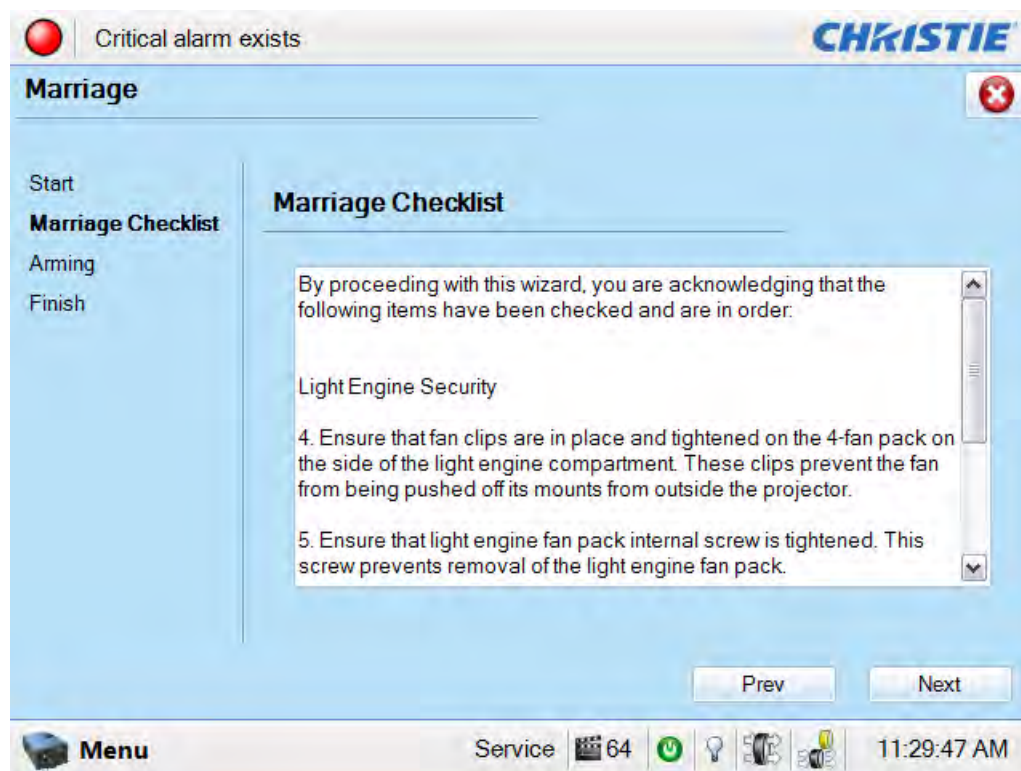


Figure 3-18 Administrator Setup: Marriage Checklist Window

3. In the **Arming** window, click the **Arm Marriage** button. (**Figure 3-18**). A 30 second count-down timer begins. (**Figure 3-19**). 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.

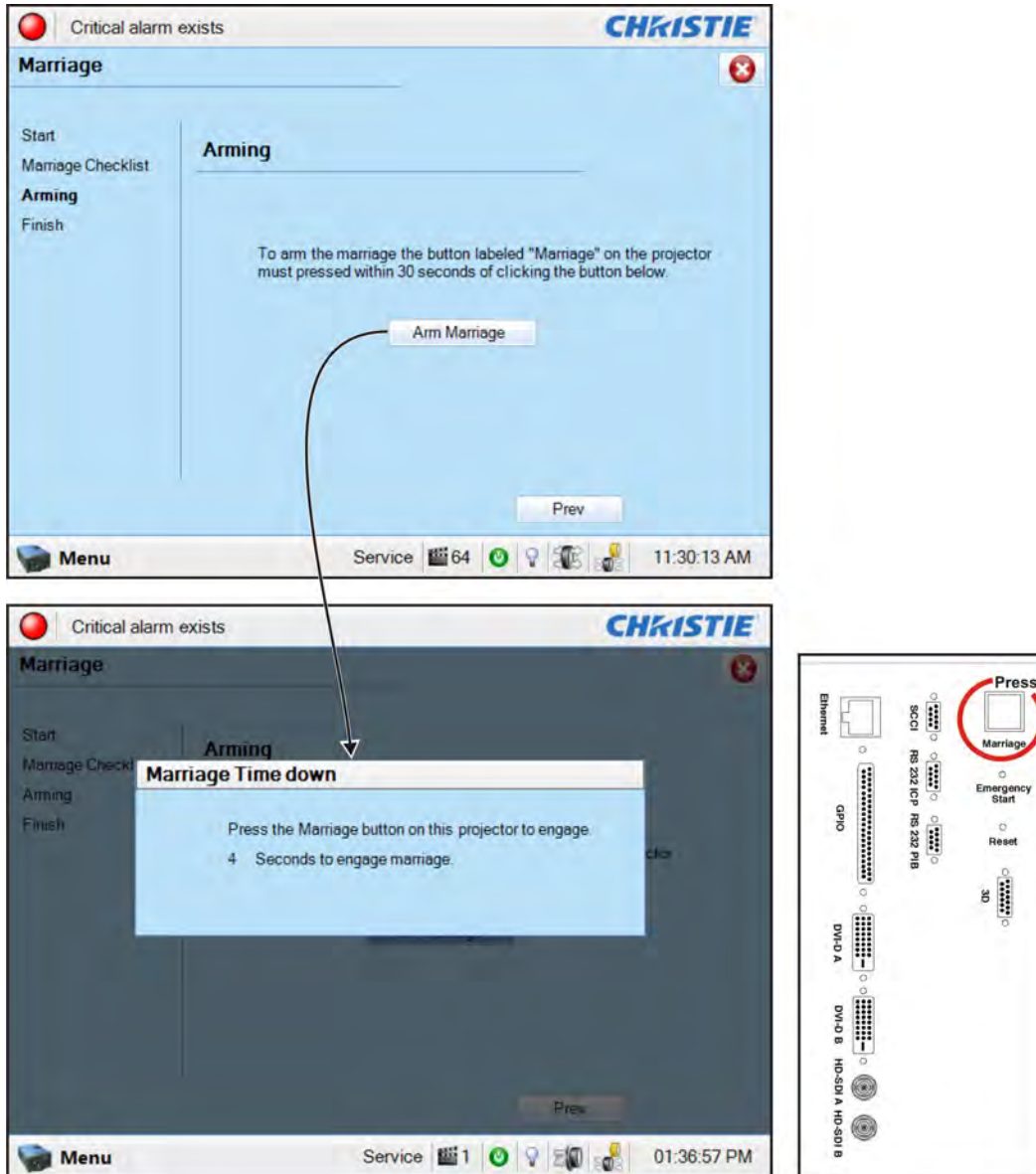


Figure 3-19 Press Marriage Button on PI Board after Clicking Arm Marriage Button

4. The **Finish** window states if the marriage was successful or not. Click the **Finish** button to return to the **Main** panel.

3.7 Upgrading Main Software

The **Upgrade** window begins a series of steps to walk you through the upgrade process. You must login as an Admin level or higher 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.

3.7.1 Steps to Install an Upgrade Package

1. Ensure you are logged in at the service level.
2. Access the Upgrade Package using 1 of the following processes:
 - Insert the USB drive containing the upgrade package into the USB port on the TPC. Navigate to the **Administrator Setup: Marriage** window and click the **Upload** button. (Figure 3-20). 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 3-20). 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.*
3. 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.
4. The **Package Details** window shows the versions of all components installed in the projector. (Figure 3-21). 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.
5. The **Installation** window displays the state of the upgrade progress. (Figure 3-22). 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.
6. Power cycle the projector by turning the breaker off and then on again.
7. Power cycle once more if you have any version mismatch errors.

3.7.2 Upgrade: File Selection Window

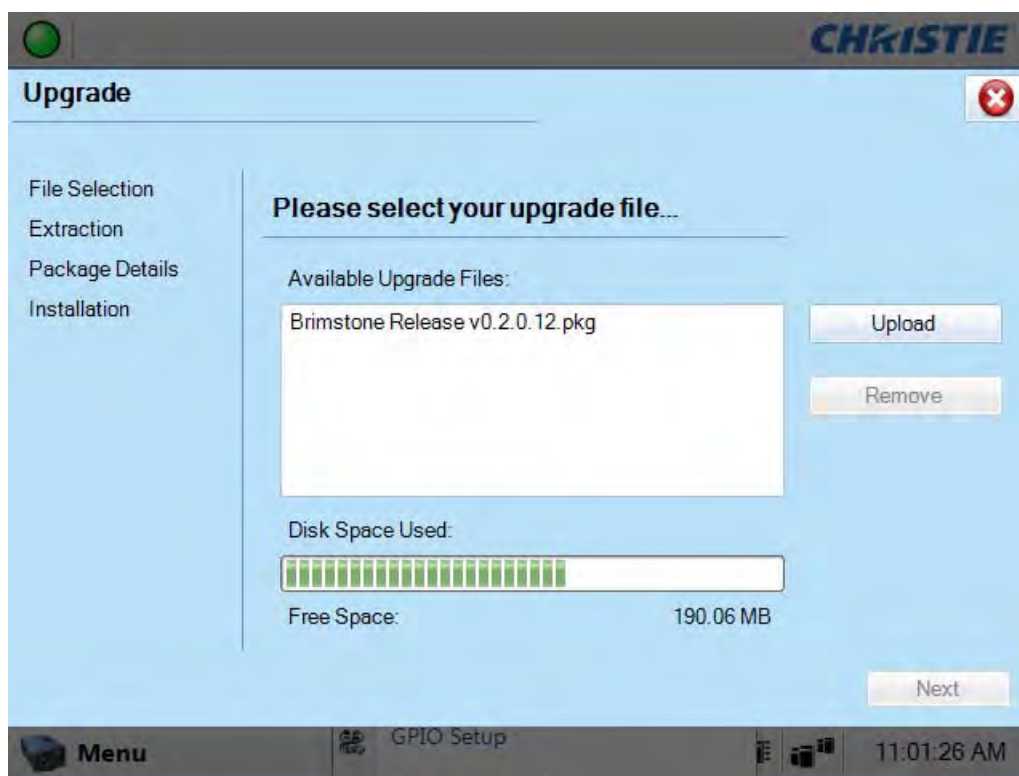


Figure 3-20 Upgrade: File Selection Window

Table 3.2 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 root folder. 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.

3.7.3 Upgrade: Package Details Window

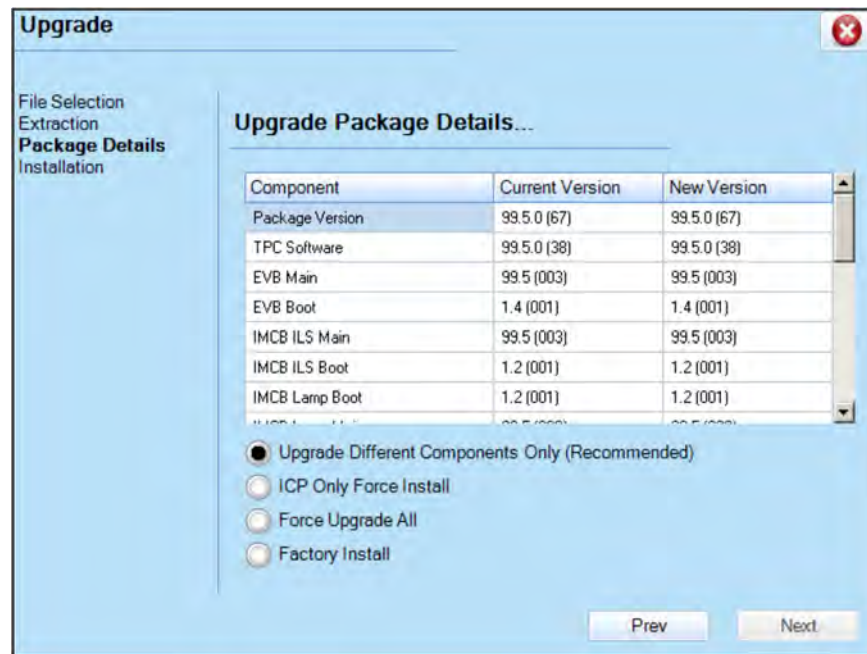


Figure 3-21 Upgrade: Package Details Window

Table 3.3 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 Components 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.
ICP Only Force Install	This selection instructs the upgrade system to force an ICP only install regardless of what current version is installed.
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.
Force 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.

3.7.4 Upgrade: Installation Window

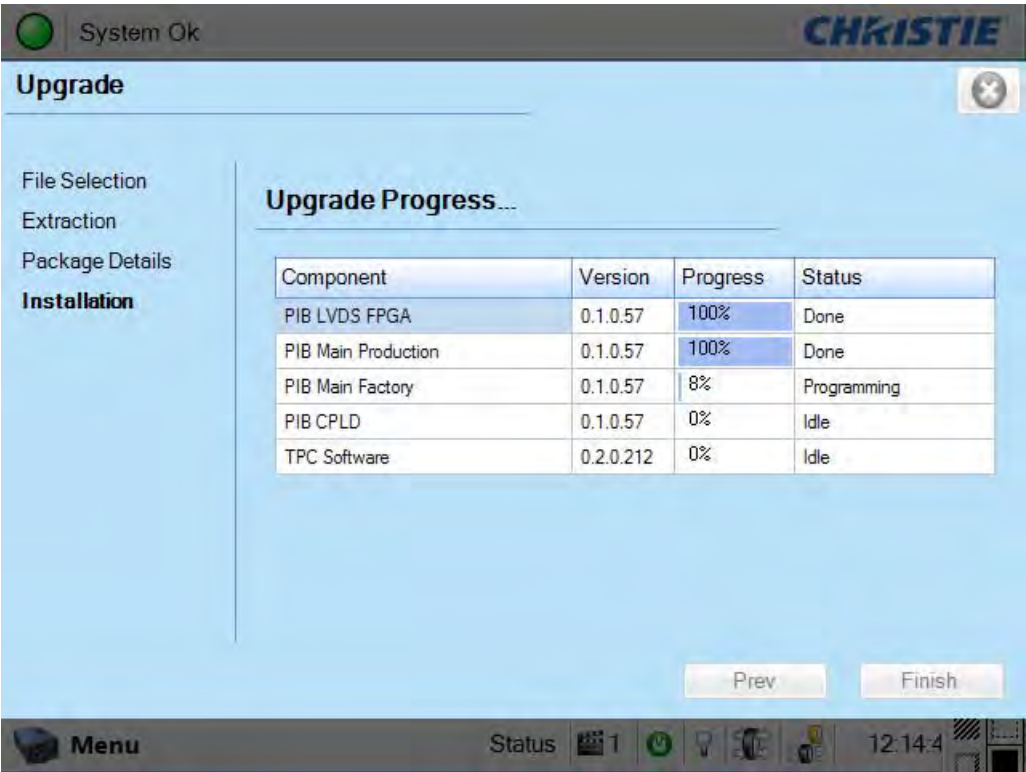


Figure 3-22 Upgrade: Installation Window

Table 3.4 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.

3.8 Hardware Change

The projector serial number is stored on four hardware devices, this includes the TPC, PIB, EVB and Backplane. If ever more than two of these hardware devices are swapped the Hardware Change window (**Figure 3-23**) is generated the next time the projector is powered ON. The user is prompted to select which hardware device contains the original serial number and to specify where to restore the settings from if both the PIB and TPC serial numbers do not match.

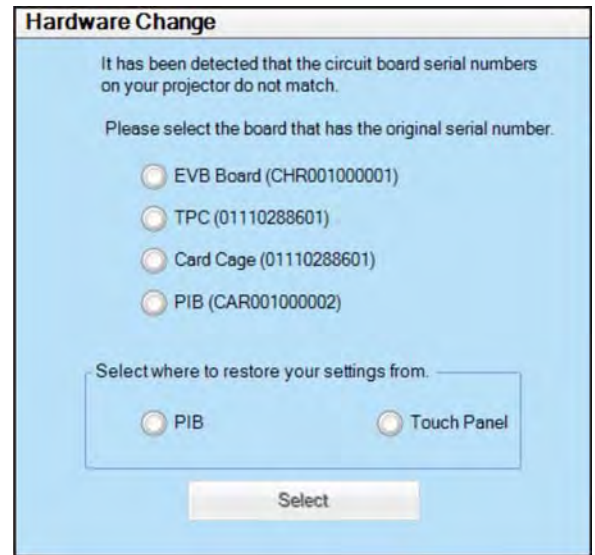


Figure 3-23 Hardware Change Window

4 Troubleshooting

This section provides troubleshooting procedures that can help direct you to the most likely cause of a specific performance problem. Refer to this section if you cannot eliminate the problem through proper adjustment of the projector. Note the symptoms present and work through the appropriate troubleshooting steps to determine the source of the problem. For more information on troubleshooting a displayed image, refer to the User Manual.

The CP2220 offers a comprehensive system of diagnostics, tracking a wide range of conditions and alerting the operator to a potential problem by display specific status information at the Touch Panel Controller (TPC) or by the available internal or external LEDs.

This system includes:

- ☐ TPC Status Menu
- ☐ TPC Alarm Windows
- ☐ External Projector Status LEDs
- ☐ Internal PCB-specific LEDs and Main AC status LED

If warnings and errors reported at these locations cannot be resolved by the operator or administrator, further troubleshooting by a qualified service technician may be required. When troubleshooting, keep in mind that the projector is comprised of numerous replaceable modules, such as printed circuit boards, optical assemblies and power supplies. This modular design can reduce the amount of time required to accurately diagnose and resolve a performance issue — the cause need only be traced down to the module level, at which point the faulty module is usually replaced. No further analysis is necessary.

4.0.1 Symptom: Projector will not turn on to full power mode from standby

- Check TPC for error messages and LEDs for projector status. Resolve reported condition(s) as required. If failure with PIB communications exists, try reseating the board. Check Ethernet status LED on rear of TPC.
- Check if internal fans are running. If not, look through the rear, right side grill to see if the power LED is illuminated. The upper right LED indicates the LVPS has power and the lower left LED indicates Main input. If green LEDs are not seen, check breaker wiring to terminal strip.
- Check all harness connections between LVPS and Backplane.
- Replace LVPS as the last attempt to resolve the issue.

4.0.2 Symptom: Lamp will not ignite

- Check all interlocks and alarm condition in the TPC **Status** window. Is there a DMD overtemp alarm condition? Resolve reported condition(s) as required.
- Check lamp connection: anode connection, igniter cables are attached and tightened on cathode nut...etc.
- Replace lamp.
- Check Lamp Power Supply (LPS).

4.0.3 Symptom: Lamp ignites but won't stay on

- Check alarm conditions in the TPC **Status** window. Is there a DMD over-temperature alarm condition? Resolve reported condition(s) as required.
- Is the correct lamp type selected in software. Check **Advanced Setup: Lamp** window.
- Check the lamp power setting in the **Advanced Setup: Lamp Power/LiteLOC Setup** window. Is it set correctly for your lamp type. **NOTE:** *Older lamps may not reliably operate at significantly lower than rated power.*
- Before you replace the lamp, check wiring connections, electronics and the Lamp Power Supply (LPS).

4.0.4 Symptom: LampLOC™ not working

- If there are no visual changes at all when performing LampLOC™ (while white test pattern is on screen), check the following:
 - ☐ Is LampLOC IMCB reporting any communication errors?
 - ☐ Is douser open?
 - ☐ Check harness connections between the Lamp IMCB (P35) and EVB (P34A).
 - ☐ Check light sensor harness connection to Lamp IMCB (P36).
- Are light sensor values changing while performing LampLOC™. If not, try replacing the Light Sensor.
- Adjust each axis manually with the lamp OFF. Do motors move freely? If not, try replacing the Lamp IMCB.
- If the lamp runs dim or the image displays poor uniform brightness, check the following:
 - ☐ Anode yoke is in the correct position for the lamp type used.
 - ☐ Anode yoke is not bent and lamp is centered in the reflector.
 - ☐ Lamp extension nut is used with CDXL-30SD lamps only.
 - ☐ The flat part of the anode end of the lamp faces up in the anode yoke. For CDXL-30SD lamps, the flat part of the anode end is positioned at the 2 or 10 o'clock position.
- Replace Lamp. Ensure to set lamp type in **Advanced Setup: Add Lamp** window.

4.0.5 Symptom: LiteLOC™ not working

- If 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.
- Replace the Lamp Power Supply (LPS).

4.0.6 Symptom: DMD over-temperature warning

- Check DMD temperature sensor readings. Are they the same? If not, check each sensor for proper mounting.
- Check coolant hoses for kinks which may restrict fluid flow. Fix if possible.
- Check coolant level. Make sure the coolant level does not fall below the minimum fill line indicated on the reservoir. Top up coolant if required, using the Christie approved coolant JEFFCOOL E105.
- Check Radiator Air Filter located behind the cover next to the lamp door. If it appears grey in color, it requires replacement.
- Ensure intake fans and LAD fans are working.
- Check LAD Filter located in light engine compartment. If it appears grey in color, it requires replacement.
- Check LAD hoses for possible kinks. Correct if necessary.

4.0.7 No Image, Just Pink Snow

If you see no image, just pink snow, the enigma has likely been bypassed. Reconnect the enigma by selecting the **LD Bypass** checkbox in the **Channel Setup: Config 2** window.

4.0.8 Symptom: No image displays, just black screen (or green screen in 3D)

A black screen error occurs when the Link Decrypter is not processing video content and produces a fixed, solid image. A black screen will appear when not processing 2D content and a green will appear when not processing 3D content.

1. Ensure the service doors are closed.
2. Ensure that marriage is established. Check the Marriage light on the main window of the TPC.
NOTE: *It takes 45-60 seconds after reset or power-up for the Link Decrypter to verify the marriage with the ICP. During this time, the LD will not accept any TLS connections or keys from the Cinema Server.*
3. The LD must not be in a FIPS error state. There are multiple integrity checks performed by the LD on startup and operation. A failure of any of these checks will cause the LD to enter the FIPS error state, during which no cryptographic operation is allowed (No TLS connections, no Cinelink-2 decryption).
NOTE: *If the LD is in the FIPS error state, you can try resetting or power-cycling the LD (the projector) to attempt to recover.*
4. Ensure the LD logs are not full. If so, the LD will not accept any Cinelink-2 keys until enough log records have been read by the Security Manager (SM) to allow the LD to create new log records. It is the responsibility of the Cinema Server to read/clear the LD's logs.
5. The LD Real Time Clock must be set correctly. If it is not correct, it may reject the client certificate presented by the server during TLS negotiations.
6. Ensure the LD security cover is intact. These are the metal covers on the LD card itself. Also, ensure the battery is charged and that the LD keys and certificate are intact.

5 Parts and Module Replacement

5.1 ORDERING PARTS

When ordering replacement parts provide the following information found on the product license label:

- Projector Model
- Projector Serial Number
- Manufacture Date

5.2 INDEX OF PARTS AND MODULES

All replacement parts and accessories for CP2220 projectors can be found in the following tables. Each table contains a description of the part, and the service kit part number. An exploded view has been provided in **Appendix A**, which can be used as a reference for identifying various projector parts.

Table 5.1 Lamp and Filter Assemblies

Part Name/Description	Christie Service Kit Part #
CDXL-20LB (2.0kW Xenon)	003-005079-01
CDXL-20SP (2.0kW Xenon)	003-004251-01
CDXL-20 (2.0kW Xenon)	003-000598-02
CDXL-30SP (3.0kW Xenon)	003-004252-01
CDXL-30 (3.0kW Xenon)	003-000599-02
CDXL-30SD (3.0kW Xenon)	003-001165-01
Filter, Air (5 pack)	003-001184-01
Filter, LAD (3 pack)	03-001982-51P
Filter, Radiator (1 pack)	003-003082-01

Table 5.2 Lamp Power Supply, Igniter and Power Supplies

Part Name/Description	Christie Service Kit Part #
AC Receptacle with Line Filter (250V, 15A)	003-002136-01
AC Line Filter (30A)	003-001461-01
AC Relay (230V AC 30A)	003-001209-01
Igniter	03-900547-51P
Lamp Power Supply (LPS), 3kW	003-001195-01
Low Voltage Power Supply (600W)	003-120508-01
Standby Power Supply (60W)	003-120509-01

Table 5.3 Optical Assemblies

Part Name/Description	Christie Service Kit Part #
Cold Mirror	003-001527-01
Fold Mirror	003-001528-01
Illumination Optics System (IOS) (does not include integrator or Liteloc™)	003-001199-01
Integrator Assembly (includes holder & nitrile gloves)	003-001529-01
UV Filter	003-001568-01

Part Name/Description	Christie Service Kit Part #
Yellow Notch Filter (1 filter & disposable nitrile gloves)	03-008004-52P
Light Engine	003-101329-01
Lamp Adjust Assembly	003-101519-01

Table 5.4 PCB Assemblies

Part Name/Description	Christie Service Kit Part #
Backplane PCB	003-111043-02
Environmental Board (EVB)	003-111059-02
ICP PCB	003-101342-01
Integrated Motor Control Board (IMCB)	003-111116-02
LD PCB Link Decrypter (sister board to PIB)	003-120535-01
Light Engine Quick Disconnect PCB (LEQD)	003-101360-01
Light Sensor PCB	003-101695-01
Projector Intelligence Board (PIB)	003-101341-01
Temperature Sensor PCB	003-100618-01
LEDB	003-111180-01

Table 5.5 Fan Assemblies

Part Name/Description	Christie Service Kit Part #
Fan - Cardcage Exhaust (12V 0.6A 4-wire 92mm)	003-110827-01
Fan - Cardcage Intake (12V 0.24A 3-wire 60mm)	003-111381-01
Fan - LAD (12V DC 50mm)	003-110854-01
Fan - Light Engine Intake (12V .6A 4-wire)	003-110827-01
Fan - Main AC Blower (230V)	003-001563-01
Fan - Radiator	003-120453-01
Heat Exchanger (120mm)	003-003083-01

Table 5.6 Miscellaneous Assemblies

Part Name/Description	Christie Service Kit Part #
Anode Clamp (aka anode mounting bracket)	003-003087-01
Anode Yoke Assembly	003-001513-01
Ceramic Plate (insulator RS-100)	003-001517-01
Douser Motor Assembly	003-001518-01
Feet (4x) *includes Front Feet 012-101097-xx and Back Feet 012-101098-xx	003-001193-01
Flex Cables	003-003630-01
Focus Knob (part of lens mount)	003-101182-01
Interlock Switch	003-001559-01
Lamp Door Interlock	003-001526-01
Lamp Reflector	003-001189-01
Lens Mount Manual	003-101581-02
Low Security Lock	003-003081-01
Offset Knob (part of lens mount)	003-101183-01
Pump Assembly (12VDC)	003-111198-01

Part Name/Description	Christie Service Kit Part #
Slide Assembly (10mm, part of lens mount)	003-101198-01
Stepper Motor	003-111326-01
Touch Panel Controller (TPC) (includes harness)	003-101289-01
Vane Switch - Exhaust	003-001208-01

Table 5.7 Optional Lenses

High Brightness Prime Zoom Lenses	Christie Service Kit Part #
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
High-Contrast Prime Zoom Lenses	
1.25-1.45 DLPCine HC Zoom Lens	38-809079-01
1.45-1.8 DLPCine HC Zoom Lens	38-809061-01
1.8-2.4 DLPCine HC Zoom Lens	38-809052-01
2.2-3.0 DLPCine HC Zoom Lens	38-809053-01
3.0-4.6 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)	38-809054-51
1.26x Wide Converter Lens	108-281101-01

Table 5.8 Optional Accessories

Optional Accessories	Christie Service Kit Part #
Bracket Foot Lock (for use with Rack Stand)	116-100101-01
Convergence Tool Kit	003-000078-xx
High-Contrast Internal Aperture Kit	38-813028-51
Motorized Auxiliary Lens Mount	108-111102-xx
Motorized Upgrade Kit	127-102104-xx
Power Plug Cord	116-102104-01
Protective Clothing Safety Kit (Kevlar gloves, flack jacket, face shield)	59-8900-095
Rack Stand	108-282101-02
TPC Harness (3ft)	003-111169-01

5.3 GENERAL SAFETY WARNINGS AND GUIDELINES

⚠ DANGER HIGH VOLTAGES! Always power down and disconnect power sources prior to servicing. All module replacement procedures must be performed by Christie authorized service technicians. Once the projector is powered down, allow the cooling fans to automatically turn OFF before disconnecting from AC and opening the projector. This takes approximately 10 minutes.

⚠ CAUTION Use a grounded wrist strap when handling electronic assemblies.

5.4 REPLACEMENT PROCEDURES

5.4.1 TOOLS REQUIRED

- Keys for security locks
- Long magnetic-tip Phillips™ screwdrivers - #1, #2 and #3
- Hex keys: 3/32", 9/64", 7/64", 5/32", 3/16", 2.5mm, 3mm
- Nut drivers: 9/16", 7/32", 7mm
- Electrostatic protective strap and pad
- Disposable Nitrile gloves (included with optical components)
- Protective clothing/safety gear (required when handling lamp), includes:
 - face shield
 - vinyl-coated or interlock knit-lined gloves
 - nylon flak jacket

5.4.2 SERVICING GUIDELINES

- Always power down and disengage all power sources to the projector prior to servicing.
- Follow all service safety guidelines.
- Refer to [Appendix A: Exploded Views](#) for the location of serviceable modules.
- When re-installing a module, follow the *removal* instructions in reverse unless otherwise indicated.
- Refer to [Section 7 Interconnections](#) when re-connecting harnesses.
- All orientations mentioned are if viewed from the back of the projector.

5.5 Removing Projector Covers

⚠ CAUTION Never operate the projector or the fans without all the covers installed.

5.5.1 Front Top Lid

(Estimated Replacement Time: 2 minutes)

Remove the top lid to gain access to the light engine and liquid cooling system compartments.

1. Unlock front top lid using the low security key provided (**Figure 5-1**).
2. Lift the lid up and remove.

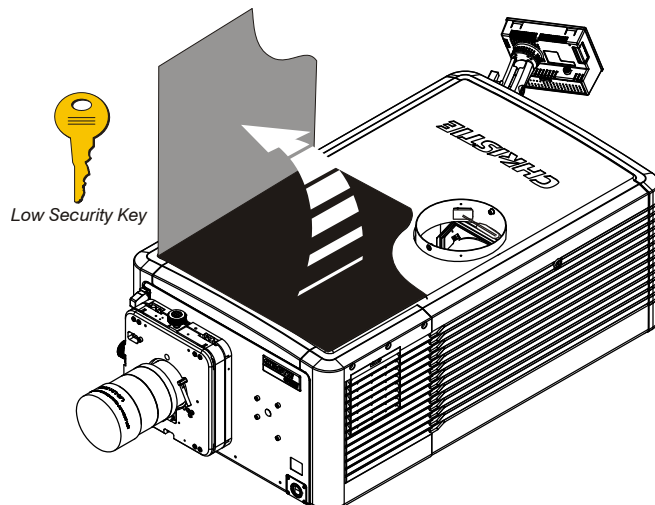


Figure 5-1 Front Top Lid

5.5.2 High Security Lid

(Estimated Replacement Time: 4 minutes)

Remove the high security lid to access components in the light engine and cardcage compartments. **NOTICE! Only Christie authorized service technicians should open the high security lid.**

1. Remove front top lid. Refer to [5.5.1 Front Top Lid, on page 5-5](#).
2. Using the high security key, unlock the high security lid (**Figure 5-2**).
3. Lift the lid up and remove.

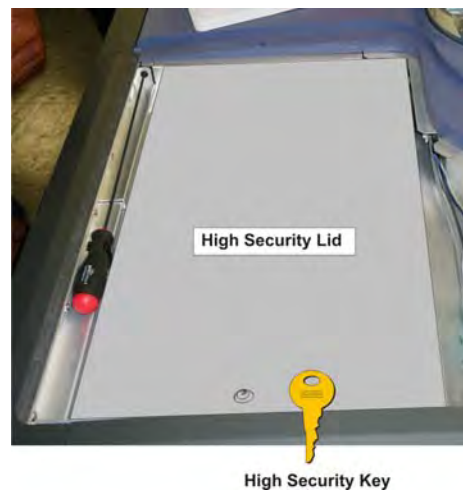


Figure 5-2 High Security Lid

5.5.3 Touch Panel Controller (TPC)

The TPC is located at the back of the projector. It is attached to a ball-joint mount which allows it to be viewed at any angle. The TPC can also be removed and be held by the operator. The TPC provides a user friendly interface that runs off a fully integrated Windows XPe-based operating system.

(Estimated Replacement Time: 4 minutes)

1. Disconnect the TPC cable from the back cover of the projector.
2. Loosen the TPC mounting arm so it can be removed from the ball joint on the back cover of the projector (**Figure 5-3**).

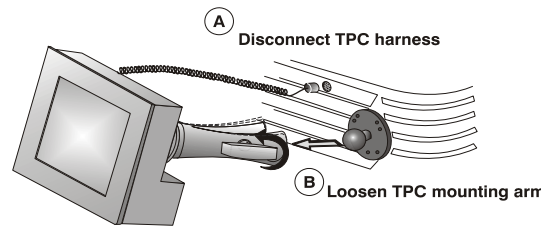


Figure 5-3 Remove TPC

3. When replacing, repeat the instructions in reverse.
4. If using a TPC-660E, check the main switch on the back of the TPC before reinstalling it. Ensure that it is connected properly. (**Figure 5-4**)



Figure 5-4 Main Switch on TPC-660E

5.5.4 Back Cover

(Estimated Replacement Time: 10 minutes)

1. Using a #2 Phillips™, loosen the three captive screws securing the back cover to the chassis (**Figure 5-5**).
2. Tilt and lift the back cover just enough for the bottom tabs to clear the frame and remove.

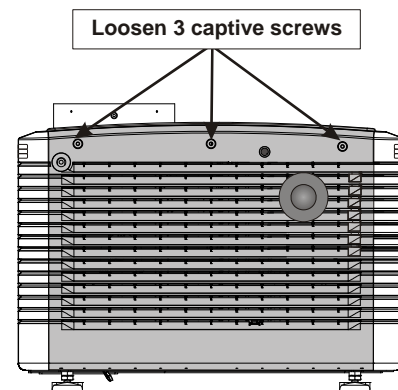


Figure 5-5 Remove Back Cover

5.5.5 Left Access Cover

(Estimated Replacement Time: 2 minutes)

Remove the left access cover, which is located next to the lamp door to access any of the components in the Illumination Optics System (IOS) and liquid cooling compartments.

1. Using a #2 Phillips, loosen the three captive screws at the top of the cover (**Figure 5-6**).
2. Pull the cover up to clear the bottom tabs and remove.
3. When re-installing the cover, align and insert the bottom tabs first, then secure the cover with the screws.

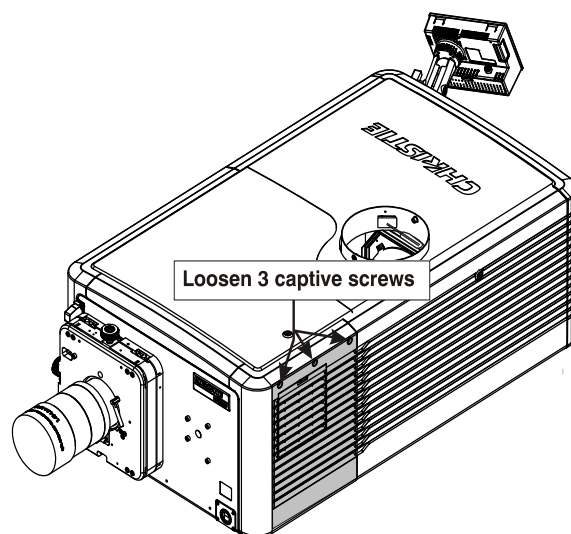


Figure 5-6 Remove Left Access Cover

5.5.6 Lamp Door

(Estimated Replacement Time: 4 minutes)

Remove the lamp door to access components in the lamp compartment. The lamp door can be removed entirely from the projector or it can remain tethered and opened up to 90°. Fixed to the inside of the door is a set of commonly used hex keys required during lamp replacement.

1. Unlock and open the lamp door (**Figure 5-7**).
2. Unhook the securing tether on the right-side of the door.
3. To release the door, slide the locking pin (accessible through the cutout located on the right side of the door) to the left.

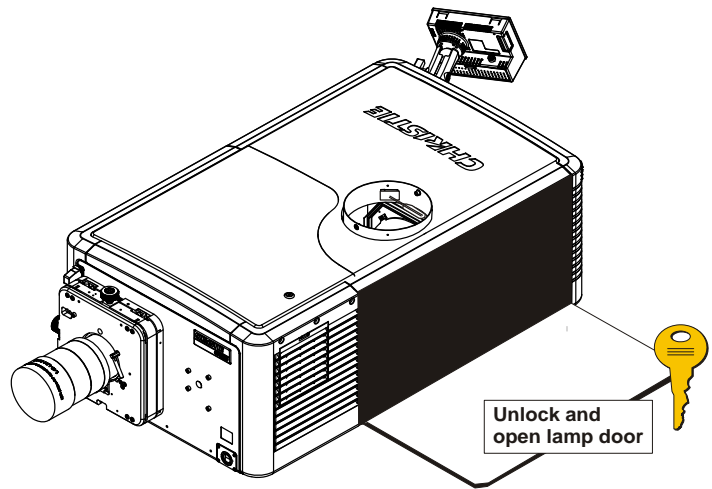


Figure 5-7 Open Lamp Door

5.5.7 LVPS/LPS Cover

(Estimated Replacement Time: 4 minutes)

Remove the LVPS/LPS cover on the operator's side of the projector to access the Lamp Power Supply (LPS) connections, AC Relay and LVPS.

1. Using a #2 Phillips™, loosen the three captive screws from the top of the cover (**Figure 5-8**).
2. Lift the cover up just enough for the bottom tabs to clear the frame and remove.
3. When re-installing, align and insert the bottom tabs first, then secure the cover with the screws.

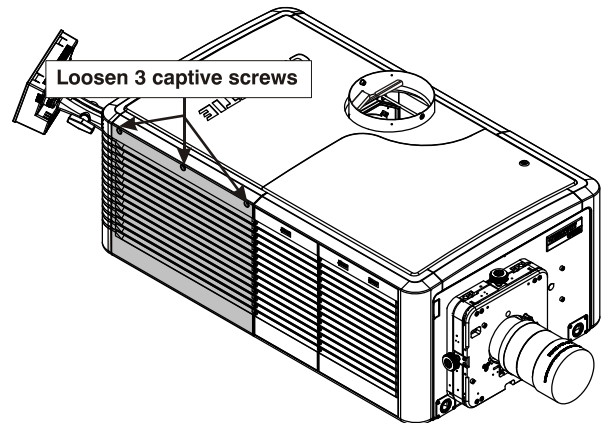


Figure 5-8 LVPS/LPS Cover

5.5.8 PIB/ICP Cover

(Estimated Replacement Time: 2 minutes)

Remove the PIB/ICP cover to access the communications panel.

1. Push down on the cover's center tab. (**Figure 5-9**)
2. Lift the cover up just enough for the bottom tabs to clear the frame and remove.
3. When installing the cover, insert the tabbed end first then lift the cover until top tab clips into place.

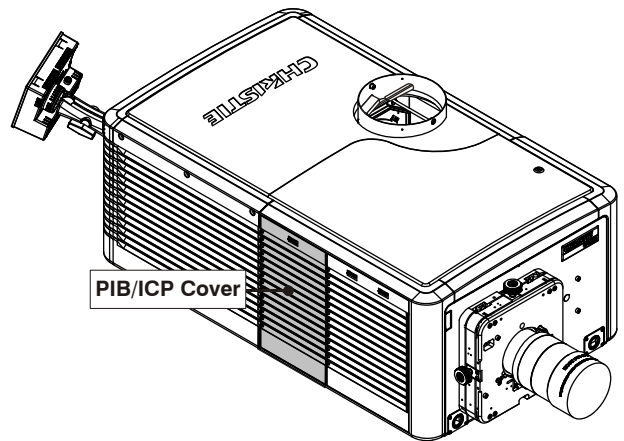


Figure 5-9 PIB/ICP Cover

5.5.9 Access Panel Frame

(Estimated Replacement Time: 8 minutes)

The Access Panel Frame is located on the operator's side (right) near the front of the projector. To access the components in the cardcage and light engine compartments the access panel frame must first be removed.

1. Remove PIB/ICP Cover (**Figure 5-9**).
2. Remove the light engine air filter cover (including filter) (**Figure 5-12**).
3. Remove the four, #2 Phillips™ screws from the top of the access panel frame securing it to the chassis (**Figure 5-10**).
4. Tilt the access panel frame a little to the front (lift left side) to clear the LVPS/LPS cover and remove.
5. Reverse instructions to re-install access panel frame.



Figure 5-10 Access Panel Frame

5.5.10 Rear Lid

(Estimated Replacement Time: 15 minutes)

1. Remove external ducting.
2. Remove the front top lid. Refer to [5.5.1 Front Top Lid](#), on page 5-5.
3. Using a #2 Phillips™, remove the two captive screws securing the Rear Lid to the chassis (Figure 5-11).
4. Open the lamp door (Figure 5-7).
5. Remove the LVPS/LPS cover (Figure 5-8).
6. Lift the rear lid up and remove.

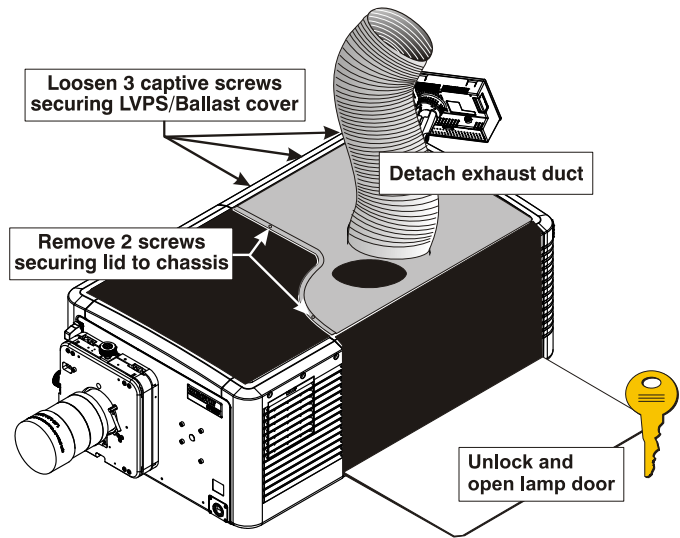


Figure 5-11 Rear Lid

5.6 Air Filters

5.6.1 Light Engine Air Filter

NOTICE: DO NOT try to clean and reuse old filters. The air filters used in this product cannot be cleaned thoroughly enough for reuse. Reusing filters can lead to the contamination of optical components.

(Estimated Replacement Time: 4 minutes)

The main air filter of the projector is located on the operator's side of the projector near the front. It is responsible for cleaning the intake air into the light engine compartment. It is strongly recommended this filter be replaced whenever a lamp is replaced or sooner in dusty and/or dirty environments. No tools required.

1. Push down on the two snap tabs at the top of the cover (Refer to Figure 5-9).
2. Lift the cover up enough for the bottom tabs to clear the frame and remove.
3. Slide the air filter out from behind the air filter cover and discard (Figure 5-12).
4. When replacing, insert a new air filter with the airflow indicator pointing into the projector. This will ensure contaminants are not forced into the projector.

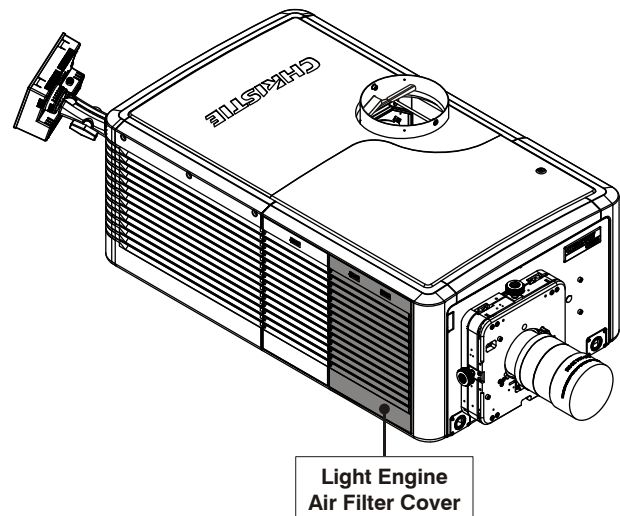


Figure 5-12 Light Engine Air Filter Cover

5.6.2 Radiator Air Filter

NOTICE: *DO NOT* try to clean and reuse old filters. The air filters in this product cannot be cleaned thoroughly enough for reuse. Reusing air filters can lead to the contamination of optical components.

(Estimated Replacement Time: 2 minutes)

The radiator air filter is located on the left side of the projector near the front. It is responsible for cleaning the intake air before it goes through the radiator (liquid to air heat exchanger) before moving into the IOS compartment. It is recommended this filter be replaced at the same time the light engine air filter is replaced.

1. Push down on the snap tab at the top of the cover. **(Figure 5-13)**
2. Pull cover out.
3. Slide the air filter out from the back of the cover and discard.
4. When replacing, insert the new air filter with the airflow indicator facing into the projector.

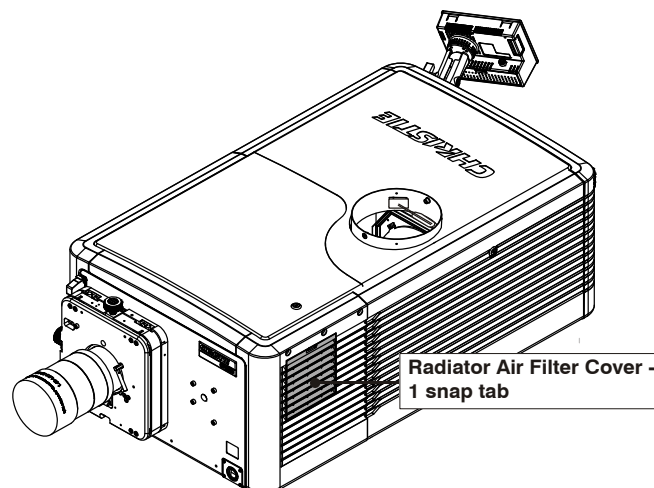


Figure 5-13 Radiator Air Filter Cover

5.6.3 LAD Filter

(Estimated Replacement Time: 10 minutes + 5 minutes calibration)

The LAD Filter is mounted together with the LAD fan in the light engine compartment. This assembly is secured to the light engine handle. The LAD filter is responsible for filtering the already filtered air from the light engine compartment, which is then directed to each DMD via clear tubing. The LAD filter rarely requires replacement, but should be inspected regularly.

1. Remove the front top lid. Refer to [5.5.1 Front Top Lid, on page 5-5](#).
2. Remove the high security lid. Refer to [5.5.2 High Security Lid, on page 5-5](#).
3. Pull the LAD filter out **(Figure 5-14)**.
4. Install a new LAD filter repeating the above instructions in reverse.
5. Disconnect the three LAD hoses (one going to each DMD) and turn projector power on using the TPC. This allows any shavings from the removal and replacement process to be blown out of the LAD hoses, but not onto the DMDs.
6. Re-connect the three LAD hoses again.

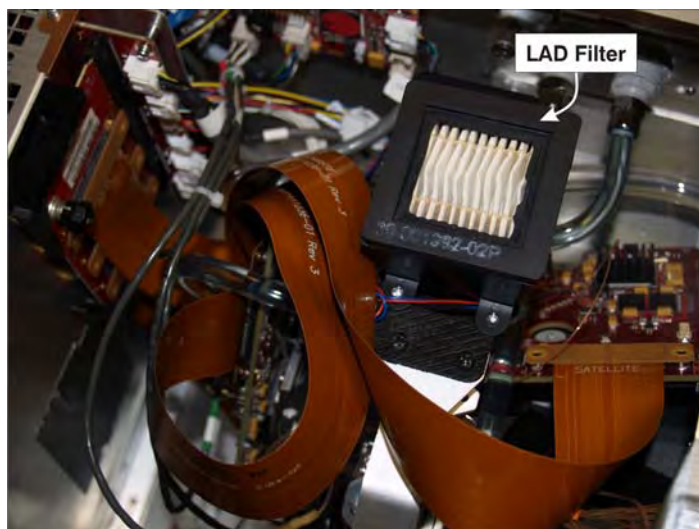


Figure 5-14 LAD Filter

5.7 Fans

5.7.1 LAD Fan

(Estimated Replacement Time: 20 minutes + 4 minutes calibration)

The LAD Fan is located in the light engine compartment. It is mounted to the light engine handle.

1. Remove the front top lid. Refer to [5.5.1 Front Top Lid, on page 5-5](#).
2. Remove the high security lid. Refer to [5.5.2 High Security Lid, on page 5-5](#).
3. Using a #2 Phillips™, loosen the two screws securing the LAD Fan assembly to the light engine assembly handle (**Figure 5-15**).
4. Remove the four hex screws securing the filter housing to the plastic frame.
5. Disconnect the LAD Fan harness (Fan 4) from the inline connector.
6. Disconnect the three LAD hoses.
7. Remove the filter housing and O-ring.
8. Repeat above instructions in reverse to install a LAD fan. Before connecting the LAD hoses turn the power on (using the TPC) to blow out any shavings which may have accumulated during the removal and replacement process. This step ensures no particles are deposited onto the DMDs. Once complete, re-connect the three LAD hoses again.

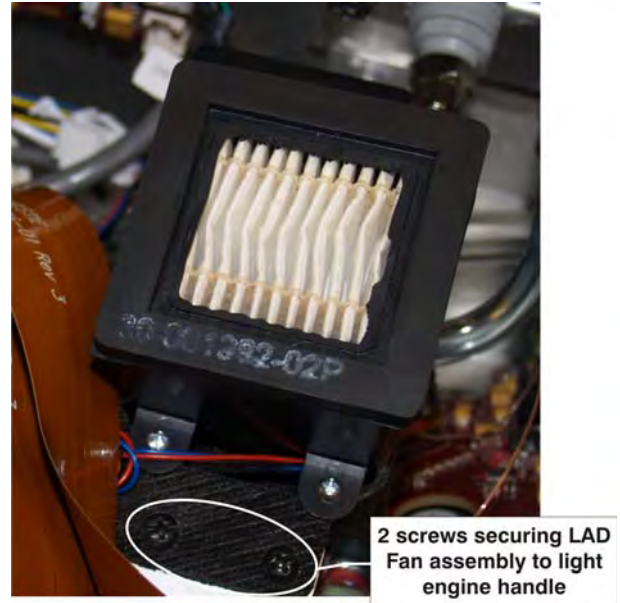


Figure 5-15 Remove LAD Fan Assembly

5.7.2 Light Engine Fan Pack (4 fans)

(Estimated Replacement Time: 30 minutes)

The light engine fan pack is located on the operator's side of the projector near the front. The four fans, which are mounted to a removable access panel frame, are responsible for drawing air into the projector to cool the light engine and cardcage components.

1. Remove the front top lid. Refer to [5.5.1 Front Top Lid, on page 5-5](#).
2. Remove the high security lid. Refer to [5.5.2 High Security Lid, on page 5-5](#).
3. Remove the PIB/ICP cover. Refer to [5.5.8 PIB/ICP Cover, on page 5-9](#).
4. Remove the light engine air filter cover. Refer to [5.6.1 Light Engine Air Filter, on page 5-10](#).
5. Remove the access panel frame. Refer to [5.5.9 Access Panel Frame, on page 5-9](#).
6. Remove the two screws from the side of the fan pack.
7. Loosen the thumbscrew accessible from the inside of the light engine compartment near the bottom left.
8. From within the light engine compartment (upper frame) unlatch the spring plunger on the frame and pull the fan pack out.
9. Disconnect the four fan harnesses from their inline connectors.
10. Replace the fan(s) required by removing the rubber isolators from each fan. **(Figure 5-16)**
NOTE: Install a fan with the label side facing into the projector,.

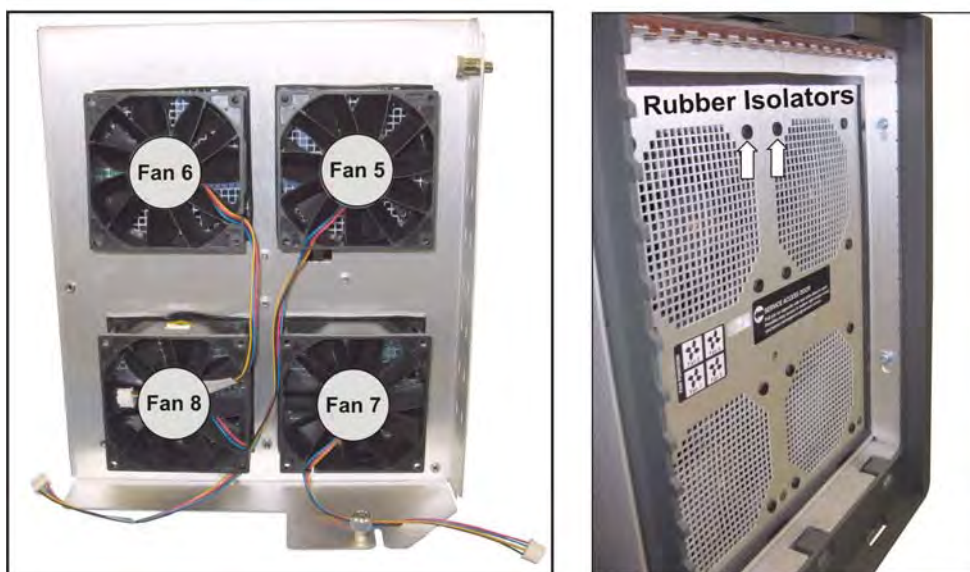


Figure 5-16 Remove Light Engine Fan Pack

5.7.3 Top Cardcage Intake Fans (2 fans)

(Estimated Replacement Time: 20 minutes)

The cardcage intake fans are located on top of the cardcage. These fans draw in air responsible for cooling the cardcage electronics. **NOTE:** Two additional fans can be installed to the top of the cardcage - these are optional and not shown in Figure 5-17.

1. Remove the front top lid. Refer to [5.5.1 Front Top Lid](#), on page 5-5.
2. Remove the high security lid. Refer to [5.5.2 High Security Lid](#), on page 5-5.
3. Disconnect the fan harness from the inline connector.
4. Remove rubber isolators, remove fan(s).

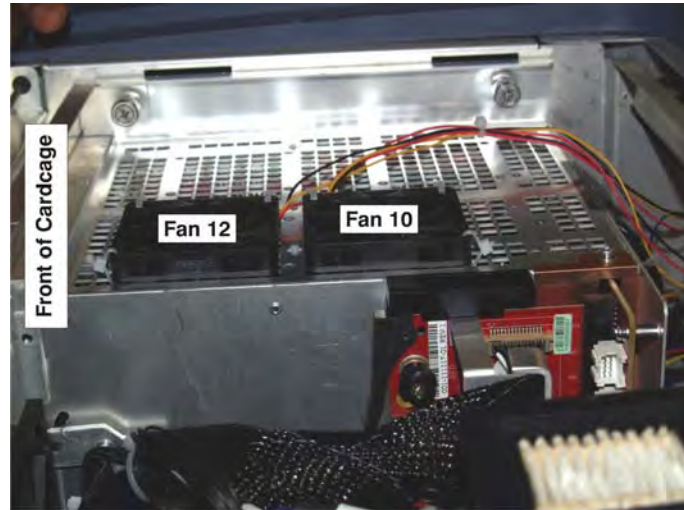


Figure 5-17 Cardcage Intake Fans

5.7.4 Bottom Cardcage Exhaust Fans (2 fans)

(Estimated Replacement Time: 60 minutes)

The bottom cardcage fans are located directly under the cardcage assembly. These two fans draw air out of the light engine/cardcage compartments. The cardcage assembly must be removed to access these fans.

1. Remove PIB/ICP cover. Refer to [5.5.8 PIB/ICP Cover](#), on page 5-9.
2. Remove the front top lid. Refer to [5.5.1 Front Top Lid](#), on page 5-5.
3. Remove the high security lid. Refer to [5.5.2 High Security Lid](#), on page 5-5.
4. Disconnect the two harnesses from the fans (inline connectors).
5. Disconnect the seven connectors from the Backplane PCB. **NOTE:** Power connector is located at the rear of the cardcage.

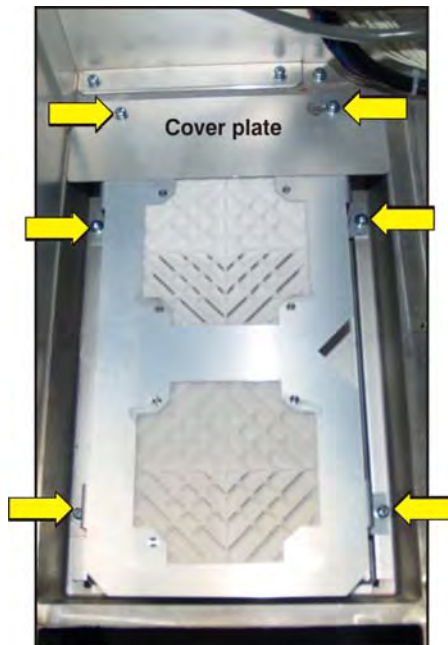


Figure 5-18 Cardcage Exhaust Fans

6. Pull the cardcage assembly out - remove two screws from the frame and loosen the thumbscrew at the bottom.
7. Using a 3mm hex driver, remove the two screws securing the fan compartment cover plate to the base (Figure 5-18).

8. Remove the four screws (3mm) securing the bottom cover/fan assemblies to the base (**Figure 5-18**).
9. Pull fans off the bottom cover's rubber isolators.
10. Reverse instructions to re-install the bottom cardage fans. Use needle-nose pliers to pull the rubber isolators through the fan mounting holes.

5.8 Feet

⚠ CAUTION Use of the rear safety strap, or hold-down bracket if using the optional rack stand, is **MANDATORY**. Ensure the strap is in place during replacement of the projector's feet to prevent the projector from tipping. Keep 3 of the projector's feet on the table at all times!

(Estimated Replacement Time: 12 minutes average between front and rear + 30 minutes for tweaking image)

1. Using a 19mm wrench, loosen the foot lock nut (**Figure 5-19**).
2. Loosen the foot until it is no longer engaged in the baseplate. Remove.
3. Replace feet repeating instructions in reverse. In some cases, the displayed image will require some tweaking to display correctly.

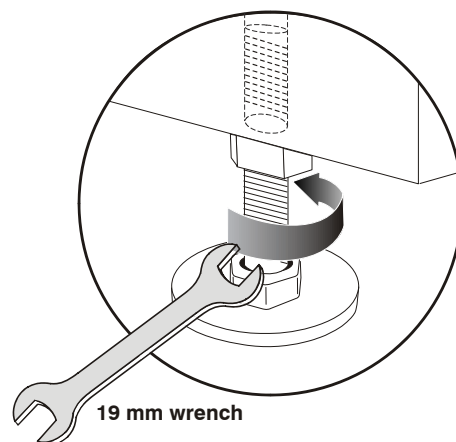


Figure 5-19 Loosen Projector Foot

5.9 Illumination Optics and Liquid Cooling Compartment

5.9.1 Cold Mirror

⚠ CAUTION Wear clean lint-free cotton gloves when handling the cold mirror and handle by the edges only. Fingerprints left on the surface can negatively impact a displayed image.

(Estimated Replacement Time: 30 minutes + 1 hour calibration)

The cold mirror is the first bend in the optical path within the IOS. It's easy to access and simple to replace.

1. Remove the front top lid. Refer to [5.5.1 Front Top Lid, on page 5-5](#).
2. Remove the light sensor module. Refer to [5.9.5 Light Sensor Module](#).
3. Loosen the two, 3/32" screws from the bottom tab securing the cold mirror.
4. From the other two tabs, *loosen* one 3/32" screw from each and *remove* one 3/32" screw from each. This allows the tabs to be swung out of the way without fully removing them (**Figure 5-21**).
5. Wearing the clean, lint free gloves provided in the service kit, carefully slide the cold mirror out.
6. When replacing the cold mirror, repeat instructions in reverse. Make sure to place the cold mirror into the holder with its reflective surface



Figure 5-20 Reflective vs. Non-Reflective Surfaces

facing in. The reflective side will show no gap with its reflection when an object is held at the surface; the non-reflective side will show a prominent gap (**Figure 5-20**).

After installation, LampLOC™ alignment and Measured Color Gamut Data (MCGD) calibration is required.

5.9.2 Fold Mirror

(Estimated Replacement Time: 30 minutes + 20 minute calibration)

The fold mirror is located under the front section of the projector.

1. Remove the four, #2 Phillips™ screws securing the fold mirror cover plate under the front portion of the projector. Remove cover plate.
2. Remove one, 2.5mm screw from each of the three tabs.
3. Loosen the other 2.5mm screw from each of the three tabs.
4. Holding the mirror in place, swing the tabs out to the side.
5. Carefully lower the mirror and remove.
6. When installing, repeat instructions in reverse. Adjust the Fold Mirror as needed. Refer to [3.1 Fold Mirror Alignment](#), on page 3-2 for details.

5.9.3 Illumination Optic System (IOS)

(Estimated Replacement Time: 120 minutes + 60 minutes calibration)

The IOS is located in the front compartment of the projector and is mounted to the baseplate. It includes all optical components between the integrator assembly and light engine assembly.

1. Remove the front top lid. Refer to [5.5.1 Front Top Lid](#), on page 5-5.
2. Remove the high security lid. Refer to [5.5.2 High Security Lid](#), on page 5-5.
3. Remove the integrator assembly. Refer to [5.9.4 Integrator Assembly](#), on page 5-17.
4. Remove the light sensor module. Refer to [5.9.5 Light Sensor Module](#), on page 5-17.
5. Remove the light engine. Refer to [5.11 Light Engine](#), on page 5-24.
6. Remove the front frame plate of the projector.
7. Remove the four, 3/16" hex screws from under the front portion of the projector.
8. Lift the IOS out to clear the dowels.
9. When installing the IOS, repeat instructions in reverse. Perform an evaluation on the IOS removed and re-calibrate the projector.

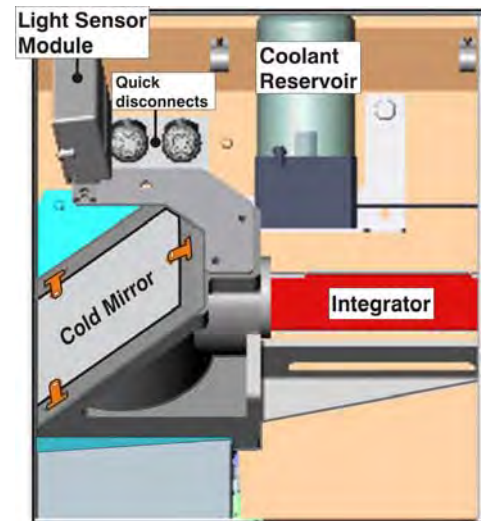


Figure 5-21 IOS Compartment

5.9.4 Integrator Assembly

(Estimated Replacement Time: 12 minutes + 20 minute calibration)

⚠ CAUTION Wear the clean handling gloves provided in the Service Kit whenever handling the integrator.

The Integrator Assembly is positioned between the IOS and the lamp compartment.

1. Remove the front top lid. Refer to [5.5.1 Front Top Lid, on page 5-5](#).
2. Remove two, 3mm hex screws securing the retaining clip to the rear end of the integrator (**Figure 5-22**). Use caution as to not damage the temperature sensor mounted nearby.
3. Loosen the one screw from the firewall snood. Pivot the tab out of the way to remove the snood.
4. Wearing the clean handling gloves provided in the service kit, carefully remove the Integrator Assembly and set aside in a clean area where it cannot be damaged.
5. When re-installing, repeat instructions in reverse. After powering up the projector, adjust the Integrator and Fold Mirror as required for proper aperture alignment. Refer to [Section 3 Service Setup](#) for details.



Figure 5-22 Integrator Assembly

5.9.5 Light Sensor Module

(Estimated Replacement Time: 20 minutes + 20 minute calibration)

The light sensor module is situated on the side of the IOS. It is orientated in such a way as to sample the light coming in through the cold mirror.

1. Remove front top lid. Refer to [5.5.1 Front Top Lid, on page 5-5](#).
2. Disconnect the light sensor harness from the inline connector.
3. Remove two, 3mm hex screws securing the light sensor module to the IOS.
4. When re-installing, repeat instructions in reverse. After powering up the projector, re-calibrate the Light Sensor module (min/max footlamberts), as described in [Section 3 Service Setup](#).

5.9.6 Liquid Cooling Assembly

(Estimated Replacement Time: 60 minutes)

The liquid cooling assembly is located in the IOS compartment of the projector and is comprised of a reservoir and pump assembly with dedicated cooling tubes that are routed to the three DMDs on the light engine. Quick disconnect, dripless connectors are used on the tubing for easy, no mess servicing of this assembly.

1. Remove the front top lid. Refer to [5.5.1 Front Top Lid, on page 5-5](#).
2. Remove the radiator air filter cover. Refer to [5.6.2 Radiator Air Filter, on page 5-11](#).
3. Remove the access panel frame. Refer to [5.5.9 Access Panel Frame, on page 5-9](#).
4. Using a #2 Phillips™, remove the four screws securing the radiator to the frame.
5. Using a stubby #2 Phillips™, loosen the knob screw securing the liquid cooling assembly (**Figure 5-23**).
6. Disconnect the two quick disconnect hoses (**Figure 5-23**).
7. Open the LVPS/LPS cover and disconnect the pump harness its inline connector.
8. Remove liquid cooling assembly.

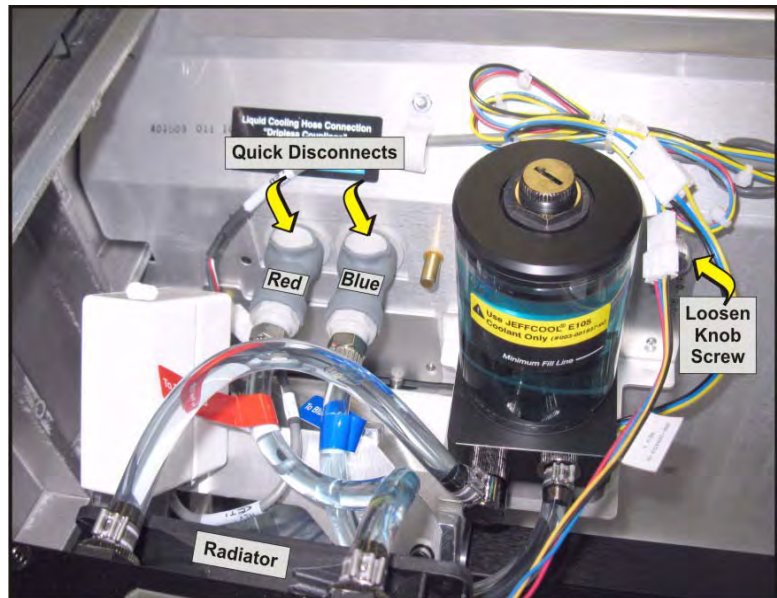


Figure 5-23 Liquid Cooling Assembly

5.9.7 Yellow Notch Filter (YNF)

(Estimated Replacement Time: 10 minutes + 60 minute calibration)

The YNF is situated in the IOS assembly, near the contrast aperture.

1. Remove the front top lid. Refer to [5.5.1 Front Top Lid, on page 5-5](#).
2. Remove the high security lid. Refer to [5.5.2 High Security Lid, on page 5-5](#).
3. Disconnect pump hoses for easier YNF access.
4. Remove the IOS access plate located on the security firewall by loosening the knob screw from the light engine compartment.
5. Remove the two, 2.5mm screws securing YNF to IOS. Loosen the center nut if necessary.
6. Carefully, pull the YNF out of the IOS.
7. When installing, repeat above instructions in reverse. Then calibrate green primary and MCGD.

5.10 Projector PCB's

5.10.1 Cardcage Assembly

(Estimated Replacement Time: 35 minutes)

The cardcage assembly is located on the operator side of the projector. Removing this assembly requires the removal of the security ring which breaks projector marriage. Marriage must only be performed by Christie authorized service technicians.

1. Remove the front top lid. Refer to [5.5.1 Front Top Lid, on page 5-5](#).
2. Remove the high security lid. Refer to [5.5.2 High Security Lid, on page 5-5](#).
3. Remove the PIB/ICP cover. Refer to [5.5.8 PIB/ICP Cover, on page 5-9](#).
4. Release the security ring by pressing down on the latch located on the inside of the cardcage (**Figure 5-24**). **NOTES: 1)** Marriage is broken when this latch is toggled. **2)** The security ring should only be removed by Christie authorized service technicians.



Figure 5-24 Spring Latch for Security Ring

5. Remove the security ring from the front of the cardcage (**Figure 5-25**).
6. Swing the security ring out and disengage from the hinge.
7. Remove the two screws holding cardcage bracket to frame and loosen the thumbscrew securing the front side of the cardcage to the baseplate.
8. Disconnect harnesses to the top cardcage fans.
9. Disconnect the seven connectors from the Backplane PCB and LEQD. **NOTE: LEQD and large power connector at rear of cardcage.**
10. Slide the cardcage back slightly, then pull it up and out to remove.
11. At this point, you can replace the entire cardcage assembly by repeating the above instructions in reverse or replace individual boards as described in other parts of this document.
12. To install, repeat the above steps in reverse. Once the projector is up and running, Service Marriage must be performed to continue playing encrypted content. Marriage should only be performed by Christie authorized service technicians. Refer to [3.6 Performing Marriage, on page 3-17](#).



Figure 5-25 Remove Security Ring

5.10.2 Backplane

(Estimated Replacement Time: 85 minutes)

The Backplane PCB is located at the back of the cardcage.

1. Remove the front top lid. Refer to [5.5.1 Front Top Lid, on page 5-5](#).
2. Remove PIB/ICP Cover. Refer to [5.5.8 PIB/ICP Cover, on page 5-9](#).
3. Remove the high security lid. Refer to [5.5.2 High Security Lid, on page 5-5](#).
4. Remove the security ring from the front of the cardcage (**Figure 5-25**).
5. Remove the blank faceplate, PIB and ICP PCBs from backplane.
6. Remove the two screws from the top of the tool holder (**Figure 5-26**).
7. Disconnect the LEQD board from the backplane (**Figure 5-31**).
8. Disconnect all harnesses (seven) from the backplane.
9. Disconnect the two top cardcage fans from the inline connectors.
NOTE: *Two additional fans can be added to the top of the cardcage. If these optional fans are used in your projector, remove them also.*
10. Loosen the single thumbscrew securing the front side of the cardcage to the baseplate.
11. Pull up on the cardcage and remove.
12. Using a #1 Phillips™, remove the screws securing the backplane to the cardcage (**Figure 5-27**).
13. Slide backplane out of the cardcage.
14. To install, repeat the above steps in reverse. Once the projector is up and running, Service Marriage must be performed to continue playing encrypted content. Marriage should only be performed by Christie authorized service technicians. Refer to [3.6 Performing Marriage, on page 3-17](#).

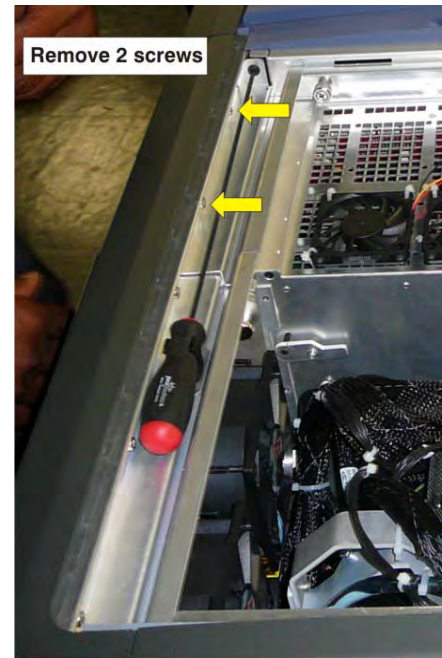


Figure 5-26 Tool Holder



Figure 5-27 Cardcage with Backplane

5.10.3 Integrated Cinema Processor (ICP)

(Estimated Replacement Time: 8 minutes)

The ICP is located in the cardcage on the operator side of the projector. This is the image processing electronics for incoming video signals.

1. Remove PIB/ICP cover. Refer to [5.5.8 PIB/ICP Cover, on page 5-9](#).
2. Remove the security ring from the front of the cardcage (**Figure 5-25**).
3. Push in the red tabs on the top and bottom ICP ejector tabs. Then, push in the top and bottom black tabs to release the ICP board from the backplane (**Figure 5-28**).
4. Pull the ICP out of the cardcage.
5. When installing the ICP, first align it with the guides in the cardcage, then slide it all the way in until the ejector tabs touch the top and bottom profile of the cardcage. With the ICP pushed up against the right wall, and the black ejector tabs positioned horizontally, push the ICP all the way into the cardcage. Engage the ejector tabs, “click” sound should be heard.
6. Once the projector is up and running, Service Marriage must be performed to continue playing encrypted content. Marriage should only be performed by Christie authorized service technicians. Refer to [3.6 Performing Marriage, on page 3-17](#).



Figure 5-28 Remove ICP

5.10.4 Projector Intelligence Board (PIB)

(Estimated Replacement Time: 8 minutes)

The PIB is located in the cardcage on the operator's side of the projector.

1. Remove PIB/ICP cover. Refer to [5.5.8 PIB/ICP Cover, on page 5-9](#).
2. Remove the security ring from the front of the cardcage (**Figure 5-25**).
3. Push in the red tabs on the top and bottom PIB ejector tabs. Then, push in the top and bottom black tabs to release the PIB Board from the backplane.
4. Pull the PIB assembly out of the cardcage (**Figure 5-29**).
5. To install, repeat the above steps in reverse. Once the projector is up and running, Service Marriage must be performed to continue playing encrypted content. Marriage should only be performed by Christie authorized service technicians. Refer to [3.6 Performing Marriage, on page 3-17](#).

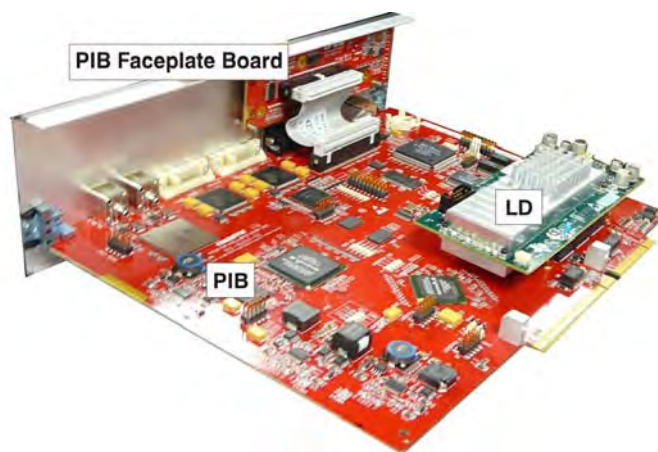


Figure 5-29 PIB, PIB Faceplate and LD

5.10.5 Link Decrypter Card

NOTICE: *This card is field replaceable only. It is not a field serviceable component.*

The link decrypter card is attached to the PI board. This card handles the decryption/encryption cinema content coming into the projector.

(Estimated Replacement Time: 20 minutes)

1. Remove the front top lid. Refer to [5.5.1 Front Top Lid, on page 5-5](#).
2. Remove the high security lid. Refer to [5.5.2 High Security Lid, on page 5-5](#).
3. Remove the PIB/ICP cover. Refer to [5.5.8 PIB/ICP Cover, on page 5-9](#).
4. Remove the security ring by pressing down on the latch on the right-side of the cardcage. See **Figure 5-24 Spring Latch for Security Ring, on page 5-19**.
5. Remove the PIB. Refer to [5.10.4 Projector Intelligence Board \(PIB\), on page 5-21](#).
6. Using a #1 Phillips™, remove the four screws securing the link decrypter card to the PIB (**Figure 5-30**).
7. Disconnect the link decrypter card from the PIP.
8. When re-installing the link decrypter card, repeat above instructions in reverse. Once the projector is up and running, Service Marriage must be performed to continue playing encrypted content. Marriage should only be performed by Christie authorized service technicians. Refer to [3.6 Performing Marriage, on page 3-17](#).

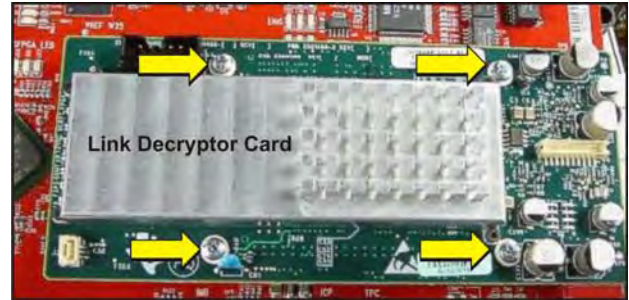


Figure 5-30 Remove Link Decrypter Card

5.10.6 Light Engine Quick Disconnect (LEQD)

(Estimated Replacement Time: 20 minutes)

The LEQD is part of the light engine assembly. It is connected to the side of the backplane where it receives LVDS signals and power from the light engine.

1. Remove the front top lid. Refer to [5.5.1 Front Top Lid](#), on page 5-5.
2. Remove the high security lid. Refer to [5.5.2 High Security Lid](#), on page 5-5.
3. Loosen the thumbscrew securing the LEQD in place (**Figure 5-31**).
4. Release the two black ejector tabs from the side of the board, which will pull the board out from the connectors.
5. Pull the LEQD out to remove.
6. Disconnect the three LVDS/power harnesses.



Figure 5-31 Remove LEQD

5.10.7 Environmental Board (EVB)

(Estimated Replacement Time: 40 minutes)

The EVB is mounted to the wall inside the light engine assembly compartment. The fans, pump, temperature sensors, and motor control connections are all plugged into the EVB.

1. Remove the front top lid. Refer to [5.5.1 Front Top Lid](#), on page 5-5.
2. Remove the high security lid. Refer to [5.5.2 High Security Lid](#), on page 5-5.
3. Loosen the single thumbscrew securing the EVB in place (**Figure 5-32**).
4. Disconnect all the harnesses from the EVB.
5. Remove the EVB.
6. When re-installing the EVB, repeat instructions in reverse and refer to the Interconnect Drawing provided when connecting harnesses.

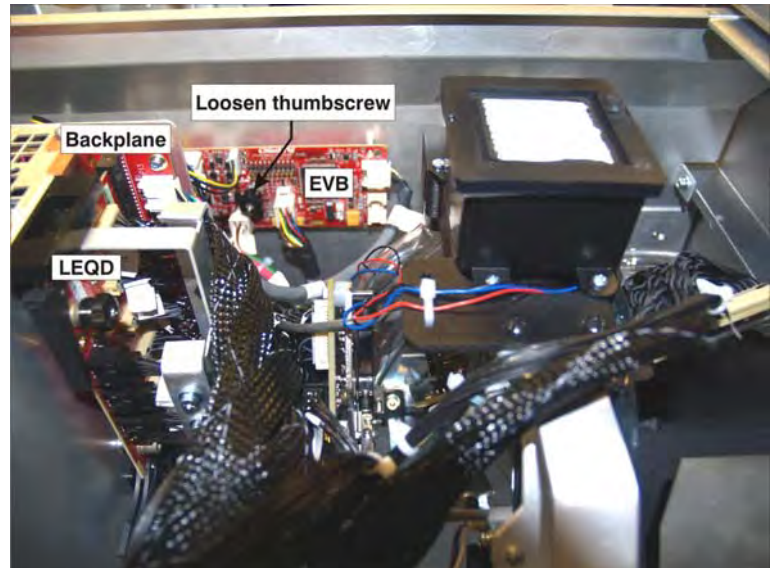


Figure 5-32 Remove EVB

5.11 Light Engine

(Estimated Replacement Time: 30 minutes + 60 minute calibration)

1. Remove the front top lid. Refer to [5.5.1 Front Top Lid, on page 5-5](#).
2. Remove the high security lid. Refer to [5.5.2 High Security Lid, on page 5-5](#).
3. Remove the projection lens.
4. Disconnect the two coolant hoses from the quick disconnects. Then loosen the thumbscrew located on the bracket next to the disconnects (**Figure 5-33**).
5. Disconnect the temperature and LAD fan connections from the EVB (P39, P40).
6. Remove the LEQD board. Refer to [5.10.6 Light Engine Quick Disconnect \(LEQD\), on page 5-23](#).
7. Remove the light engine air filter cover to access the service door in the fan pack assembly. The service door provides an easy way of accessing the bottom captive screw on the light engine using the hex driver tool provided with the projector. (**Figure 5-12 Light Engine Air Filter Cover, on page 5-10**)
8. Remove the light dump - single thumbscrew.
9. Using the hex tool provided, loosen the three screws securing the light engine in place.
10. Using the built-in light engine handle, carefully lift the light engine assembly out of the projector (**Figure 5-34**).



Figure 5-33 Liquid Cooling Quick Disconnects

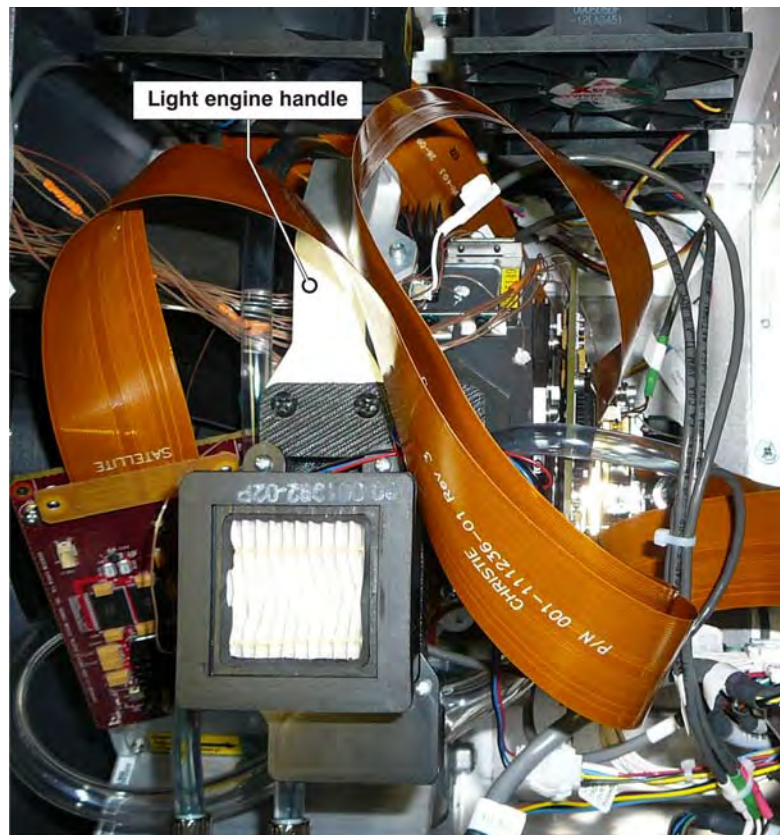


Figure 5-34 Top View of Light Engine

5.12 Power Supplies

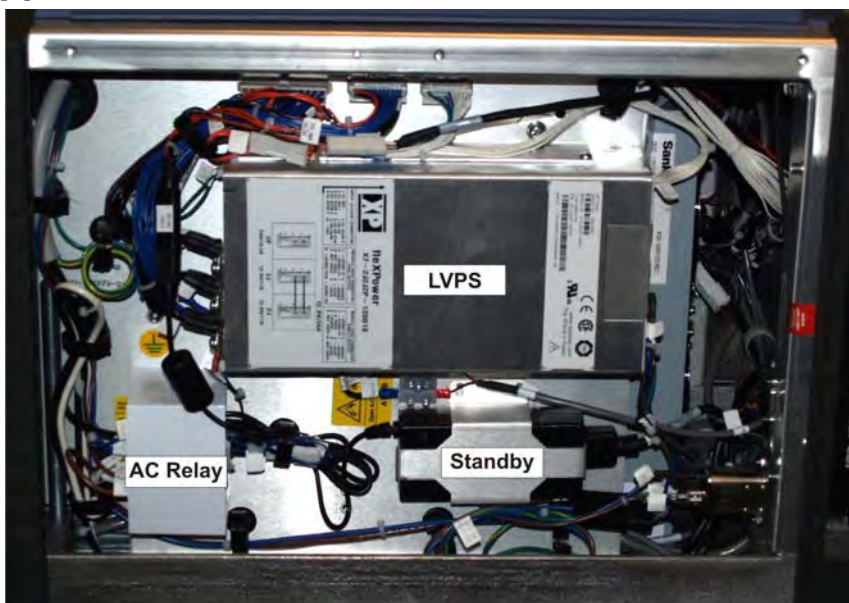


Figure 5-35 LVPS Compartment

5.12.1 AC Line Filter

(Estimated Replacement Time: 20 minutes)

The AC Line Filter is located at the front of the projector directly under the IOS. It's accessible from the bottom of the projector.

1. Using a #2 Phillips™, remove the screws securing the cover plate to the bottom of the projector.
2. Disconnect the four harnesses from the AC line filter.
3. Remove the two screws securing the AC line filter to the baseplate.

5.12.2 AC Relay

(Estimated Replacement Time: 30 minutes)

The AC relay is mounted next to the standby power supply.

1. Remove the LVPS/LPS cover. Refer to [5.5.7 LVPS/LPS Cover, on page 5-8](#).
2. Remove the white plastic cover over the AC relay. Pinch the sides of the cover in slightly to release the top and bottom tabs and pull out to remove.
3. Disconnect incoming AC (terminals 4 and 8 - brown) from AC relay (2, #2 Phillips screws).
4. Disconnect outgoing AC (terminals 2 and 6 - blue) from AC relay (4, #2 Phillips screws).
5. Disconnect DC from AC relay (terminals 0 and 1).
6. Remove two, #2 Phillips™ screws securing the AC relay to the LVPS mounting wall.

5.12.3 AC Terminal Block

(Estimated Replacement Time: 20 minutes)

The AC Terminal Block is located under the IOS and is accessible from the bottom of the projector (Figure 5-36).

1. Loosen the two screws securing the cover plate to the bottom of the projector.
2. Disconnect the four AC connections.
3. Using a #2 Phillips™, remove the two screws securing the AC terminal block to the baseplate.

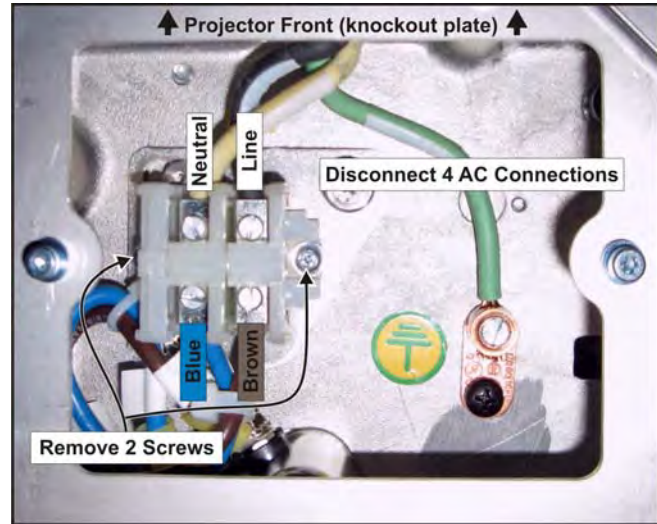


Figure 5-36 AC Terminal Block

5.12.4 Standby Power Supply

(Estimated Replacement Time: 10 minutes)

The Standby Power Supply is located on the operator side of the projector right directly above the LVPS. The Standby Power Supply powers the PIB, EVB, IMCB and the TPC when the projector is in standby mode.

1. Remove the LVPS/LPS cover. Refer to [5.5.7 LVPS/LPS Cover, on page 5-8](#).
2. Disconnect both DC and AC cables from the standby power supply.
3. Loosen the thumbscrew at bottom of standby power supply. Remove.



Figure 5-37 Standby Power Supply

5.12.5 Lamp Power Supply (LPS)

⚠ WARNING

- Use of the projector's rear safety strap, or hold-down bracket if using the optional rack stand, is **MANDATORY** to prevent the projector from tipping when removing the Lamp Power Supply (LPS).
- Keep the anode lead from the igniter at least 15mm away from the 1" hose used to cool the igniter.

(Estimated Replacement Time: 90 minutes + 10 minute LampLOC™ Alignment)

The Lamp Power Supply (LPS) is located at the back of the projector between the firewall and the LVPS mounting wall.

1. Remove lamp door. Refer to [5.5.6 Lamp Door, on page 5-8](#).
2. Remove lamp. Refer to [5.13.5 Lamp, on page 5-31](#).
3. Remove projector's rear lid. Refer to [5.5.10 Rear Lid, on page 5-10](#).
4. Remove back cover. Refer to [5.5.4 Back Cover, on page 5-7](#).
5. Remove LVPS/LPS cover. Refer to [5.5.7 LVPS/LPS Cover, on page 5-8](#).
6. Disconnect anode lead from igniter (M8 nut).
7. Disconnect cathode lead from grounding bracket.
8. Route both the anode and cathode leads through the opening in the firewall.
9. Remove the white plastic AC relay cover.
10. Disconnect terminals 2 and 6 (Lamp Power Supply AC) from the AC relay (2, #2 Phillips).
11. Route AC connections through the opening in the LVPS mounting wall.
12. Disconnect ground lead from the PEM stud (7mm nut).
13. Remove rear crossbar (2, 4mm hex screws on each end and 1, 3mm hex screw in the center of the firewall).
14. Remove the four screws (#3 Phillips™) securing the LPS to the firewall and to the baseplate.
15. Disconnect "RS232" and "Interface" connections from the LPS.
16. Carefully, lift the LPS up and slide it out the back of the projector using caution not to cut any of the harnesses running along the side and behind the LPS.
17. When re-installing, repeat instructions in reverse making sure to keep the anode lead at least 15mm from the coolant hose used to cool the igniter. Perform LampLOC™ alignment. **NOTE:** When installing the LPS ensure the harnesses are not pinched.

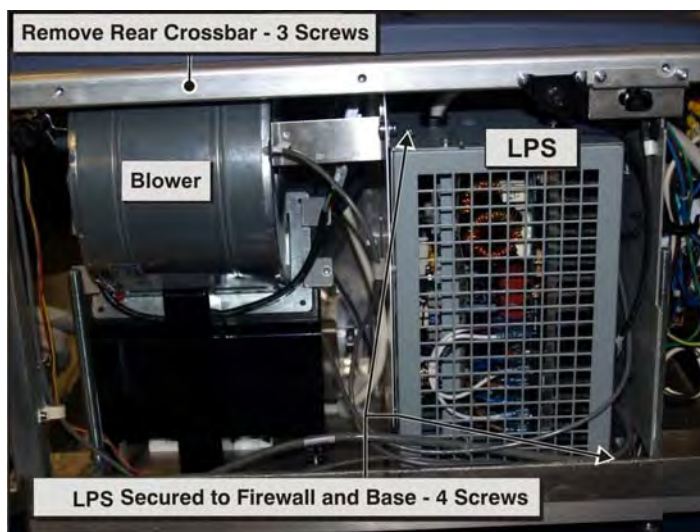


Figure 5-38 Rear Projector View

5.12.6 Low Voltage Power Supply (LVPS)

(Estimated Replacement Time: 30 minutes)

The LVPS is mounted behind the LVPS/LPS cover to a vertical plate near the LPS. It powers the entire projector except for the TPC.

1. Remove the LVPS/LPS cover. Refer to [5.5.7 LVPS/LPS Cover, on page 5-8](#).
2. Disconnect LVPS harness inline connections from AC relay.
3. Disconnect all inline connections to the LVPS (harnesses stay with the LVPS).
4. Using a 3mm hex key, remove the four socket head screws securing the LVPS to the wall.
5. Remove the two angled brackets from LVPS using a #2 Phillips™.

5.13 Lamp Compartment

5.13.1 Anode Yoke

The anode yoke (also known as the lamp anode stand) sits just in front of the lamp reflectors. It is mounted to the baseplate of the projector and is used to support the anode end of the lamp.

(Estimated Replacement Time: 4 minutes)

1. Open lamp door. Refer to [5.5.6 Lamp Door, on page 5-8](#).
2. Remove lamp. Refer to [5.13.5 Lamp, on page 5-31](#).
3. Remove the two screws (using 5mm hex key) securing the anode yoke to the baseplate (**Figure 5-39**).

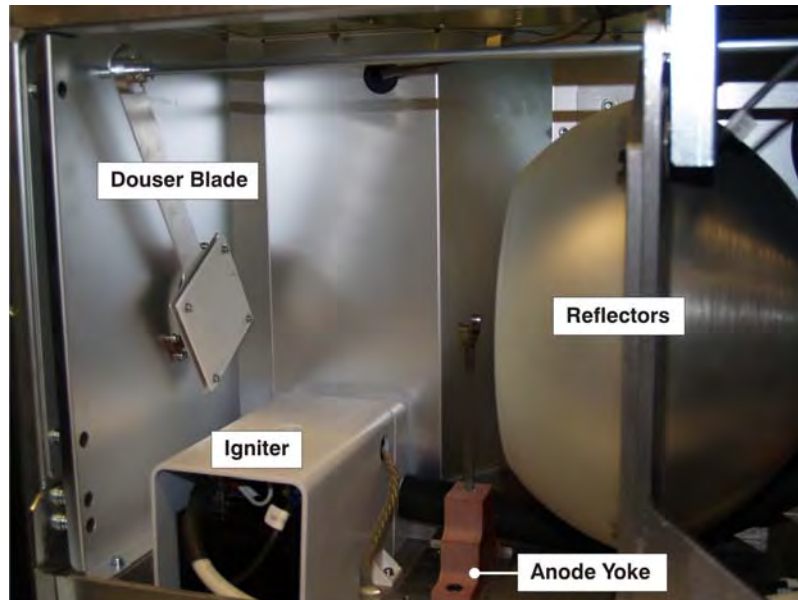


Figure 5-39 Front of Lamp Compartment (shown with lamp removed)

5.13.2 Ceramic Plate on Douser Blade

(Estimated Replacement Time: 30 minutes + 10 minute LampLOC™ Alignment)

The 3"x3" Ceramic Plate is located in the lamp compartment and mounted to the douser blade. It is used to absorb heat from the light emitted by the lamp.

1. Remove lamp door. Refer to [5.5.6 Lamp Door, on page 5-8](#).
2. Remove lamp. Refer to [5.13.5 Lamp, on page 5-31](#).
3. Remove the four, #2 Phillips™ screws securing the ceramic plate to the douser blade (**Figure 5-40**).
4. When installing, repeat instructions in reverse. Once installed, perform LampLOC™ alignment. See [3.3 Adjusting Lamp Position \(LampLOC™\), on page 3-3](#).



Figure 5-40 Ceramic Plate

5.13.3 Douser Motor

(Estimated Replacement Time: 30 minutes + 10 minute LampLOC™ Alignment)

The Douser Motor is located in the lamp compartment behind the reflector assembly.

1. Remove Lamp Door. Refer to [5.5.6 Lamp Door, on page 5-8](#).
2. Remove Lamp. Refer to [5.13.5 Lamp, on page 5-31](#).
3. Disconnect the douser motor harness (P94) on the IMCB.
4. Remove two, #2 Phillips™ screws securing the Douser Motor to the mounting bracket. A short stubby screwdriver is recommended to reach the screws (**Figure 5-41**).
5. When installing, repeat instructions in reverse. Make sure to route the douser motor harness through the clips that run along the projector frame to prevent it from falling into the lamp area. Once installed, perform LampLOC™ alignment.

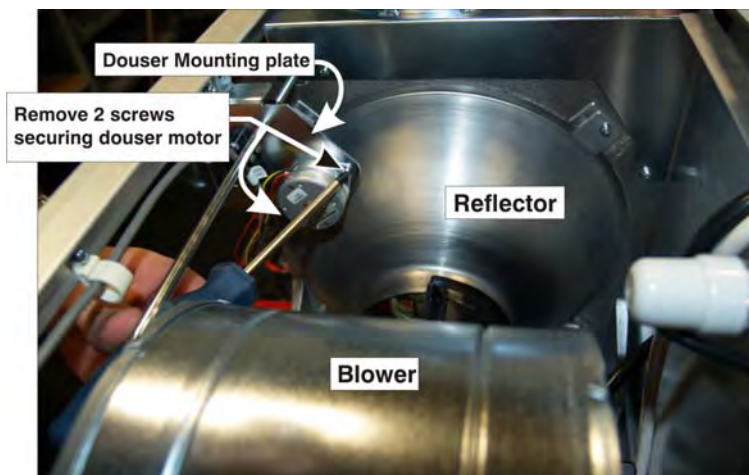


Figure 5-41 Douser Motor

5.13.4 Igniter

(Estimated Replacement Time: 90 minutes + 10 minute LampLOC™ Alignment)

The igniter is positioned below the UV filter directly in front of the lamp. A plastic white shield covers the igniter for protection and the main blower helps keep the igniter cool.

1. Remove lamp door. Refer to [5.5.6 Lamp Door, on page 5-8](#).
2. Remove lamp. Refer to [5.13.5 Lamp, on page 5-31](#).
3. Remove the screw securing the anode clamp to the anode braid. Once the anode braid is loose, push it through the opening in the igniter cover (**Figure 5-42**).
4. Using a 3mm hex key, remove the two screws securing the igniter cover to the baseplate.
5. Remove the four, #2 Phillips™ screws securing the igniter to the baseplate.

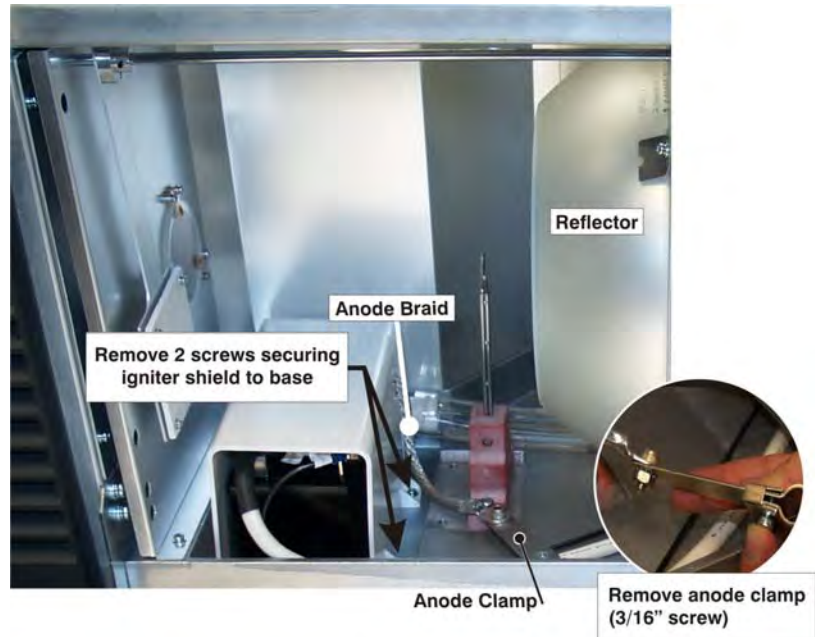


Figure 5-42 Lamp Compartment



Look through the exhaust duct to get a better view of the igniter's rear screws.

6. Pull the igniter cover up and towards the anode yoke to gain access to the igniter.
7. Remove two, M8 bolts to disconnect the "LPS +", "Anode +" and "Igniter -" wires from the igniter (**Figure 5-43**).
8. Disconnect the anode braid from igniter (M8 bolt).
9. When installing, repeat instructions in reverse. Check all connections carefully.

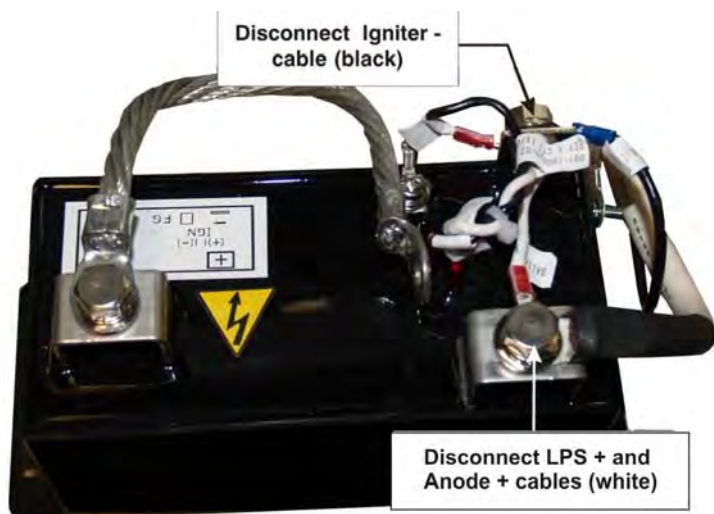


Figure 5-43 Igniter

5.13.5 Lamp

⚠ DANGER

- Lamp replacement must be performed by a Christie authorized service technician only.



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. Ensure those within the vicinity of the projector are also wearing protective safety gear.

(Special protective clothing is available from Christie – P/N: 598900-095)



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 before handling.

(Estimated Replacement Time: 20 minutes + 10 minute LampLOC™ Alignment)

- Wearing authorized protective safety gear, unlock and open the lamp door. If desired, release the latch mechanism to remove the door entirely.
- Remove the lamp.
 - Remove the front lamp duct to reveal the cathode end (-) of the lamp (Figure 5-44).



Figure 5-44 Front Lamp Duct

- 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 5-45).
- Carefully slip the positive anode connector off the front of the lamp.
- 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.

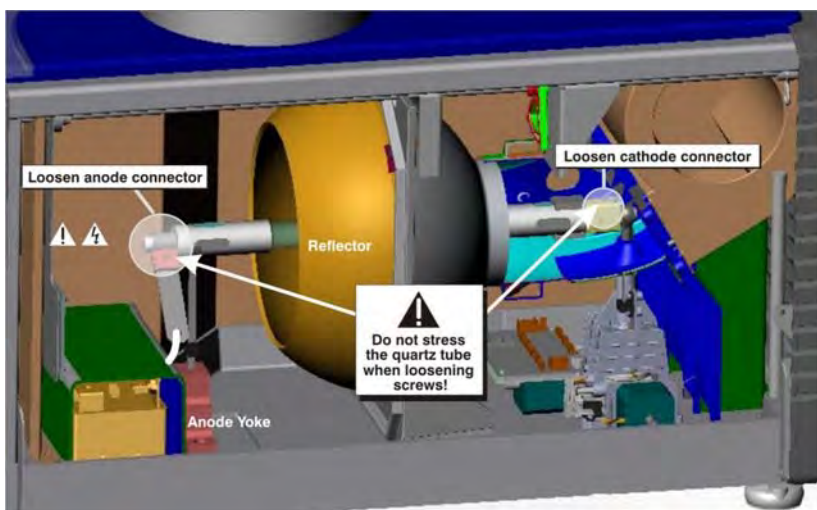


Figure 5-45 Remove Lamp

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.**
3. Install new lamp.
 - a. Remove the protective cover from the new lamp by removing the tape, knurled nut and locking star washer securing it to its cover.
 - b. If you are installing a different type of lamp from the original, ensure the correct position of the anode yoke (Figure 5-46).

For 3.0kW CDXL-30SD lamps only: Install the lamp spacer provided with the projector on the cathode end connector before installing the lamp. Required for proper positioning of this lamp type. Also, ensure the anode clamp is in the right position.

- c. If installing a 3.0 kW CDXL-30SD lamp, make sure the lamp extension nut supplied with the projector is installed on the cathode end connector. If you are installing any other lamp type make sure this extension nut is removed and threaded onto the unused stud located on the baseplate in the lamp compartment (labeled).

NOTE: The purpose of the extension nut is to correctly position the lamp for optimal light output.

- d. Insert the threaded cathode (-) end of the lamp into the negative lamp connector nut located in the rear of the lamp compartment. (Figure 5-47) Using both hands, hand-tighten this end into the threaded nut.

CAUTIONS! 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.

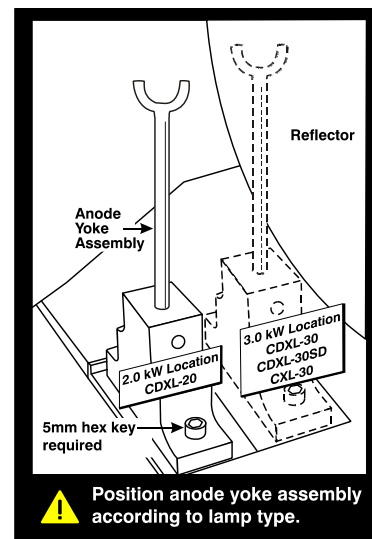



Figure 5-46 Anode Yoke

- e.  **WARNING! Explosion hazard! DO NOT apply torque to the anode end of the lamp.** Rest the anode (+) end of the lamp on the anode yoke and slip the positive lamp connector over the bulb end. (Figure 5-47) Using the 5mm Allen key, squeeze together with the anode clamp making sure not to place any torque on the lamp quartz tube. **IMPORTANT! For CDXL-30SD lamps, make sure the "flat" part of the anode end of the lamp (if applicable) is facing in the 10 or 2 o'clock position once the lamp finger is installed in the 14mm threads and the clamp screw is tightened. For all other lamp types, keep the "flat" part of the anode end of the lamp facing up.**

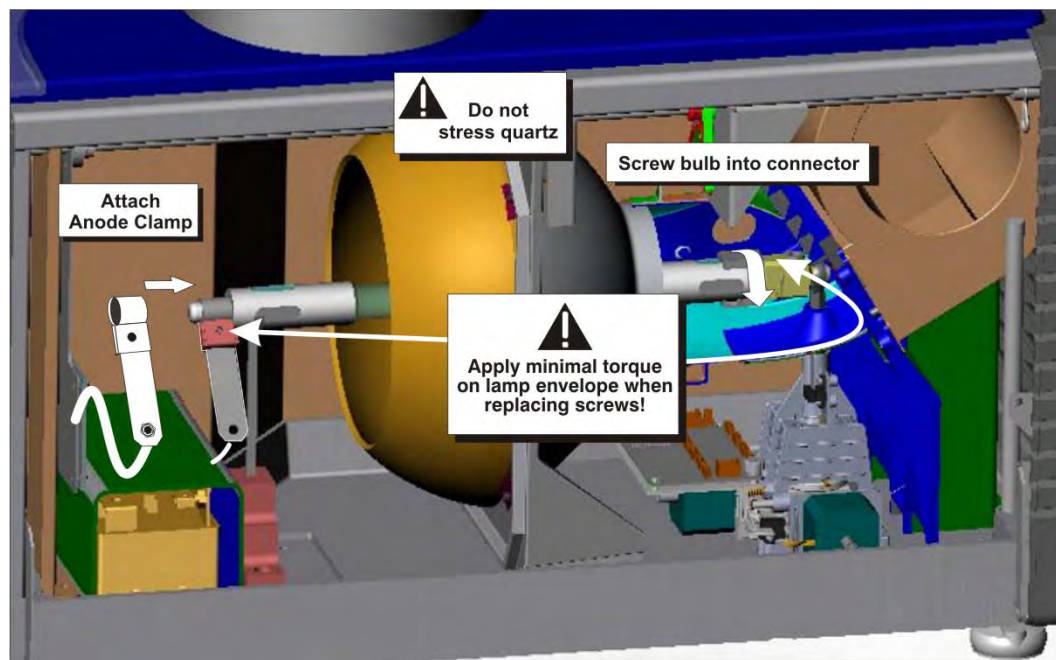


Figure 5-47 Install New Lamp

- f. Tighten screws in both negative and positive lamp connectors. **Important!** *Proper electrical contact prevents resistance in the lamp connectors.* **CAUTIONS!** 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.**

- g. Re-install the front lamp duct.

CRITICAL! As you install the front lamp duct, lift the small light shield on the rear lamp duct cover so that it does not get jammed between the two pieces when they come together. (**Figure 5-48**) To ensure a good fit between the two pieces, squeeze the top and bottom cover snaps to ensure they are locked in place. The light shield should move freely to the touch.

4. Close lamp door.
5. Turn wall circuit ON.
6. Perform 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. Press **Save** to save the data entered (**Figure 5-49**).

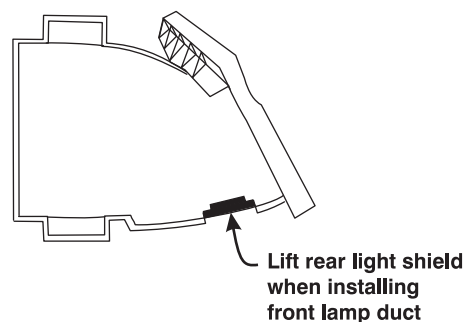



Figure 5-48 Light Shield on Front Lamp Duct

7. Turn lamp ON.
8. Click  from the TPC **Main** panel to turn the lamp on.
9. 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.

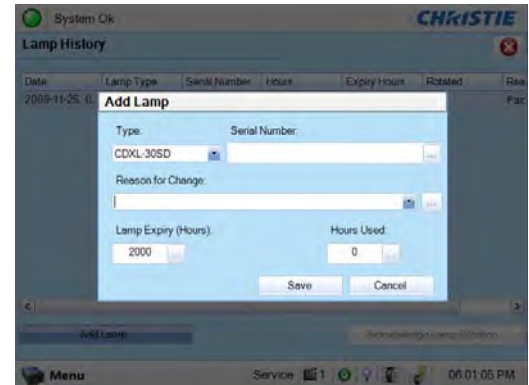


Figure 5-49 Add Lamp Window

5.13.6 Lamp Adjuster Assembly (including IMCB)

(Estimated Replacement Time: 60 minutes + 10 minute LampLOC™ Alignment)

The Lamp Adjuster Assembly is position at the back of the projector directly below the lamp blower and ducting.

1. Remove lamp door. Refer to [5.5.6 Lamp Door, on page 5-8](#).
2. Remove lamp. Refer to [5.13.5 Lamp, on page 5-31](#).
3. Remove the back cover. Refer to [5.5.4 Back Cover, on page 5-7](#).
4. Disconnect P35 and P36 from the Lamp Integrated Motor Control Board.
5. Disconnect the two cathode wires from the cathode nut (one 4 mm hex screw) (**Figure 5-50**).
6. Remove the three screws located at the base of the lamp blower. Move the blower assembly to the side to gain access to the two rear screws holding the lamp adjuster assembly in place (**Figure 5-51**).
7. Loosen the four captive screws, using a #2 Phillips™ driver, which secure the lamp adjuster assembly to the baseplate.

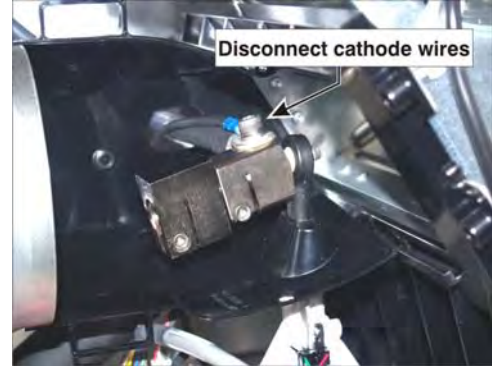


Figure 5-50 Cathode Nut

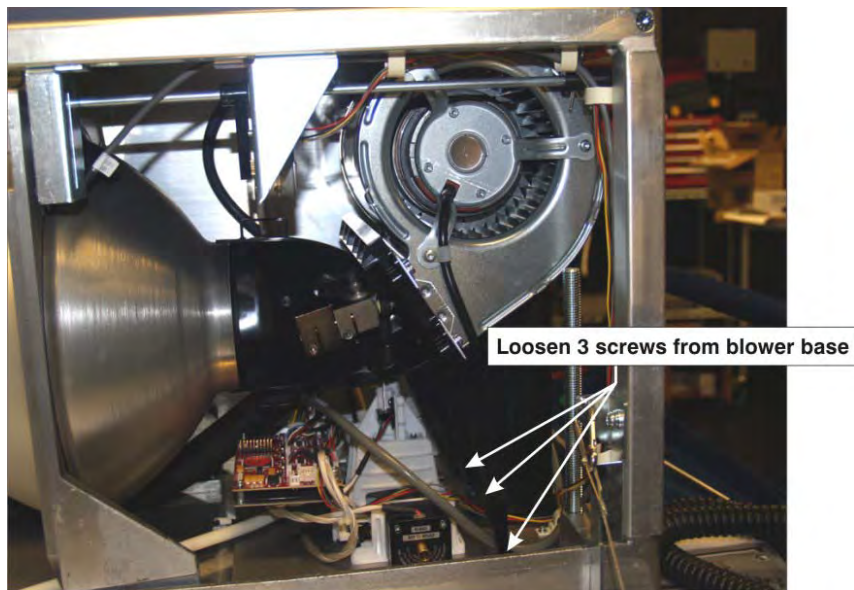


Figure 5-51 Lamp Blower Base

8. Remove the lamp adjuster assembly through the lamp door.

5.13.7 Main AC Blower

(Estimated Replacement Time: 60 minutes + 10 minute LampLOC™ Alignment)

The Main AC Blower or Lamp Blower is located at the rear of the projector behind the lamp.

1. Remove lamp door. Refer to [5.5.6 Lamp Door, on page 5-8](#).
2. Remove lamp. Refer to [5.13.5 Lamp, on page 5-31](#).
3. Remove the projector's rear lid. Refer to [5.5.10 Rear Lid, on page 5-10](#).
4. Disconnect the main AC blower power harness.
5. Using a 3mm hex key, remove the four screws securing the blower to its mounting bracket (**Figure 5-52**).
6. Carefully, remove the fan out the top of the projector.
7. When installing, repeat instructions in reverse. Perform LiteLOC™.

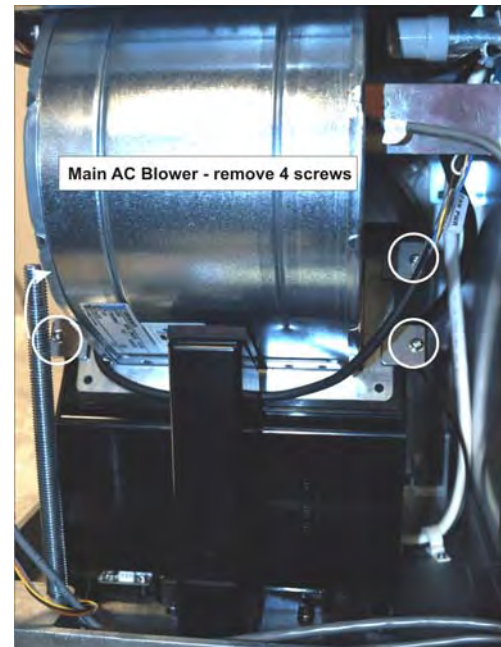


Figure 5-52 Main AC Blower

5.13.8 Reflectors (Including Heat Dump)

(Estimated Replacement Time: 90 minutes + 10 minute LampLOC™ Alignment)

1. Remove lamp door. Refer to [5.5.6 Lamp Door, on page 5-8](#).
2. Remove lamp. Refer to [5.13.5 Lamp, on page 5-31](#).
3. Remove rear lid.
4. Remove the four hex screws securing the reflector casting to the baseplate.
5. Remove the lamp anode yoke assembly. Refer to [5.13.1 Anode Yoke, on page 5-28](#).
6. Lift the casting up slightly to clear the alignment pins, then tilt the top of the casting forward and down.
7. Remove the entire reflector assembly out the open lamp door.
8. Using a 3mm hex key, remove the four screws securing the reflector cover (also called the heat dump).
9. Remove four pressure clips to remove the front and rear reflectors (**Figure 5-53**).

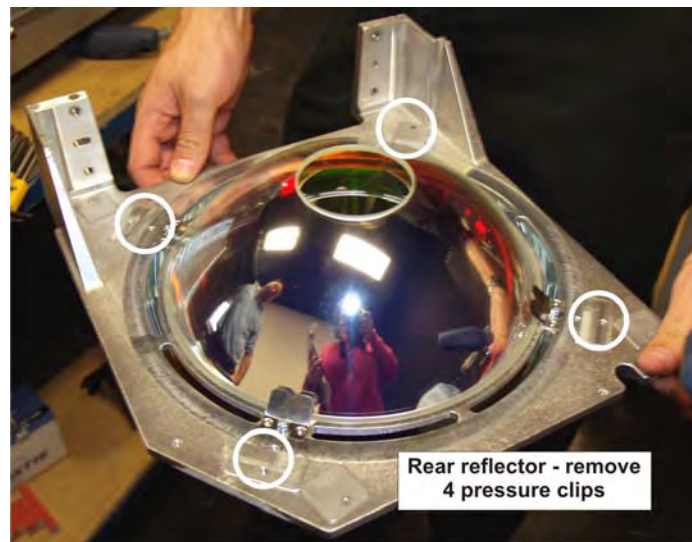


Figure 5-53 Rear Reflector

When installing, repeat instruction in reverse. Perform LampLOC™ alignment. For details, refer to [3.3 Adjusting Lamp Position \(LampLOC™\), on page 3-3](#).

5.13.9 UV Filter

⚠ CAUTION Always handle the UV filter by its edges only while wearing clean, lint free gloves.

(Estimated Replacement Time: 60 minutes + 10 minute LampLOC™ Alignment)

The UV filter is located at the front of the lamp compartment.

1. Remove lamp door and remove lamp. Lamp removal is required for safety reasons only.
2. Remove one, #2 Phillips™ screw from each of the tabs securing the filter.
3. Loosen the remaining three, #2 Phillips™ screws from the tabs and swing them away. Remove UV filter (**Figure 5-54**).
4. When installing, notice the “arrow” marking on the side of the UV filter. This indicates which side of the filter should face the lamp. Once the UV filter is in position, repeat instructions in reverse to secure it in place. Once installed, perform LampLOC™ alignment. For details, refer to [3.3 Adjusting Lamp Position \(LampLOC™\)](#), on page 3-3.

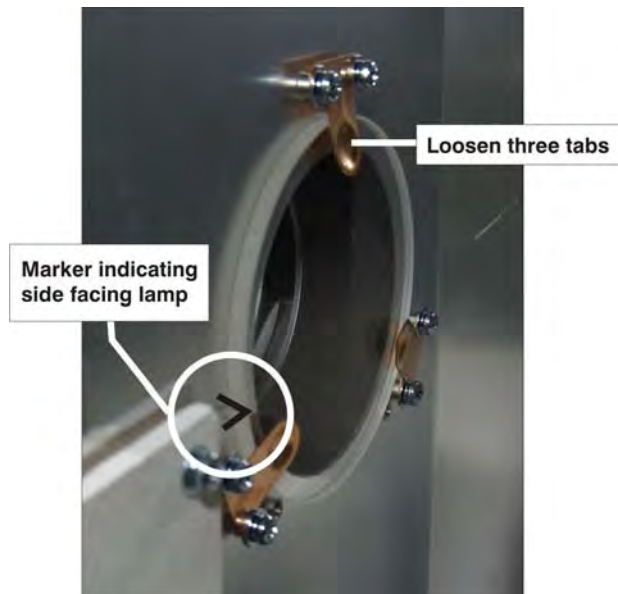


Figure 5-54 UV Filter

5.14 Interlocks and Switches

5.14.1 Exhaust Duct Vane Switch

(Estimated Replacement Time: 30 minutes + 10 minute LampLOC™ Alignment)

The Exhaust Duct Vane Switch is mounted directly inside the exhaust duct. It can be accessed by removing the lamp door if ducting is present.

1. Remove lamp door.
2. Remove lamp. This is required for safety reasons only.
3. Disconnect the harness.
4. Remove the two nuts securing the vane switch to the mounting bracket (**Figure 5-55**).
5. When installing, repeat instructions in reverse. Once installed, perform LampLOC™ alignment. For details, refer to [3.3 Adjusting Lamp Position \(LampLOC™\)](#), on page 3-3.

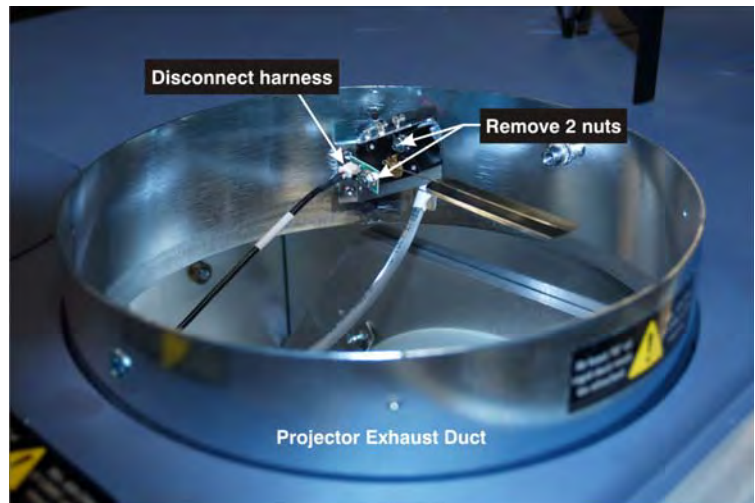


Figure 5-55 Exhaust Duct Vane Switch

5.14.2 High Security Interlock Switch

(Estimated Replacement Time: 10 minutes)

The Interlock High Security Switch is located in the light engine compartment, directly above the heat dump.

1. Remove the front top lid. Refer to [5.5.1 Front Top Lid](#), on page 5-5.
2. Remove the high security lid. Refer to [5.5.2 High Security Lid](#), on page 5-5.
3. Remove the two, #2 Phillips™ screws securing the switch (**Figure 5-56**).
4. Disconnect the harness from the switch.



Figure 5-56 High Security Interlock

5.14.3 Lamp Door Interlock

(Estimated Replacement Time: 30 minutes + 10 minute LampLOC™ Alignment)

The Lamp Door Interlock is fastened to the frame.

1. Remove lamp door. Refer to [5.5.6 Lamp Door, on page 5-8](#).
2. Remove lamp. Refer to [5.13.5 Lamp, on page 5-31](#).
3. Disconnect red and black leads from the Lamp Door Interlock. **NOTE:** Red lead to “No” label on interlock and black lead to “COM” label (Figure 5-57).
4. Remove the two nuts (3mm) securing switch to bracket.

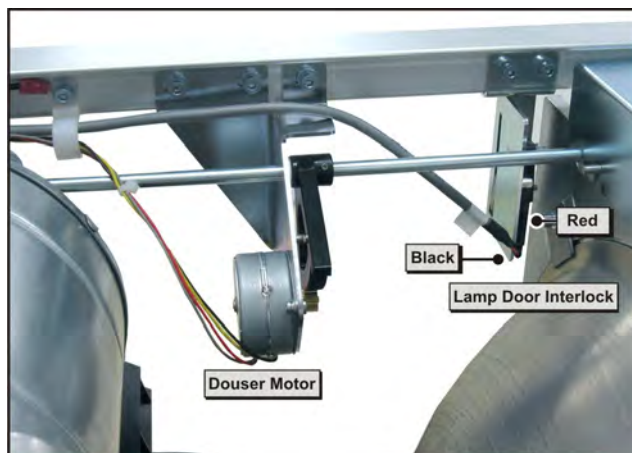


Figure 5-57 Lamp Door Interlock

5.14.4 Main Blower Vane Switch

(Estimated Replacement Time: 90 minutes + 10 minute LampLOC™ Alignment)

The Main Blower Vane Switch is located inside the Main AC Blower close to the firewall side. The vane switch monitors the airflow from the blower to ensure there is adequate cooling provided for the lamp.

1. Remove the lamp door. Refer to [5.5.6 Lamp Door, on page 5-8](#).
2. Remove lamp. This is required for safety reasons. Refer to [5.13.5 Lamp, on page 5-31](#).
3. Remove the projector's rear lid. Refer to [5.5.10 Rear Lid, on page 5-10](#).
4. Disconnect the harness from the vane switch (Figure 5-58).
5. Remove the two nuts (3mm) securing the vane switch to the mounting bracket (Figure 5-58).
6. When installing, repeat instructions in reverse. Once installed, perform LampLOC™ alignment. For details, refer to [3.3 Adjusting Lamp Position \(LampLOC™\), on page 3-3](#)

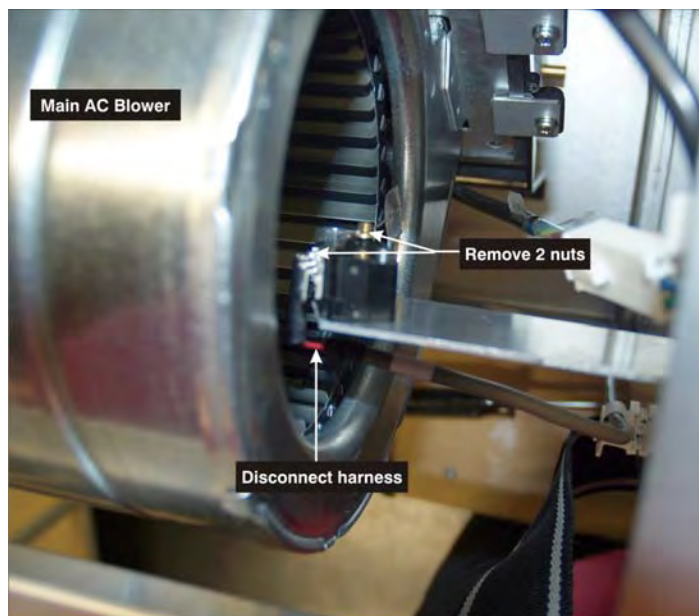


Figure 5-58 Main Blower Vane Switch

5.15 Primary Lens Mount

(Estimated Replacement Time: 30 minutes + 30 minutes Boresight Alignment)

1. Turn the lever on the lens mount to the unlock the lens.
2. Remove the lens.
3. Adjust offset (manually or via Motorized Lens Mount) to center the lens mount vertically and horizontally.
4. Remove the two boresight alignment screws (5mm hex) from the lens mount.
5. Remove the main focus screw (5mm hex).
6. When replacing, repeat instructions in reverse. Once the lens mount is installed, perform Boresight Alignment. For details, refer to the *CP2220 User Manual (P/N: 020-100420-xx)*.

6 Cleaning Projector Optics

This section provides information and procedures for cleaning optical components. Only these optical components can be cleaned:

- Reflector
- Light Engine Prism
- UV Filter
- Integrator
- Projection Lens

The procedures must be performed by service personnel trained by Christie following consultation with Christie support. Failure to follow this recommendation could result in damage to the projector and void the warranty.

Typically, optical components do not need to be cleaned frequently if they are installed and operated in a location that meets or exceeds the environmental standard recommended by Christie. Christie recommends that all cinema projectors are installed and operated in an environment that meets or exceeds Underwriters Laboratories (UL) standard 609.50 Pollution Degree 2 and ISO Class 9 Standard for Office Environments.

6.1 Safety Precautions

⚠ DANGER Danger! Failure to comply with the following results in death or serious injury.

ELECTRICAL SHOCK HAZARD! Always turn off, disconnect, and disengage all power sources to the projector before servicing.

⚠ CAUTION Caution! Failure to comply with the following could result in minor or moderate injury.

Only Christie accredited service technicians are permitted to open any enclosure on the projector and only if the AC power has been fully disconnected.

NOTICE! Failure to comply with the following may result in property damage.

- To prevent damage to electronic components by static electricity, wear an anti-static wrist strap and follow anti-static protocols.
- Cleaning procedures should be performed in a clean, well lit, and dust-free environment that meets or exceeds Underwriters Laboratories (UL) standard 609.50 and ISO Class 9 Standard for Office Environments..
- When cleaning projector optics, never touch an optical surface with your bare hands.
- Always wear powder free latex gloves when handling and cleaning projector optics.

6.2 Recommended Service Kit

- Powder free latex gloves
- Soft camel-hair brush
- Dust-free blower - air bulb or a canned air duster without additives such as Techspray 1671-10S Ultra-Pure Duster
- Lint-free lens tissue, such as Lensx 90 tissue or Newport Optics cleaning tissue
- Lens cleaning solution and a microfiber cloth (for the lens only)
- Isopropyl Alcohol Reagent Grade (ACS) 99.9%
- Acetone Reagent Grade (ACS)

- Optical grade cotton swabs with wooden stems
- Sticklers Fiber Optic Cleaner (can be used on all optical components)
- A bright, portable illumination device such as an LED flashlight

6.3 Clean Projector Optics

If the recommended cleaning supplies described in the procedures are unavailable in your area, contact Christie service. For improving brightness and contrast, the procedures are organized from most to least effective.

NOTICE! Failure to comply with the following may result in property damage.

- **Always wear powder free latex gloves when handling and cleaning projector optics.**
- **Handling optics increases the risk of damage. You should only clean optics when necessary.**
- **Only use solvents if dirt remains after dusting with compressed air.**
- **Do not reuse lens tissues. Use a clean tissue for each cleaning attempt.**
- **Handle optics by their edges.**
- **When using Techspray 1671-10S do not shake the can prior to use.**

6.3.1 Prepare the Projector for Service

1. Turn the lamp and projector off.
2. Allow the projector to cool for a minimum of fifteen minutes.
3. Disconnect the projector from AC power.

6.3.2 Clean the Light Engine Prism

If the entire light engine requires cleaning, contact Christie support.

If you cannot access additive free compressed air, use an air bulb or a camel hair brush to remove dust and debris. If you have questions about the cleaning methodology, contact Christie.

1. Prepare the projector for service. See [6.3.1 Prepare the Projector for Service](#).
2. Remove the light engine and set it on a clean, lint free cloth. See [5.11 Light Engine](#).

The prism is easily damaged. Handle with care.

3. Clean the prism with Techspray 1671-10S:
 - a. Firmly attach the red output tube to the output nozzle on the Techspray 1671-10S canister.
 - b. While pointing the output tube away from the prism, press the trigger rapidly 3 times to clear contaminants from the output tube.
 - c. Press the trigger of the Techspray 1671-10S canister rapidly 3 times 6 inches above the optical component.

You must hold the Techspray 1671-10S canister vertically. Holding the canister at an angle can release liquid refrigerant and contaminate the projector optics.

4. If the prism still appears dirty:
 - a. Put on a pair of powder free latex gloves.

- b. Dampen a clean, folded lint free cloth with Acetone Reagent Grade and wipe the surface of the prism carefully with the smooth portion of the cloth that has no folds or creases. Do not apply pressure with your fingers. Use the tension in the folded cloth.
 - c. Inspect the prism surface with a bright light and verify it is streak free. If streaks are present, repeat step b.
5. Reassemble the light engine and the projector.
Connect the projector to AC power.

6.3.3 Clean the UV Filter

If you cannot access additive free compressed air, use an air bulb or a camel hair brush to remove the debris. If you have questions about the cleaning methodology, contact Christie.

1. Prepare the projector for service. See [6.3.1 Prepare the Projector for Service](#).
2. Remove the lamp. See [5.13.5 Lamp](#).
3. Put on a pair of powder free latex gloves.
4. Remove the UV filter and set on a clean, lint free cloth. See [5.13.9 UV Filter](#).
If the filter is yellow, replace it.
5. Clean the UV filter with Techspray 1671-10S:
 - a. Firmly attach the red output tube to the output nozzle on the Techspray 1671-10S canister.
 - b. While pointing the output tube away from the UV filter, press the trigger rapidly 3 times to clear contaminants from the output tube.
 - c. Hold the UV filter by its edges and press the trigger of the Techspray 1671-10S canister rapidly 3 times 6 inches above the UV filter.

You must hold the Techspray 1671-10S canister vertically. Holding the canister at an angle can release liquid refrigerant and contaminate the UV filter.

6. Turn the UV filter over and repeat step 4.
7. If the UV filter still appears dirty:
 - a. Place the filter on a clean and dry lint free cloth.
 - b. Dampen a clean, folded lint free cloth with acetone and wipe the surface carefully. Do not apply pressure with your fingers. Use the tension in the folded cloth.
 - c. Allow the solvent to dry.
 - d. Turn the UV filter over and repeat step b.

8. Reassemble the projector and connect it to AC power.

When replacing the UV filter make sure the directional arrow on the filter faces the reflector.

6.3.4 Clean the Projection Lens

If you cannot access additive free compressed air, use an air bulb or a camel hair brush to remove dust and debris. If you have questions about the cleaning methodology, contact Christie.

1. Prepare the projector for service. See [6.3.1 Prepare the Projector for Service](#).
2. Put on a pair of powder free latex gloves.
3. Remove the projection lens from the projector and place it on a flat, stable surface

4. Clean the input end of the lens with Techspray 1671-10S:
 - a. Firmly attach the red output tube to the output nozzle on the Techspray 1671-10S canister.
 - b. While pointing the output tube away from the input end of the lens, press the trigger rapidly 3 times to clear contaminants from the output tube.
 - c. Press the trigger of the Techspray 1671-10S canister rapidly 3 times 6 inches above the optical component.

You must hold the Techspray 1671-10S canister vertically. Holding the canister at an angle can release liquid refrigerant and contaminate the projector optics.
5. If the input end of the lens still appears dirty:
 - a. Dampen a clean, folded lint free cloth with Acetone Reagent Grade and wipe the surface of the input end of the lens carefully with the smooth portion of the cloth that has no folds or creases.
 - b. Inspect the input end of the lens with a bright light and verify no streaks appear. If streaks are present, repeat step a.
6. Reinstall the lens.
7. Press the trigger of the Techspray 1671-10S canister rapidly 3 times 6 inches above the surface of the output end of the lens.

You must hold the Techspray 1671-10S canister vertically. Holding the canister at an angle can release liquid refrigerant and contaminate the projector optics.
8. If the output end of the lens still appears dirty:
 - a. Dampen a clean, folded lint free cloth with Acetone Reagent Grade and wipe the surface of the output end of the lens carefully with the smooth portion of the cloth that has no folds or creases.
 - b. Inspect the output end of the lens with a bright light and verify no streaks appear. If streaks are present, repeat step a.
9. Reassemble the projector and connect it to AC power.

6.3.5 Clean the Reflector

The reflector must be cleaned with Isopropyl Alcohol Reagent Grade (ACS) 99.9%. Other solvents can damage the reflective coating on the reflector. Clean the reflector with care. The reflector is fragile and is easily damaged.

If you cannot access additive free compressed air, use an air bulb or a camel hair brush to remove the debris. If you have questions about the cleaning methodology, contact Christie.

1. Prepare the projector for service. See [6.3.1 Prepare the Projector for Service](#).
2. Remove the lamp. See [5.13.5 Lamp](#).
3. Remove the reflector. See [5.13.8 Reflectors \(Including Heat Dump\)](#).
4. Put on a pair of powder free latex gloves.
5. Clean the reflector with Techspray 1671-10S:
 - a. Firmly attach the red output tube to the output nozzle on the Techspray 1671-10S canister.
 - b. While pointing the output tube away from the projector optics, press the trigger rapidly 3 times to clear contaminants from the output tube.
 - c. Press the trigger of the Techspray 1671-10S canister rapidly multiple times 6 inches above the optical component.

You must hold the Techspray 1671-10S canister vertically. Holding the canister at an angle can release liquid refrigerant and contaminate the projector optics.

6. If the reflector still appears dirty:
 - a. Fold a lint free cloth and wipe the remaining dust particles off the inside of the reflector with the smooth portion of the cloth that has no folds or creases. Do not apply pressure with your fingers. Instead, use the tension in the folded cloth to remove the dust.
 - b. If significant dust remains on the reflector surface, dampen a clean lint free cloth with Isopropyl Alcohol Reagent Grade (ACS) 99.9% and wipe the surface carefully. Fold a clean, dry lint free cloth and wipe the remaining alcohol off the reflector with the smooth portion of the cloth that has no folds or creases.
7. Reassemble the projector and connect it to AC power.

6.3.6 Clean the Integrator

Clean the integrator with care. The integrator is fragile and is easily damaged. This procedure must be performed by trained Christie service personnel.

If you cannot access additive free compressed air, use an air bulb or a camel hair brush to remove the debris. If you have questions about the cleaning methodology, contact Christie.

1. Prepare the projector for service. See [6.3.1 Prepare the Projector for Service](#).
2. Remove the integrator. See [5.9.4 Integrator Assembly](#).
3. Put on a pair of powder free latex gloves.
4. Clean the input end of the integrator with Techspray 1671-10S:
 - a. Firmly attach the red output tube to the output nozzle on the Techspray 1671-10S canister.
 - b. While pointing the output tube away from the projector optics, press the trigger rapidly 3 times to clear contaminants from the output tube.
 - c. Press the trigger of the Techspray 1671-10S canister rapidly 3 times 6 inches above the optical component.

You must hold the Techspray 1671-10S canister vertically. Holding the canister at an angle can release liquid refrigerant and contaminate the projector optics.

5. If the input end of the integrator still appears dirty:
 - a. Remove the input aperture.
 - b. Dampen a clean, folded lint free cloth with Acetone Reagent Grade and wipe the surface of the input end of the integrator carefully with the smooth portion of the cloth that has no folds or creases.
 - c. Inspect the input end of the integrator with a bright light and verify no streaks appear. If streaks are present, repeat step b.
 - d. Carefully place the input aperture on the integrator rod and make sure there is enough room around the integrator rod and aperture to prevent damage to the corners.
6. Reassemble the projector and connect it to AC power.
7. Align the integrator.

7 Interconnections

The *CP2220 Interconnect Diagram* illustrates the path of electrical connections between modules. Manufacturer's part numbers are included. **NOTE:** *Part numbers are subject to change.*

7.1 CP2220 Interconnect Drawing

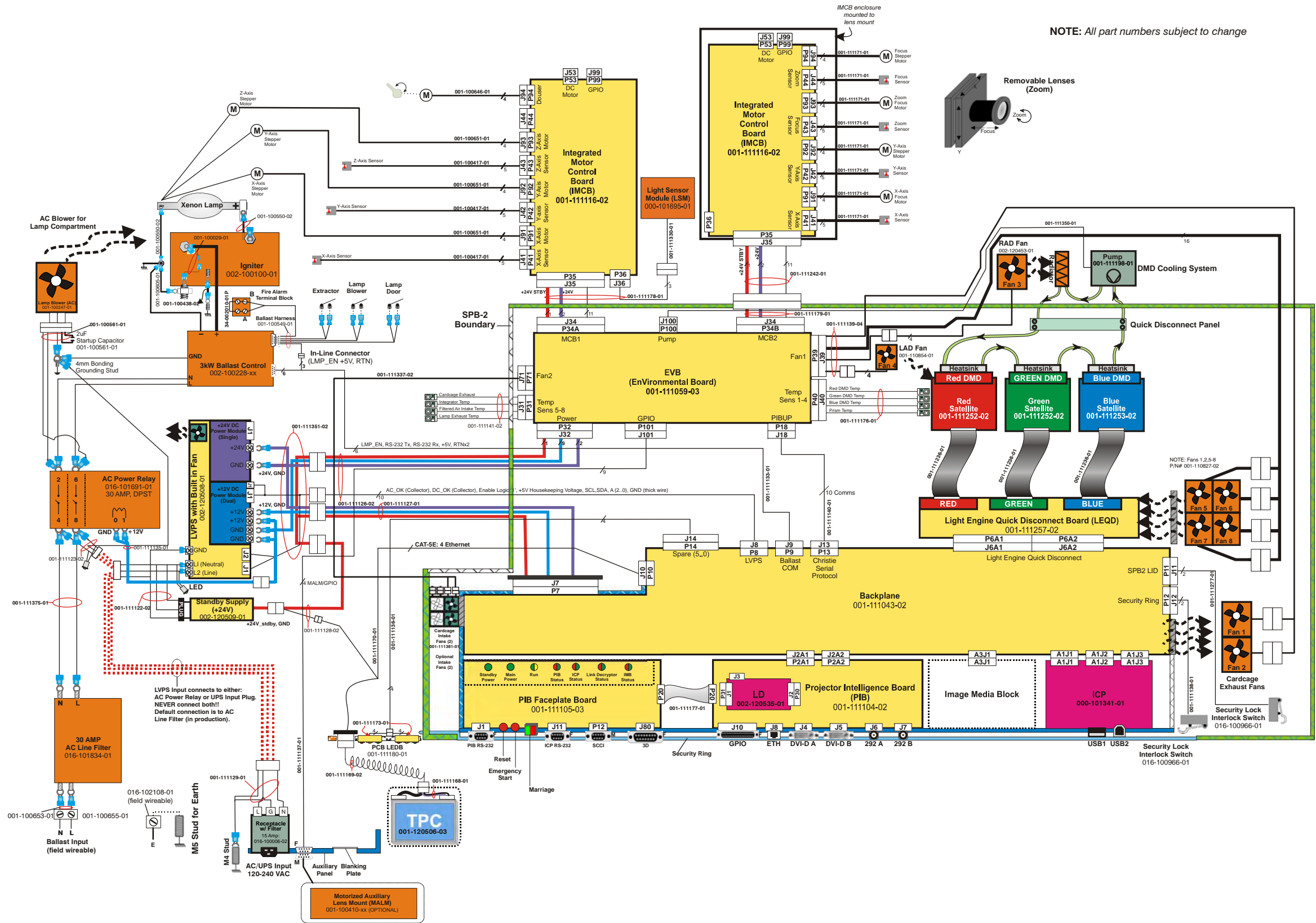


Figure 7-1 CP2220 Interconnect Drawing

8 Serial API

Table 8.1 Function Codes

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: 0 - lens removed from optical path, 1 - lens inserted in optical path
POSI*	Returns where MALM is located. Read-only command.
<p>* command not applicable on all projectors</p> <p>EXAMPLES:</p> <p>(AML?) Get the current status of auxiliary lens.</p> <p>(AML+C108 1) Use auxiliary lens on channel 108.</p> <p>(AML+C108?) Query auxiliary lens setting for channel 108.</p> <p>(AML+C108!001) Response from previous query.</p> <p>(AML+INST 1) Set flag for using MALM, otherwise MALM is ignored</p> <p>(AML+LENI -300) Move lens to -300 for lens in position</p> <p>(AML+LENO 6000) Move lens to 6000 for lens out position</p> <p>(AML+POSI ?) Query where the lens is</p>	
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.
<p>EXAMPLES:</p> <p>(ASD?) Get the current status of Automatic Scan Type Detection on the current active channel.</p> <p>(ASD+C108?) Get the current status of Automatic Scan Type Detection on the provided channel.</p> <p>(ASD+C108 1) Use Automatic Scan Type Detection on channel 108.</p> <p>(ASD+C108 0) Do not use Automatic Scan Type Detection on channel 108.</p>	

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: (BDR+PRTA6) Set baud rate on port A to 115200 bits per second (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: (CHA?) Get current active channel (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: (CHI+C108 "/etc/data/icons/ch108.ico") Use ch 108.ico for channel 108. (CHI+C108 ?) Get icon file name and path for channel 108. (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: (CSP+C108 "RGB Unity") Use file "RGB Unity" on channel 108 (CSP+C108?) Get color space file name on channel 108 (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.
<p>EXAMPLES:</p> <p>(DEF 111) Restore all preference, configuration, and user controls to default.</p> <p>(DEF+USER 111) Clear all users and restore factory default user</p> <p>(DEF+CONF 111) Reset all configuration controls</p> <p>(DEF+PREF 111) Reset all preference controls</p> <p>(DEF+CHAN 101) Restore Channel 101</p> <p>(DEF+CHAN 0) Restore all channels</p>	
Data Logging (DLG)	
<p>Set/get the lowest log level to write to the engineering log, also extract data from log in text format.</p> <p>Levels are:</p> <p>0 = Trace: Level test output, threading info, protocol.</p> <p>1 = Debug: Debug messages.</p> <p>2 = Info: Informational messages.</p> <p>3 = Notices: Event of importance</p> <p>4 = Warning: Warnings</p> <p>5 = Error: An error has occurred</p> <p>6 = Clear: An error has been cleared</p>	
SUBCODE	DESCRIPTION OF USE
NONE	Set/get the minimum log level to write to the log.
EXLG	<p>Extract entries from log files. Requires 3 parameters: "startdate", "enddate", "logtype". The data parameters require the date in the format "yyymmdd". The logtype parameter can have the following values:</p> <p>"ENG" (engineering),</p> <p>"SEC" (security),</p> <p>"OPR" (operational),</p> <p>"MAI" (maintenance),</p> <p>"EVE" (event),</p> <p>"SYS" (system),</p> <p>"ALL".</p>
<p>EXAMPLES:</p> <p>(DLG "20091108" "20091110" "ALL")</p> <p>(DLG+EXLG!"Log data extracted to filename 'logextract.txt' on FTP root")</p> <p>(DLG 2) Set current logging level to 2</p> <p>(DLG?) Get current logging level. Response is (LDG!00002 "Info")</p>	

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: (DTF?) Get current data format (DTF?L) Show entries on the list (DTF 1) Set current data format to 1 (292: 422 Packed 12Bit) (DTF+C108?) Get data format on channel 108 (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, 1 - Fan Fail warning will be generated.
NONE	0 - Disable broadcast, 1 - Enable broadcast of error messages to all connected serial ports and telnet sessions.
TEMP	0 - No Over Temperature warning will be generated, 1 - Over Temperature warning will be generated.
EXAMPLES: (EME 1) Enable broadcasting error messages (EME+FANF 0) Disable fan fail alarm warnings (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: <i>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.</i> <p>Use command without subcode:</p> <ul style="list-style-type: none"> • If ILS is ON, motor will move to specified steps, and save data to the active channel. • 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.
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) is 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)	
<p>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 JJ KKK).</p> <p>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</p>	
SUBCODE	DESCRIPTION OF USE
NONE	None
<p>EXAMPLES:</p> <p>(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)</p>	
Serial Help (HLP)	
Get help on serial commands.	
SUBCODE	DESCRIPTION OF USE
NONE	Request entire command help listing or list for a single command
<p>EXAMPLES:</p> <p>(HLP?) Retrieve entire command help listing (HLP? "DLG") Retrieve all subcodes/descriptions for DLG control</p>	
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.
<p>EXAMPLES:</p> <p>(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</p>	

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%)
<p>EXAMPLES:</p> <p>(ILS 1) Enable ILS, lens will be moved to the position in each channel</p> <p>(ILS 0) Disable ILS, position data in each channel will not be used. Moving lens will not affect any channel setting</p> <p>(ILS+CALB 5) Calibrate all axes of the lens. Set only command</p> <p>(ILS+RSET 5) Reset all axes of the lens</p> <p>(ILS+ACLB 1) Reset lens automatically when power on.</p>	

Internal Media Block Installed/Device Type (IMB)	
Access Level: Advanced Min Power Level: Power Down 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: (IMI 1) Set to IMB installed. (IMI+DEVT?L) List valid device types. (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?) Query 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)
MINS	Set sensor value at minimum lamp power
NONE	Not available

EXAMPLES:

(LCA+MINF 10) Set 10 footlamberts as measured brightness at minimum lamp power
 (LCA+MINF?) Get footlamberts on minimum lamp power
 (LCA+MINS 5000) Set 5000 as reading value from the light sensor at minimum lamp power
 (LCA+MAXF 17) Set 17 footlamberts as measured brightness as maximum lamp power
 (LCA+MAXF?) Get footlamberts at maximum lamp power
 (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:

(LCT+C108 "9x9x9") Use PCF file "9x9x9" on channel 108
 (LCT+C108?) Get LUT-CLUT file name on channel 108
 (LCT?L) List all entries of LUT-CLUT control

Link Decrypter Bypass (LDB)

Setting LD bypass to TRUE (1) will bypass the link decrypter (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:

(LDB+C108 1) Bypass link decrypter on channel 108.
 (LCT 0) Use link decrypter on current channel (i.e. do not bypass).
 (LCT+C108?) Get value for LDB on channel 108.

Link Decrypter Installed (LDI)

Access Level: Advanced
Min Power Level: Power Down
 Set LD to installed or not installed.

SUBCODE	DESCRIPTION OF USE
None	Set to 1 to installed and 0 to not installed.

EXAMPLES:

(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:

(LEN+MMOD?L) List supported lens model
 (LEN+AMOD?L) List supported auxiliary lens model
 (LEN+MMOD 1 Set lens model
 (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.*

Use command without subcode:

- If ILS is ON, motor will move to specified steps and save data to the active channel.
- 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.
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.
<p>EXAMPLES:</p> <p>(LHO 500 1) Move lens to position 500 along horizontal axis with positive approach</p> <p>(LHO 500 -1) Move lens to position 500 along horizontal axis with negative approach</p> <p>(LHO+C101 -500 1) Set lens horizontal position for channel 1 to -500 with positive approach</p> <p>(LHO ?) Return current motor position along horizontal axis and direction (-1 or 1)</p> <p>(LHO+CALB 1) Calibrate the horizontal axis</p> <p>(LHO+RSET 1) Reset the horizontal axis</p> <p>(LHO+STRT 1) Starts motor moving in positive direction</p> <p>(LHO+STOP) Stops motor</p> <p>(LHO+MOVR -100) Move motor 100 steps in negative direction</p> <p>(LHO+MOVR 200) Move motor 200 steps in positive direction</p>	
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.
<p>EXAMPLES:</p> <p>(LID?L) List supported lamp IDs</p> <p>(LID?) Get the lamp ID for installed lamp</p>	
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 ± 375 .
MTRY	Moving Y-axis motor manually. Data range from ± 375 .
MTRZ	Moving Z-axis motor manually. Data range from ± 375 .
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.
<p>EXAMPLES:</p> <p>(LLM+MTRX 100) Move motor X to position 100</p> <p>(LLM+AUTO 1) Do LampLOC™ automatically</p> <p>(LLM+AUTO 0) Abort LampLOC™. It will restore the motors to previous position automatically</p> <p>(LLM+AUTO?) Get running status. (LLM+AUTO!000) indicates finished, (LLM+AUTO!001) indicates running</p> <p>(LLM+STAT ?) Get the progress feedback of the Auto mode (0-100%)</p>	

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>) where <lhodir>, <lvodir>, <zomdir>, and <fcsdir> represent the horizontal, vertical, zoom, and focus position information. Valid values for direction are 1 and -1.
EXAMPLES: (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: (LOC+TIME 1) Set time zone to standard 12 hour (LOC+TIME?1) Get list of formats (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: (LPC+LPID 2) Set lamp type ID (LPC+SERL "CDX30-001") Set lamp serial number (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
Cxxx	Set or get the current lamp file for a specific channel
NONE	Set lamp file for current channel

EXAMPLES:

(LPF+C101 “Default”) Set lamp file for channel 1 to file “Default”

(LPF?L) List all available lamp files

(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:

(LPH?) Get usage in hours

(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:

(LPI 4500) Set lamp intensity to 4500 for current channel

(LPI+C103 4000) Set the lamp intensity to 4000 for channel 3

(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. 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.
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. 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:

(LPL 1500) Set lamp life limit to 500 hours.
 (LPL 0) Set lamp life limit to default hours based on the lamp type.
 (LPL ?) Get lamp life limit.
 (LPL+LIFE 1) Enable lamp expired message.
 (LPL+LIFE 0) Disable lamp expired message.
 (LPL+ROTW 1) Enable lamp rotation message.
 (LPL+ROTA 1) Acknowledge that lamp was rotated.

Lamp Mode (LPM)

Set lamp mode to constant power or LiteLOC™ for global and per channel. **NOTE:** *This command can only be used to update the current lamp file. Changing the lamp power for the current channel will change the lamp power 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 mode for the current channel.

EXAMPLES:

(LPM 0) Set Constant Power mode for current channel
 (LPM “Constant Power”) Set Constant Power mode for active channel
 (LPM+C101 1) Set intensity mode for channel 1
 (LPM?) Get Lamp mode for active channel

Lamp Power (LPP)

Set lamp power to be used when in Constant Power mode. **NOTE:** *This command can only be used to update the current lamp file. Changing the lamp power for the current channel will change the lamp power for any channel using the same lamp file.*

SUBCODE	DESCRIPTION OF USE
Cxxx	Replace Cxxx with the channel number. Valid range is 101-164.
MINI	Get nominal minimum lamp power for the current lamp. Read-only value
NONE	Set lamp power for the current channel.

EXAMPLES:

(LPP 2500) Set lamp power to 2500 for current channel
 (LPP+C102 2000) Set lamp power to 2000 for channel 2
 (LPP+C102?) Get the lamp power for channel 2

Lens Vertical Offset Adjustment (LVO)

Adjust lens offset to specific vertical position with a specific direction. **NOTE:** *This command can only be used to update the current ILS file. Changing the vertical offset for the current channel will change the vertical offset for any channel using the same ILS file.*

Use command without subcode:

- If ILS is ON, motor will move to specified steps and save data to the active channel.
- 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. Set only command.
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.
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:

(LVO 500 1) Move lens to position 500 along vertical axis with positive approach
 (LVO 500 -1) Move lens to position 500 along vertical axis with negative approach
 (LVO+C101 -500 1) Set lens vertical position for channel 1 to -500 with positive approach
 (LVO ?) Return current motor position along vertical axis and direction
 (LVO+CALB 1) Calibrate the vertical axis
 (LVO+RSET 1) Reset the vertical axis
 (LVO+STRT 1) Starts motor moving in positive direction
 (LVO+STOP) Stops motor
 (LVO+MOVR -100) Move motor 100 steps in negative direction
 (LVO+MOVR 200) Move motor 200 steps in positive direction

Measured Color (MCG)

Select the Measured Color Gamut file. This file describes the native colorimetry for the projector as installed and is required for accurate color processing in the cinema electronics. This control is per channel to allow for different colorimetry for applications such as 3D.

SUBCODE	DESCRIPTION OF USE
Cxxx	Replace xxx with the channel number. Valid range is 101 - 164.
NONE	Select measured color gamut for the current channel.

EXAMPLES:

(MCG+C108 "Nominal") Use file "Nominal" on channel 108
 (MCG+C108?) Get measured color file name on channel 108
 (MCG?L) List all entries of measured color control

Channel Name (NAM)

Set the descriptive channel name for the specified channel

SUBCODE	DESCRIPTION OF USE
Cxxx	Replace xxx with the channel number. Valid range is 101 - 164.
NONE	Select channel name for the current channel.

EXAMPLES:

(NAM+C108 "Scope 2.39") Set channel name for channel 108
 (NAM+C108?) Get channel name for channel 108

Network Setup (NET)	
Set the network parameters for Eth0, Gateway, and Subnet 0.	
SUBCODE	DESCRIPTION OF USE
DLP0	Set the IP address for the MGMT Ethernet controller (deprecated).
ETH0	Set the WAN IP address for the projector
GATE	Set the WAN Gateway for the projector
HOST	Host name
MAC0	Gets the MAC address of the projector
SUB0	Set the WAN subnet mask for the projector
EXAMPLES: (NET+ETH0 "192.168.1.35") Set new IP address on the MGMT Ethernet controller (NET+GATE "192.168.0.1") Set the gateway (NET+SUB0 "255.255.255.0") Set the subnet mask on the MGMT Ethernet controller (NET+HOST "MyHostName") Set the host name (NET+ETH0 ?) Retrieve IP address from the MGMT Ethernet controller. (NET+ETH0! 192.168.1.35) (NET+MAC0 ?) Retrieve MAC address from MGMT controller. (NET+MAC0! 00:12:3F:7B:76:B4) (NET+GATE ?) Retrieve default gateway. (NET+GATE! 192.168.0.1) (NET+DLP0 "192.168.206.10") Set IP address (deprecated) (NET+DLP0?) (NET+DLP0! "192.168.206.10") Query IP address (deprecated)	
Projector Configuration File (PCF)	
Set Projector Configuration File (PCF) file for the specified channel. This file is used to configure many aspects of the cinema electronics. It will only be used if PCF in use (PIU) control is set.	
SUBCODE	DESCRIPTION OF USE
Cxxx	Replace xxx with the channel number. Valid range is 101 - 164.
NONE	Select PCF file for the current channel
EXAMPLES: (PCF+C108 "SCOPE 2.39") Use PCF file "Scope 2.39" on channel 108. File used when PIU is on (PCF?L) List all entries of PCF control	
PCF In Use (PIU)	
Select whether to use the PCF file or not.	
SUBCODE	DESCRIPTION OF USE
Cxxx	Replace xxx with the channel number. Valid range is 101 - 164.
NONE	Select "Use PCF" for the current channel
EXAMPLES: (PIU?) Get the current status of PCF file (PIU+C108 1) Use PCF file on channel 108 (PIU+C108 0) Do not use PCF file on channel 108	

Ping (PNG)	
<p>This command returns basic projector information to the user which includes the type of device & main software version. Note that some devices have multiple CPUs each with its own software version. Only the software version of what is considered to be the master CPU is returned here. The return parameters are: Type, Major, Minor, and Beta. The beta value is optional meaning it is an engineering build and has not been validated. NOTE: <i>List of devices:</i> 40 = ACT, 41 = CP2000-ZX, 42 = CP2000-M, 46 = CP2210/CP2220/CP2230, 48 = MCB/IMCB, 49 = EVB</p>	
SUBCODE	DESCRIPTION OF USE
NONE	None
<p>EXAMPLES: (PNG?)(PNG!46 001 000 234) -- Indicates 'Cinema' type, software: 1 major, 0 minor, 234 beta</p>	
Power (PWR)	
<p>Change the power state of the projector. Data can be: 3 - Power OFF - all electronics power OFF except Projector Control Module (PCM). It's also called Standby mode. 1 - Power ON - projector is powered ON with lamp ON. 0 - Full power mode - projector is ready for lamp ON. 11 - Warm up. Read only, it's middle status between standby and full power mode. 10 - Cool down. Read only, projector will stay in cooling down mode for 15 minute after lamp is turned OFF.</p>	
SUBCODE	DESCRIPTION OF USE
COOL	Status of current cooling down timer. Read only command.
NONE	Select power state.
STAT	Status of current power state. Read only command.
<p>EXAMPLES: (PWR+STAT?) - Get projector power status (PWR+COOL?) - Get how many seconds left on cooling down mode (PWR3) - Set the projector to standby mode (PWR0) - Turn the projector ON and lamp OFF (PWR1) - Turn the projector ON and lamp ON (PWR?) - Get the target power state from the latest command sent to the projector. Target power state. For projector power states, refer to the CP2220 User Manual (P/N: 020-100420-xx).</p>	
Remote Access Level (RAL)	
<p>Set the remote serial protocol access level for a serial communications port. Valid sections are 0 - No Access, 1 - Login Required, 2 - Free Access. Default value is 1 - Login required.</p>	
SUBCODE	DESCRIPTION OF USE
NONE	Set the access level on Ethernet all ports.
PRTA	Set the access level on RS232 port A.

EXAMPLES: (RAL 0) Disable remote serial protocol access for all Ethernet ports (RAL?) Get access level for Ethernet ports (RAL!0) (RAL+PRTA 2) Set remote serial protocol access level on port A to free access (RAL+PRTA?) Get access level (RAL+PRTA!2)	
Reboot TPC (RBT)	
Command for rebooting the TPC, requires argument 3.	
SUBCODE	DESCRIPTION OF USE
NONE	Reboot TPC, use 3 as argument other arguments have no effect.
Screen Format (SCF)	
Select Screen format file which describes the geometry for the output image.	
SUBCODE	DESCRIPTION OF USE
Cxxx	Replace xxx with the channel number. Valid range is 101 - 164.
NONE	Select screen file for the current channel.
EXAMPLES: (SCF+C108 "FLAT") Use file "FLAT" on channel 108 (SCF+C108?) Get screen file name on channel 108 (SCF?L) List all available entries of screen control	
Shutter/Douser (SHU)	
Open/Close shutter/douser	
SUBCODE	DESCRIPTION OF USE
NONE	Select douser position 0 - douser removed from optical path 1 - douser blocking optical path
STEP	The number of steps the douser should be moved when opening/closing (default 60, minimum 30, maximum 200)
EXAMPLES: (SHU 1) Close shutter (SHU 0) Open shutter (SHU?) Get current status of shutter (SHU+STEP?) Get number of steps douser should move to open/close	
Select Input (SIN)	
Selecting input port will reset the list and default data of DTF control. Use index number or text description to select input port. Available options are: "Auto-select", "292-A", "292-B", "292-Dual", "DVI-A", "DVI-B", "DVI-Dual/Twin"	
SUBCODE	DESCRIPTION OF USE
Cxxx	Replace xxx with the channel number. Valid range is 101 - 164.
NONE	Select input for current channel

EXAMPLES:

(SIN?) Get current input port
(SIN?L) Show entries on the list
(SIN 1) Set current input port to entry with index 1
(SIN+C101 ?) Get input port on channel 101
(SIN+C101 1) Set input on channel 101

SNMP Agent Configuration (SNM)

This control will set the various configuration options for SNMP Agent

SUBCODE	DESCRIPTION OF USE
ENVT	Enables/Disables SNMP version 2 and enables version 3
LEXT	Gets/sets the Lamp Expire Trap Flag for the SNMP Agent
LHLT	Gets/sets the Lamp Half Life Trap Flag for the SNMP Agent
TSIP	Sets the Trap IP address for the SNMP agent

EXAMPLES:

(SNM+TSIP "xxx.xxx.xxx.xxx") Sets the Trap IP address to xxx.xxx.xxx.xxx
(SNM+TSIP "0.0.0.0") Setting the IP address to 0.0.0.0 will stop SNMP Agent from sending the traps.
(SNM+LHLT 1) Setting this flag to 1 will disable any future lamp half life traps
(SNM+LEXT 1) Setting this flag to 1 will disable any future lamp expire traps
(SNM+ENVT ?) Get the flag to see if V2 is enabled (1) or disabled (0)
(SNM+ENVT 1) Enable SNMP V2
(SNM+ENVT 0) Disable SNMP V2

Screen Orientation (SOR)

Set screen orientation. This allows for flipping the screen orientation to allow for various mounting options of the projector including the use of mirrors and front or rear screen projection.

SUBCODE	DESCRIPTION OF USE
NONE	Select Orientation: 0 - Normal Front, 1 - Inverted Rear, 2 - Normal Rear, 3- Inverted Front

EXAMPLES:

(SOR?L) List orientation options
(SOR?) Get the orientation status
(SOR0) Set orientation to front

Select Source Format (SRF)

Select the Source format file.

SUBCODE	DESCRIPTION OF USE
Cxxx	Replace xxx with the channel number. Valid range is 101 - 164.
NONE	Select source format for the current channel.

EXAMPLES:

(SRF+C108 "XXX") Use file "XXX" on channel 108
(SRF+C108?) Get source file name on channel 108
(SRF?L) List all entries of source control
(SRF+RFSH 1) Refresh TI file list

System Status (SST)	
Retrieve the various system status groups.	
SUBCODE	DESCRIPTION OF USE
ALRM	Returns a summary of any active alarms
CONF	Returns configuration data - model, sn, build date, etc
COOL	Returns cooling data - cooling fans, air flow, etc
HLTH	Returns system health
INTE	Returns interlock data
LAMP	Returns lamp operational data.
NONE	Returns information on all status groups, with one message per item.
PERI	Returns peripherals data - Cine-IPM, etc
SECU	Returns security data
SERI	Return serial numbers
SIGN	Returns signal data - freq, etc.
SYST	Returns system data - power, hours of use, shutter open, etc
TEMP	Returns temperature data
VERS	Returns version numbers
EXAMPLE: (SST+ALRM?) returns (SST+ALRM!000 002 "101" "Prism temperature") where parameters are: P1=index number, P2=error level, P3=value, P4=description. Error level is: 0=no errors or warnings, 1=warning, 2=error, 3=error and warning	
Stop DLP Communication (STP)	
Stop communications to DLP® Cinema Electronics temporarily, i.e. for DLP software upgrading.	
SUBCODE	DESCRIPTION OF USE
NONE	0 - restart DLP communications; 1 - stop DLP communications.
EXAMPLES: (STP 0) Restart DLP communication (STP 1) Stop DLP communication (STP?) Request current state. Example response is (STP!000)	

Projector Platform and Motherboard Related Information (SYS)	
Query only command that returns version information.	
SUBCODE	DESCRIPTION OF USE
BACB	Return backplane version information.
FACB	Return faceplate version information.
PIBB	Return PIB version information.
EXAMPLES: (SYS+BACB?) Returns backplane version information.	
Target Color Gamut (TCG)	
Set the Target Color Gamut file. This file describes desired output colorimetry from the projector. For this control to function the Measured Color Gamut Data must be accurate.	
SUBCODE	DESCRIPTION OF USE
Cxxx	Replace xxx with the channel number. Valid range is 101 - 164.
NONE	Select target color gamut for the current channel.
EXAMPLES: (TCG+C108 "Atlantis") Use file "Atlantis" on channel 108 (TCG+C108?) Get target color file name on channel 108 (TCG?L) List all available entries of target color control	
Enable 3D (TDC)	
Enable/disable 3D on the specified channel or the current channel. This controls the frame rate multiplication features that allow for simulated three dimensional image projection.	
SUBCODE	DESCRIPTION OF USE
Cxxx	Replace xxx with the channel number. Valid range is 101 - 164.
NONE	Select 3D enable for the current channel
EXAMPLES: (TDC+C108 1) Enable 3D on channel 108 (TDC+C108?) Get 3D setting on channel 108 (TDC?) Get current 3D status	
3D Dark Time (TDK)	
Set dark time_for 3D control. This controls how much time between displayed images the output remains dark to allow for the glasses on other gating mechanism to flip between the eyes.	
SUBCODE	DESCRIPTION OF USE
Cxxx	Replace xxx with the channel number. Valid range is 101 - 164.
NONE	Select dark time for the current channel
EXAMPLES: (TDK+C101 1) Set dark time to 1 on channel 101 (TDK+C101?) Get dark time on channel 101	

Output Reference Delay (phase) (TDP)	
Set output reference delay phase for 3D control. This is an additional control for output timing relative to input timing. The data range is -180 to 180.	
SUBCODE	DESCRIPTION OF USE
Cxxx	Replace xxx with the channel number. Valid range is 101 - 164.
NONE	Select output reference delay phase for the current channel
EXAMPLES: (TDP+C101 1) Set output reference delay phase to 1 on channel 101 (TDP+C101?) Get output reference delay phase on channel 101	
3D L/R Display Reference (TDR)	
Set the L/R display reference for 3D control.	
SUBCODE	DESCRIPTION OF USE
Cxxx	Replace xxx with the channel number. Valid range is 101 - 164.
NONE	Select L/R display reference for the current channel
EXAMPLES: (TDR+C101 1) Set L/R display reference to 1 on channel 101 (TDR+C101?) Get L/R display reference on channel 101	
Output Reference Delay (time) (TDT)	
Set output reference delay time for 3D control. This command controls how much delay between the input and output reference timing.	
SUBCODE	DESCRIPTION OF USE
Cxxx	Replace xxx with the channel number. Valid range is 101 - 164.
NONE	Select reference delay for the current channel
EXAMPLES: (TDT+C101 1) Set output reference delay time to 1 on channel 101 (TDT+C101?) Get output reference delay time on channel 101	
L/R Display Sequence (TFD)	
Set L/R Display Sequence for 3D control. This selects which signal is considered first in the source signal, the left or the right.	
SUBCODE	DESCRIPTION OF USE
Cxxx	Replace xxx with the channel number. Valid range is 101 - 164.
NONE	Select L/R display sequence for the current channel
EXAMPLES: (TFD?L) List all entries on Input Frame Dominance control (TFD+C101 1) Set Input Frame Dominance to 1 on channel 101 (TFD+C101?) Get Input Frame Dominance on channel 101	

3D Frame Rate Multiple (TFR)	
Setup frame rate multiple for 3D control	
SUBCODE	DESCRIPTION OF USE
Cxxx	Replace xxx with the channel number. Valid range is 101 - 164.
NONE	Select 3D frame rate for the current channel.
EXAMPLES: (TFR?L) List all entries on the frame rate multiple factor (TFR+C101 3) Set frame rate multiple to “4:2” on channel 101 (TFR+C101?) Get frame rate multiple on channel 101	
Get Certificates (TIG)	
Gets the LD or ICP certificate.	
SUBCODE	DESCRIPTION OF USE
ENG C	Retrieve LD Certificate
ICPC	Retrieve ICP Certificate
EXAMPLES: (TIG+ENG C?) Gets the LD certificate (TIG+ICPC?) Gets the ICP certificate	
3D Input Reference (TIR)	
Setup the Input Reference for 3D control.	
SUBCODE	DESCRIPTION OF USE
Cxxx	Replace xxx with the channel number. Valid range is 101-164.
NONE	Select input reference for the current channel.
EXAMPLES: (TDK+C101 “Use GPI (polarity=true)”) set Input Reference to ‘Use GPI (polarity=true)’ on channel 101 (TDK+C101?) get Input Reference for channel 101	
Time/Date (TMD)	
Set/get the time, date and time zone.	
SUBCODE	DESCRIPTION OF USE
DATE	Get the date in the form yyyy/mm/dd. Read-only.
DSTA	Set/get the daylight savings time adjust value.
TIME	Set/get the local time in the form hh:mm:ss. Ready only.
TOFF	Set Time Offset in seconds (\pm 900 seconds). Must be powered ON. (Write-only)
ZONE	Set/get the time zone

EXAMPLES:

(TMD+DSTA?) 0 or 1 (DST OFF or DST ON)
 (TMD+DSTA 0) Turn daylight savings OFF (0) or ON (1)
 (TMD+ZONE 20) Set time zone to EST
 (TMD+TIME?) Get local time (TMD+TIME! 17:50:45)
 (TMD+TOFF 120) Increase the time by two minutes.
 ("TMD+TOFF: Disabled Control") Error message returned when power is OFF.
 ("TMD+TOFF: LD Real Time Clock Offset range for time adjustment has been exceeded.")

3D Output Reference Polarity (TOP)

Setup output timing signal reference polarity for 3D control.

SUBCODE	DESCRIPTION OF USE
Cxxx	Replace xxx with the channel number. Valid range is 101-164.
NONE	Select output reference polarity for the current channel.

EXAMPLES:

(TOP+C101 1) Set Output Reference Polarity to 1 on channel 101
 (TOP+C101?) Get Output Reference Polarity on channel 101

User ID (UID)

Allows users to login to the serial interface.

SUBCODE	DESCRIPTION OF USE
NONE	None

EXAMPLES:

(UID) "username" "password") Login a user
 (UID) Logout the current user, also happens automatically when a new user logs in
 (UID?)(UID! "username" 01) Display the current logged in user and their access level

Zoom Lens Position Adjustment (ZOM)

Adjust lens to specific zoom position with a specified direction (1, -1). **NOTE:** *This command can only be used to update the current ILS file. Changing the zoom for the current channel will change the zoom for any channel using the same ILS file.*

Use command without subcode:

- If ILS is ON, motor will move to specified steps and save data to the active channel.
- 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 vertical position.
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.
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.
<p>EXAMPLES:</p> <p>(ZOM 500 1) Move lens to position 500 with positive approach</p> <p>(ZOM 500 -1) Move lens to position -500 with negative approach</p> <p>(ZOM+C101 -500 1) Set lens zoom position for channel 1 to -500 with positive approach.</p> <p>(ZOM ?) Return current motor position</p> <p>(ZOM + CALB 1) Calibrate the zoom</p> <p>(ZOM + RSET 1) Reset the zoom</p> <p>(ZOM+STRT 1) Starts motor moving in positive direction</p> <p>(ZOM+STOP) Stops motor</p> <p>(ZOM+MOVR -100) Move motor 100 steps in negative direction</p> <p>(ZOM+MOVR 200) Move motor 200 steps in positive direction.</p>	

9 Specifications

Due to continuing research, specifications are subject to change without notice.

9.1 Display

9.1.1 Panel Resolution and Refresh Rate

Pixel format (H x V square pixels)	2048 x 1080
Processing path	23.97 - 120Hz
3D (24 fps per eye input, DLP Cinema®)	
Processing), Full Image (2048 x 1080)	144Hz (frame tripled)

9.1.2 Maximum Lumen Output (Center Lumens)

	<u>Maximum</u>
2.0kW (CDXL-20LB)	7,000 lumens
2.0kW (CDXL-20SP)	9,000 lumens
2.0kW (CDXL-20)	9,000 lumens
3.0kW (CDXL-30SP)	16,000 lumens
3.0kW (CDXL-30)	16,000 lumens
3.0 kW (CDXL-30SD)	22,000 lumens

9.1.3 Achievable Contrast Ratio

450:1 ANSI, 2100:1 Full Field ON/OFF

9.1.4 Color and Gray Scale

Displayable colors	35.2 trillion
Gray Scale resolution	45 bits total linear, 15 bits per RGB component

9.1.5 White Point

Review Rooms:

Nominal White <i>(full white, after calibration to Telecine mode)</i>	$x = 0.314 \pm 0.002$
	$y = 0.351 \pm 0.002$

Theatres:

Nominal White <i>(full white, after calibration to Telecine mode)</i>	$x = 0.314 \pm 0.006$
	$y = 0.351 \pm 0.006$

9.1.6 Gamma

Review Rooms (nominal)	2.6 ±2%
Theater (nominal)	2.6 ±5%

9.2 Source Signal Compatibility

9.2.1 Cinema Inputs

- Number of inputs 2
- Standard supported SMPTE 292M bit-serial
- Connector type BNC

Table 9.1 Standard Single-link SMPTE 292M Formats

Source Standard	Original Source Resolution	Vertical Frequency (Hz)	Scan Type	Display Frame Rate (Hz)
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 296M	1280 x 720	100	Progressive	100
SMPTE 296M	1280 x 720	120	Progressive	120
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 274M	1920 x 1080	48	Progressive	48
SMPTE 295M	1920 x 1080	50	Progressive	50
SMPTE 274M	1920 x 1080	59.94 / 60	Progressive	59.94 / 60
SMPTE 274M	1920 x 1080	23.98 / 24	Interlaced	11.99 / 12
SMPTE 274M	1920 x 1080	25	Interlaced	12.5
SMPTE 274M	1920 x 1080	29.97 / 30	Interlaced	14.985 / 15
SMPTE 274M	1920 x 1080	48	Interlaced	24
SMPTE 295M	1920 x 1080	50	Interlaced	25
SMPTE 274M	1920 x 1080	59.94 / 60	Interlaced	29.97 / 30
SMPTE 274M	1920 x 1080	100	Interlaced	50

Source Standard	Original Source Resolution	Vertical Frequency (Hz)	Scan Type	Display Frame Rate (Hz)
SMPTE 274M	1920 x 1080	120	Interlaced	60
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
	640 x 480	23.98 / 24	Progressive	23.98 / 24
	640 x 480	25	Progressive	25
	640 x 480	29.97 / 30	Progressive	29.97 / 30
	640 x 480	48	Progressive	48
	640 x 480	50	Progressive	50
	640 x 480	59.94 / 60	Progressive	59.94 / 60
	640 x 480	100	Progressive	100
	640 x 480	120	Progressive	120
	720 x 525	23.98 / 24	Interlaced	11.99 / 12
	720 x 525	25	Interlaced	12.5
	720 x 525	29.97 / 30	Interlaced	14.985 / 15
	720 x 525	48	Interlaced	24
	720 x 525	50	Interlaced	25
	720 x 525	59.94 / 60	Interlaced	29.97 / 30
	720 x 525	100	Interlaced	50
	720 x 525	120	Interlaced	60
DCI**	2048 x 1080	24	Progressive	24
DCI**	2048 x 1080	48	Progressive	48

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 (SMPTE 372M) they will support all the formats listed in Table 9.1 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.

9.2.2 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 9.2 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
720 x 480	8	119.88 / 120 Hz

Table 9.3 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
720 x 480	10	119.88 / 120 Hz

9.3 Control Signal Compatibility

9.3.1 Ethernet Port

Interface	10Base-T/100-Base-TX
Connector	Female RJ-45
Bit Rate	10 Mbps or 100 Mbps half and full duplex

9.3.2 RS232-PIB

Interface	TIA-232
Connector	9-pin subminiature D, female
Bit Rate	115,200 bps
Flow Control	Hardware (RTS/CTS)
Data Format	1 start bit, 8 data bits, 1 stop bit, no parity
Communication Protocol	Christie Serial Protocol

9.3.3 RS232-ICP

Interface	TIA-232
Connector	9-pin subminiature D, female
Bit Rate	38,400 (default), 57,600, 115,200 bps, <u>not</u> auto-detected
Flow Control	Hardware (RTS/CTS)
Data Format	1 start bit, 8 data bits, 1 stop bit, parity odd

9.3.4 GPIO Port

Interface	Opto-LED inputs, TTL voltage output
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 nom., 1.4V max. (@5mA)

9.3.5 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 nom., 1.4V max. (@5mA)

9.3.6 3D Port

Interface	Proprietary 3D connector
Connector	15-pin subminiature D, female
Bit Rate	1200 bps
Flow Control	Software
Data Format	1 start bit, 8 data bits, 1 stop bit, no parity
Communication Protocol	RS232 and GPIO

9.3.7 USB 1 Port

Interface	Universal Serial Bus 2.0
Connector	USB Device Standard Sizes (Series “A”)
Maximum Bit Rate	12 Mbps

9.3.8 USB 2 Port

Interface	Universal Serial Bus 2.0
Connector	USB Device Standard Sizes (Series “B”)
Maximum Bit Rate	12 Mbps

9.3.9 MALM (located on Auxiliary Input Panel)

Interface	3.3V CMOS
Connector	9-pin subminiature D, female
Number of I/O Lines	4 GPIO

9.4 Touch Panel Controller

9.4.1 TPC-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	10/100Base-T Ethernet
Power Requirement	1.02 A maximum at 24VDC ±10%
Interface Connector	12-pin Circular connector (push-pull)

9.4.2 TPC-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	10/1000Base-T Ethernet
Power Requirement	0.71A (typical)
Interface Connector	12-pin Circular connector (push-pull)

9.5 Power Requirements

9.5.1 AC Input

Voltage Range	200 - 240 VAC
Line Frequency	50Hz - 60Hz nominal
Inrush Current	45 A maximum (LVPS <u>or</u> LPS)
Current Consumption	23 A maximum (at 200 VAC)
Power Consumption	4500 W maximum
Current Rating of AC Input	30 A maximum (Specified Wall Breaker)

9.5.2 UPS AC Input

Voltage Range	100 - 240 VAC
Line Frequency	50Hz - 60Hz nominal
Inrush Current	50 A maximum
Current Consumption	10 A maximum
Power Consumption	1000 W maximum
Current Rating of AC input	15 A maximum (Specified Wall Breaker)

9.6 Lamp

Type: Xenon Short Arc

Power (software adjustable):

CDXL-20LB	1000W min., 2000W nom., 2200W max.
CDXL-20SP	1000W min., 2000W nom., 2200W max.
CDXL-20	1000W min., 2000W nom., 2200W max.
CDXL-30SP	1000W min., 3000W nom., 3100W max.
CDXL-30	1000W min., 3000W nom., 3100W max.
CDXL-30SD	1000W min., 3000W nom., 3100W max.

NOTES: **1)** The LPS is power regulated. 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 LPS is restricted to 3000W ± 100W.

Average Life:

CDXL-20LB	3500 hours
CDXL-20SP	4000 hours
CDXL-20	3500 hours
CDXL-30SP	2800 hours
CDXL-30	2500 hours
CDXL-30SD	1500 hours

Warm-up time to full brightness 20 minutes max.

NOTES: **1)** The listed average life can be expected if the lamp is used in accordance with the Best Practices for Lamp Usage outlined in the Christie Xenolite lamp solutions brochure. **2)** Hot re-strikes reduce lamp life.

9.7 Physical Specifications

Overall Size (L x W x H) (including lens mount, stack and feet)	1181 mm (46.5 inches) x 635 mm (25.0 inches) x 483 mm (19.0 inches)
Weight:	
As installed with lens	116 kg (256 lbs)
Shipping (includes packaging)	148 kg (326 lbs)
Operating Position:	
Rotation about projection axis	± 15 degrees maximum
Tilt of projection axis from horizontal	± 15 degrees maximum

9.8 Regulatory

This product conforms to the following regulations related to product safety, environmental requirements and electromagnetic compatibility (EMC):

9.8.1 Safety

- CAN/CSA C22.2 No. 60950-1
- UL 60950-1
- IEC 60950-1

9.8.2 Electro-Magnetic Compatibility

Emissions

- FCC CFR47, Part 15, Subpart B, Class A - Unintentional Radiators
- CISPR 22/EN 55022, Class A - Information Technology Equipment

Immunity

CISPR 24 / EN55024 EMC Requirements - Information Technology Equipment

Environmental

- EU Directive (2002/95/EC) on the restriction 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 electrical and electronic equipment (WEEE) and the applicable official amendment(s)
- Regulation (EC) No. 1907/2006 concerning the Registration, Evaluation, Authorization and Restriction of Chemicals (REACH) and its amendments
- 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)

9.9 Environment

9.9.1 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

9.9.2 Non-Operating Environment

Temperature	-25°C to 65°C (-13°F to 149°F)
Humidity (non-condensing)	0% to 95%

9.10 Accessories

9.10.1 Standard (sold with product)

- Touch Panel Controller (TPC) with interface cable
- User Manual (with CD containing additional technical documentation)
- Interconnect Diagram

9.10.2 Accessories (sold separately)

- Lenses (prime and auxiliary)

High Brightness Prime Zoom Lenses

- 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)

High Contrast Prime Zoom Lenses

- 1.25-1.45 DLPCine HC Zoom Lens (38-809079-01)
- 1.45-1.8 DLPCine HC Zoom Lens (38-809061-01)
- 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 optional Motorized Auxiliary Lens Mount (MALM).*

- Motorized Auxiliary Lens Mount (108-111101-xx & 108-111102-xx)
- Motorized Lens Mount Motor Kit (127-102104-xx)
- Rack Stand (108-282101-02)
- Bracket Foot Lock *used with optional Rack Stand* (116-100101-01)
- Power Plug Cord (116-102104-01)
- High-contrast Internal Aperture Kit (38-813028-51)
- Replacement Lamps
 - 003-005079-01 CDXL-20LB
 - 003-004251-01 CDXL-20SP
 - 003-000598-02 CDXL-20
 - 003-004252-01 CDXL-30SP
 - 003-000599-02 CDXL-30
 - 003-001165-01 CDXL-30SD
- Replacement Air Filters
 - 003-001184-01 Light Engine Filter
 - 003-003082-01 Liquid Cooling Radiator Filter
- Liquid Cooling Kit (003-001837-03)
- TPC Remote Cable (30m) (003-111169-01)

Appendix A: Exploded Views

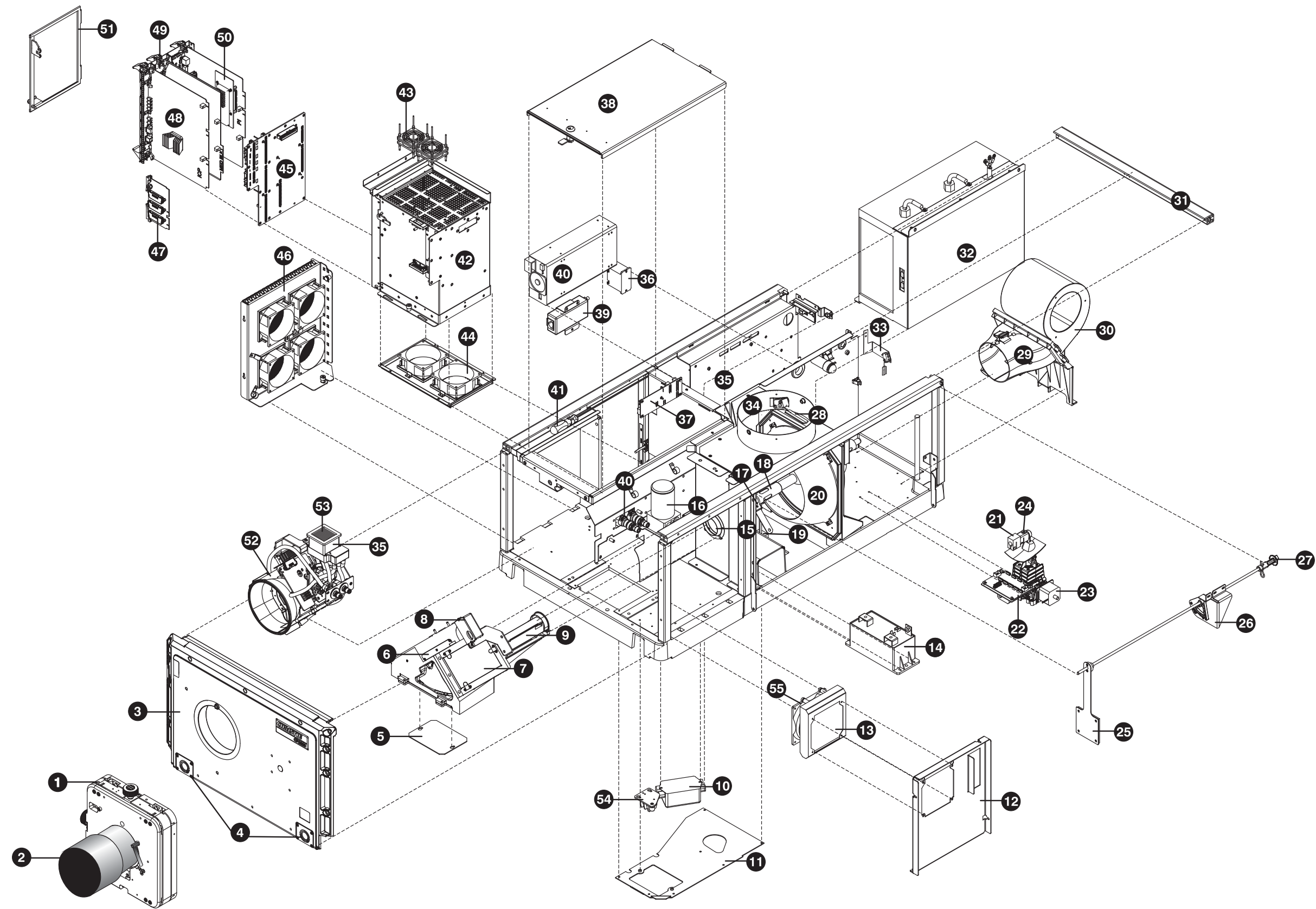
The following exploded views have been provided to assist in identifying the various serviceable parts in the projector.

Table A.1 CP2220 Exploded View Index

EXPLODED VIEW LABEL	PART NAME/DESCRIPTION
1	Lens Mount Manual
2	Lens
3	Front Faceplate
4	Knockout Plate
5	Fold Mirror
6	Yellow Notch Filter (<i>1 filter, disposable nitrile gloves</i>)
7	Cold Mirror
8	Light Sensor PCB
9	Integrator Assembly (<i>includes holder, nitrile gloves</i>)
10	AC Line Filter (30A)
11	Fold Mirror Access Plate
12	Left Access Cover
13	Radiator Air Filter (1 per kit)
14	Igniter
15	UV Filter
16	Liquid Cooling Assembly
17	Anode Clamp
18	Lamp
19	Anode Yoke Assembly
20	Reflector
21	Lamp Extension Nut (<i>for CDXL-30SD lamps only</i>)
22	Integrated Motor Control Board PCB
23	Stepper Motor
24	Cathode Connector
25	Ceramic Plate
26	Douser Motor Assembly
27	Douser Knob
28	Vane Switch - Exhaust
29	Lamp Duct
30	Fan - Main Blower (230V)
31	Rear Cross Bar
32	Lamp Power Supply (LPS), 3kW
33	Vane Switch - Main Blower
34	Exhaust Duct
35	Fan - LAD (12V DC 50mm)

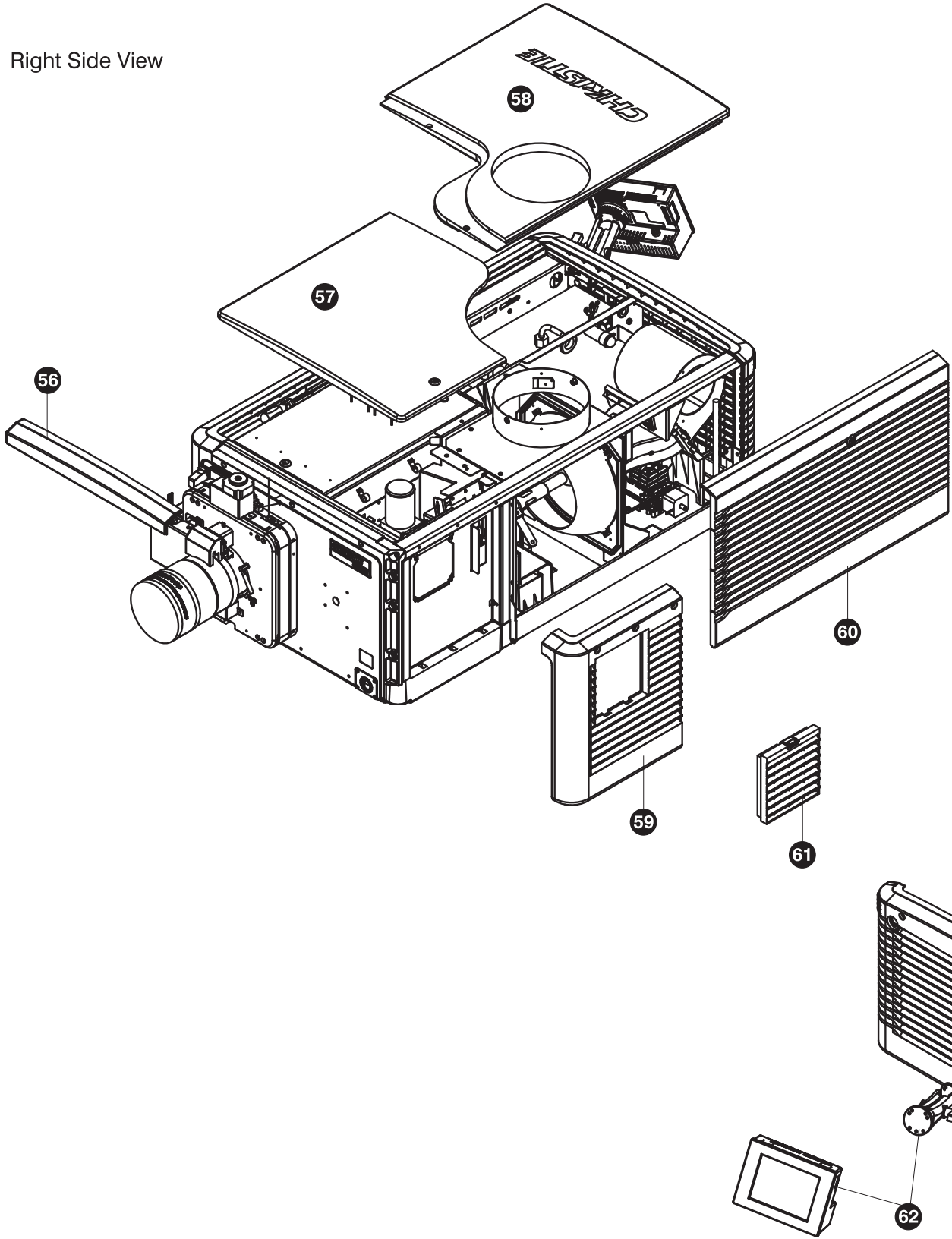
EXPLODED VIEW LABEL	PART NAME/DESCRIPTION
36	AC Relay (230V AC 30A)
37	EVb PCB (Environmental Board)
38	High Security Lid
39	Standby Power Supply (60W)
40	Low Voltage Power Supply (600W)
41	5mm Hex Tool
42	Cardcage Frame
43	Fan - Cardcage Intake
44	Fan - Cardcage Exhaust
45	Backplane PCB
46	Fan - Light Engine Intake (12V .6A 4-wire)
47	Light Engine Quick Disconnect (LEQD) PCB
48	ICP PCB
50	PIB PCB
51	Security Ring
52	Light Engine Assembly
53	LAD Filter (3 pack)
54	AC Terminal Block
55	Radiator Fan
56	Front Baffle
57	Front Top Lid
58	Rear Lid
59	Cover - Left Access
59	Lamp Door
60	Cover - Lamp Door
62	Touch Panel Controller (TPC)
63	Back Panel
64	Cover - LVPS/LPS
65	Access Panel Frame
66	Cover - PIB/ICP
67	Cover - Light Engine Air Filter

A.1 Exploded View - Internal

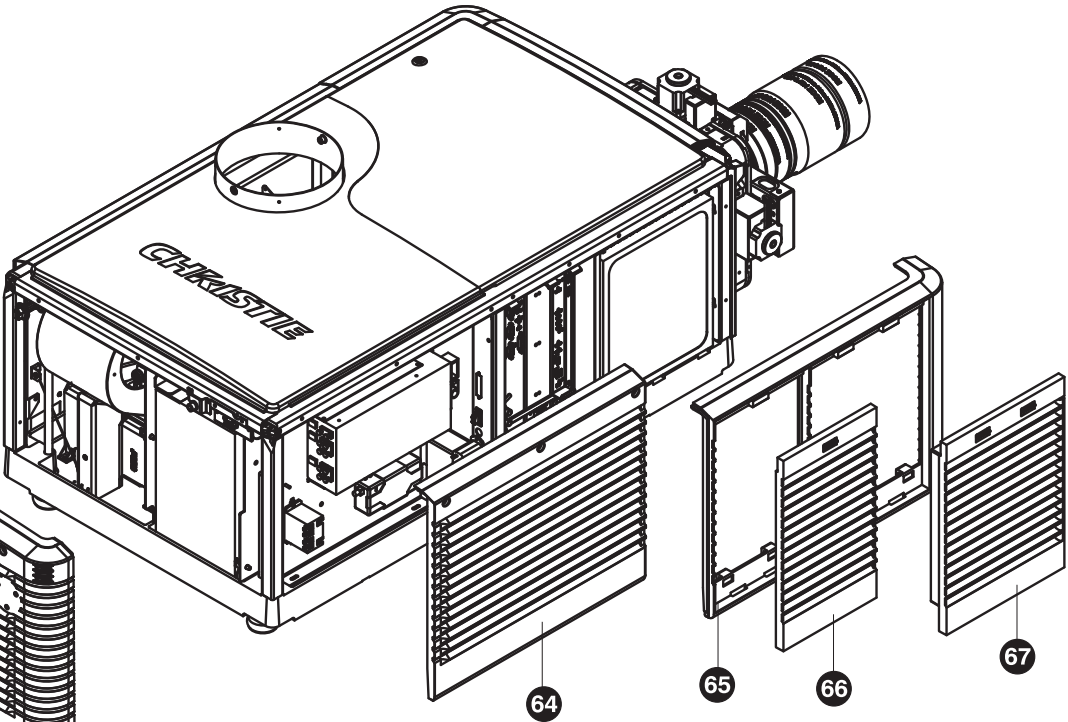


A.2 Exploded View - External

Right Side View



Left Side View



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