

CP4230

Service Manual

020-100622-04

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NOTICES

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This Class A digital apparatus complies with Canadian ICES-003.
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- 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.
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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 CP4230 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.

1.0.1 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.

1.1 Projector Components - Overview

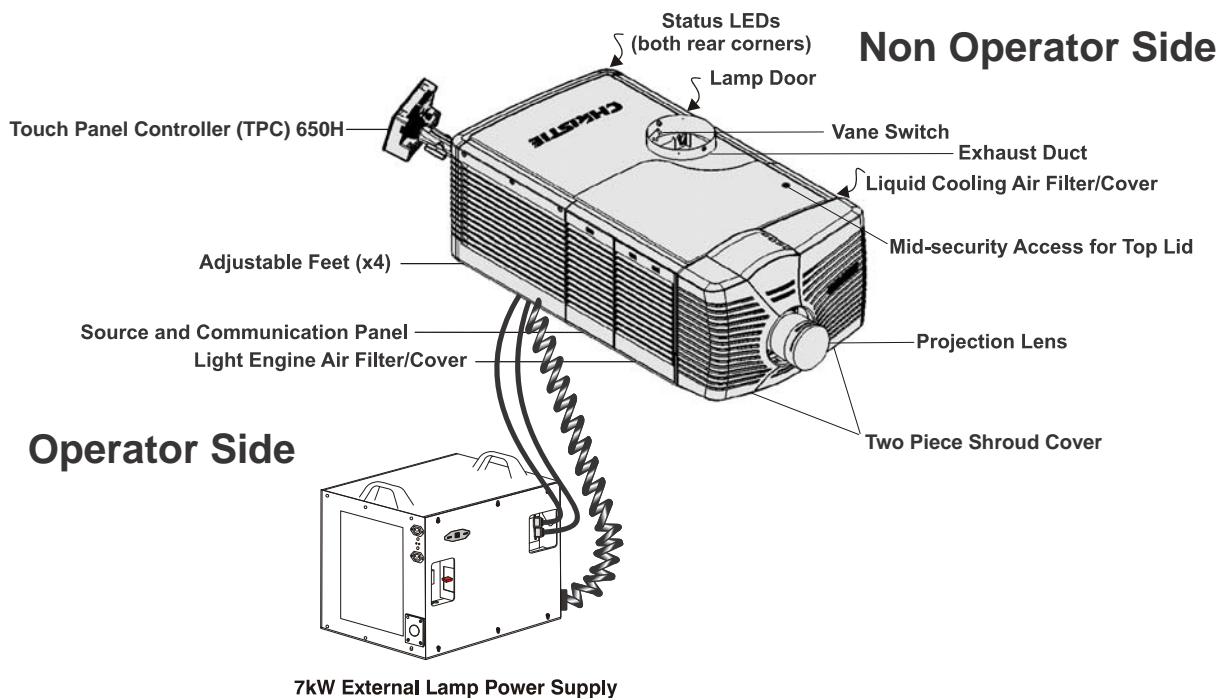


Figure 1-1 Projector Overview

1.1.1 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.

1.1.2 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. **NOTE:** The TPC for the CP4230 is not interchangeable with CP2220 to CP2230 TPC's.

1.1.3 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. 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. For complete details on controlling the projector via ASCII messaging instead of using the TPC screen, refer to [Section 8 Serial API](#).

1.1.4 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.

1.1.5 Lamp Power Supply Interface Signals

Two communication/control cables link the digital lamp power supply (LPS) 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, it is jumpered closed. The LPS communication/control cables each route to their own 9-pin connector located on the operator's side of the LPS.

1.2 Cooling

1.2.1 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 Power and Lamp Requirements

The universal lamp power supply (LPS) in the CP4230 offers adjustable lamp power to suit the size of lamp currently in use. Software allows each lamp to be over-driven by approximately 10% of its maximum rating. The CP4230 accommodates different lamps. Refer to [Section 9.7 Lamp](#) for a complete list of supported lamps.

1.3.1 Lamp Area

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 at the exhaust opening located at the top of the projection head. The required minimum airflow for the 2kW and 3kW lamps is 450 CFM, and for the 4.5kW and 6kW lamps it is 600 CFM. 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.*

1.3.2 7kW Lamp Power Supply (LPS)

⚠ WARNING

- **DO NOT connect the lamp power supply to AC until it is first connected to the projector.**
- **Certified electrician required.**

- **Ground (earth) connection is necessary for safety. Never compromise safety by returning the current through the ground. Connect ground first to reduce shock hazard from high leakage.**
- **Use an appropriate strain relief connector on the AC supply cable to prevent the cable from rubbing against the LPS knockout plate and becoming damaged.**

The head is powered by 200-240VAC (nominal) single phase power through an IEC320 receptacle which is plugged into the remote lamp power supply (via a reverse IEC320 connection), into the wall (where available) or used with a UPS. The latter two methods require an appropriately rated line cord for the country of installation. The projector is provided with an IEC320 connector near the input panel for connection to a UPS. This connection takes 100-240VAC power and will power all the electronics of the projector. Standby Power (24V) is available at all times when the wall breaker/disconnect is powered on via a separate “power brick” style power supply. This unit will power the TPC and electronics only. The remote switching lamp power supply can be wired to 3 phase 208 or 400 VAC and provides a well regulated DC current up to 180 amps with a maximum power of 7 kW. The voltage input to the lamp depends on the installed lamp, and can range from 18 to 46 VDC. The power output from the lamp power supply is controlled from the projection head using a dedicated 9-pin RS232 connection. The lamp power supply power can be user adjusted and also automatically adjusted using the LiteLOC feature to maintain constant light output. The connection can be disconnected during servicing, allowing the lamp power supply to be operated and interrogated by a service person using a laptop. For more information, refer to the *CP4230 User Manual (P/N: 020-100621-xx)*.

1.3.3 Low Voltage Power Supply

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).
- The 12V main rail supplies the ICP, the link decrypter, fans and pump, and lamp power supply (LPS) opto-isolators.

1.3.4 Standby Power Supply

The standby power supply is a fanless 24V power supply that supplies power to the PIB, EVB, IMCB and the TPC when the projector is in STANDBY mode.

1.3.5 Igniter

The igniter is located opposite the lamp compartment. It is powered by the 7kW lamp power supply located in a separate enclosure. 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.

1.4 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.
Fire Alarm (Optional)	The fire alarm interlock is an externally accessible interlock for connection to the facilities fire alarm system. Connect this terminal to the theater's fire alarm system, as required by local fire safety codes. A jumper is provided to close this connection by default. When connecting to the fire alarm system use a relay to short the connector when the fire alarm system is OFF and to open the connector when the fire alarm system is triggered. An open connector turns the lamp OFF and generates an alarm, which is displayed on the TPC.

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.

1.5 Lamp

The Xenon arc lamp resides in the rear left hand side of the projector. Replacing a lamp requires the high-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 (4.5kW and 6.0kW CDXL) versus shorter (2.0kW and 30kW CDXL) 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, arrow buttons on this same page can be used to move the lamp manually along each axis.

1.5.1 LampLOC™ Module

The electro-mechanical LampLOC™ module (a.k.a. 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).

1.5.2 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.

1.6 Lenses

1.6.1 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 *CP4230 User Manual (P/N: 020-100621-xx)* for all other primary lens installation details, the boresight adjustment procedure at the screen, and lens specifications.

1.6.2 Motorized Auxiliary Lens Mount (MALM)

The MALM assembly is an optional hardware component, which is used to switch from flat to "scope" formats. This assembly is secured to the projector base and supports either a 1.25x anamorphic lens or a 1.26x

wide converter lens (WCL). The drive and control electronics package for this motorized lens mount communicates with and is controlled by the projector over a 9-pin subminiature D cable that connects to the User I/O panel.

1.6.3 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. The anamorphic lens horizontally spreads the image back into its wider 2.39:1 scope image and is typically used in side-masking theatres and on larger screens. When using an anamorphic lens the incoming data must be scaled up to a higher vertical resolution in order to work correctly.

1.6.4 Wide Converter Lens

In some applications a wide converter lens (WCL) can be used to accommodate changes between flat and "scope" cinema displays. The wide converter lens "zooms" the image from flat to scope image formats. It magnifies a scope-formatted 2.39:1 image so it fills the screen without the use of an anamorphic lens.

2 Service Guidelines

⚠ 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.

2.1 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 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.*

2.3 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.

2.4 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.

2.5 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.

2.6 Safety Warnings and Guidelines

2.6.1 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.

2.6.2 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](#).

2.6.3 AC/Power Precautions

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

⚠ WARNING

- **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.**

2.6.4 Lamp Precautions

⚠ DANGER



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

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

Wear Protective Clothing

Never open the lamp door unless you are wearing authorized protective clothing such as that included in a Christie Protective Clothing Safety Kit #598900-095. Recommended protective clothing includes, but may not be limited to a polycarbonate face shield, protective gloves, and a quilted ballistic nylon jacket or a welder's jacket. **NOTE:** *Christie's protective clothing recommendations are subject to change. Any local or federal specifications take precedence over Christie recommendations.*

Cool the Lamp Completely

DANGER



Lamp may explode causing bodily harm or death. 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. 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!

2.7 Cooling

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

2.7.1 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.

2.7.2 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 [5.5.1 Light Engine Air Filter](#), on page 5-12 for instructions.

2.7.3 Liquid Cooling (Radiator) Air Filter

Check: Monthly

Located on the left/front side of the projector the air filter for the liquid cooling system, should be inspected routinely and replaced if it appears greyish in color. Refer to [5.5.2 Radiator Air Filter](#), on page 5-12 for instructions.

2.7.4 Liquid Cooling System

Check: Every 6 months

The liquid cooling system circulates liquid to and from the DMD heatsinks in the CP4230 reducing the DMD operating temperature to an acceptable level. Check the coolant level every 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.

2.7.5 Filling the Coolant Reservoir

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

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

Top up the coolant with the Christie approved coolant JEFFCOOL E105. Use the refill bottle (with the nozzle) provided in the Liquid Coolant Fill Service Kit (P/N: 003-001837-xx). When refilling, use caution not to spill or drip on or near the electronics. Do not allow the level of coolant to fall below the Minimum Fill Line.

NOTE: After filling the reservoir, check the coolant hoses for kinks which may restrict fluid flow. **DO NOT OVERFILL.**



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.

2.7.6 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 power up the lamp.
2. Turn OFF the extractor fan.
3. Confirm that the extractor vane switch has indicated an extractor status light error on the TPC **Status** page. Turn the 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.*

2.8 Maintenance and Cleaning

WARNING



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.

2.8.1 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.

2.8.2 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

2.8.3 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.

2.8.4 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.

2.8.5 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

NOTICE! 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 CP4230 uses two airflow interlocks; a lamp blower vane switch and an extractor vane switch. The lamp blower vane switch is located within the lamp cooling compartment. The extractor vane switch is located just inside the top duct on the projector lid. Check and clean the switches to remove accumulated dust or dirt that could impede movement if necessary. Within the exhaust duct connected at the top of the projector, adequate airflow must be maintained and routed outside of the building. Inspect regularly and confirm that 1) there are no obstructions or “kinks” within the ducting, 2) all air intake areas are unobstructed, and 3) exhaust airflow is at least 450 CFM* for 2kW and 3kW lamps and 600 CFM* for the 4.5kW and 6KW lamps (measured at the rigid end of the duct when not connected to the projector).

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. Contact Christie or your dealer.

2.9 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.

3 Service Setups

This section describes special internal hardware and software adjustments and related details that may require the attention of a qualified 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.

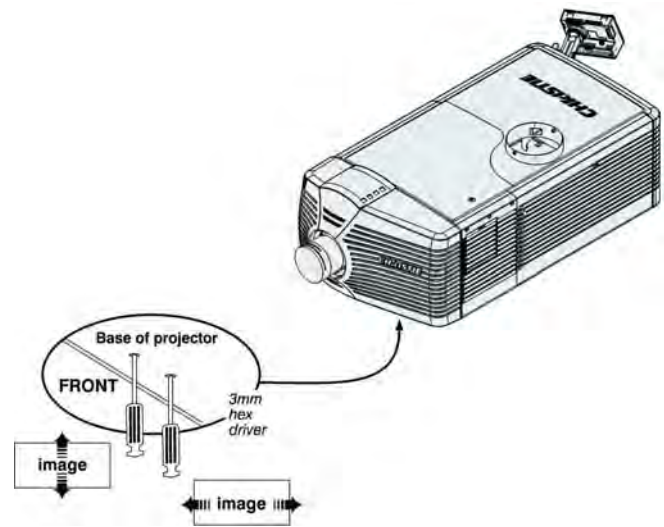


Figure 3-1 Fold Mirror Alignment

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**)

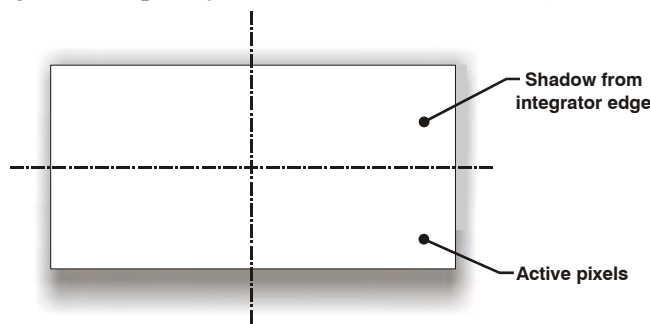


Figure 3-3 Centering the Integrator

3.3 Adjusting Lamp Position (LampLOC™)

LampLOC™ is a required adjustment after servicing many of the projector's 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. Tap the **Do Auto** button.
3. Let a few minutes pass to allow the LampLOC™ mechanism to establish the best lamp position and optimize the light output. You will see 100% displayed on the screen when the operation is complete.

TIP You can improve on-screen uniformity after running LampLOC™ by manually adjusting the z-axis motor. However, brightness will be decreased by a very small amount when this is done.

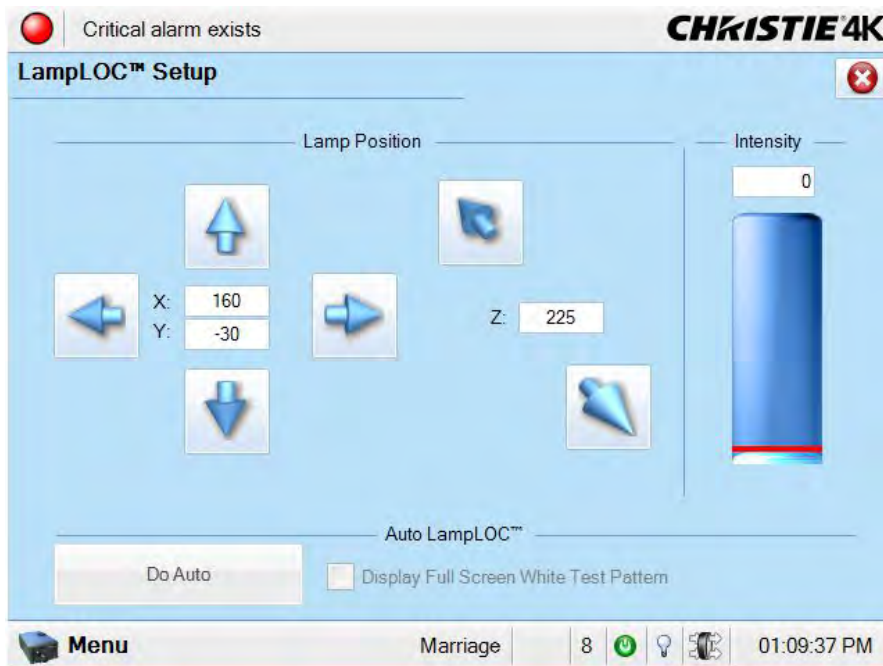


Figure 3-4 Adjust Lamp Position

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.
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.

NOTICE! Do not run the projector while performing convergence with the Light Engine Fan Pack or the Cooling Duct removed. This will cause overheating of the Satellite Formatter Board FPGA's.

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.

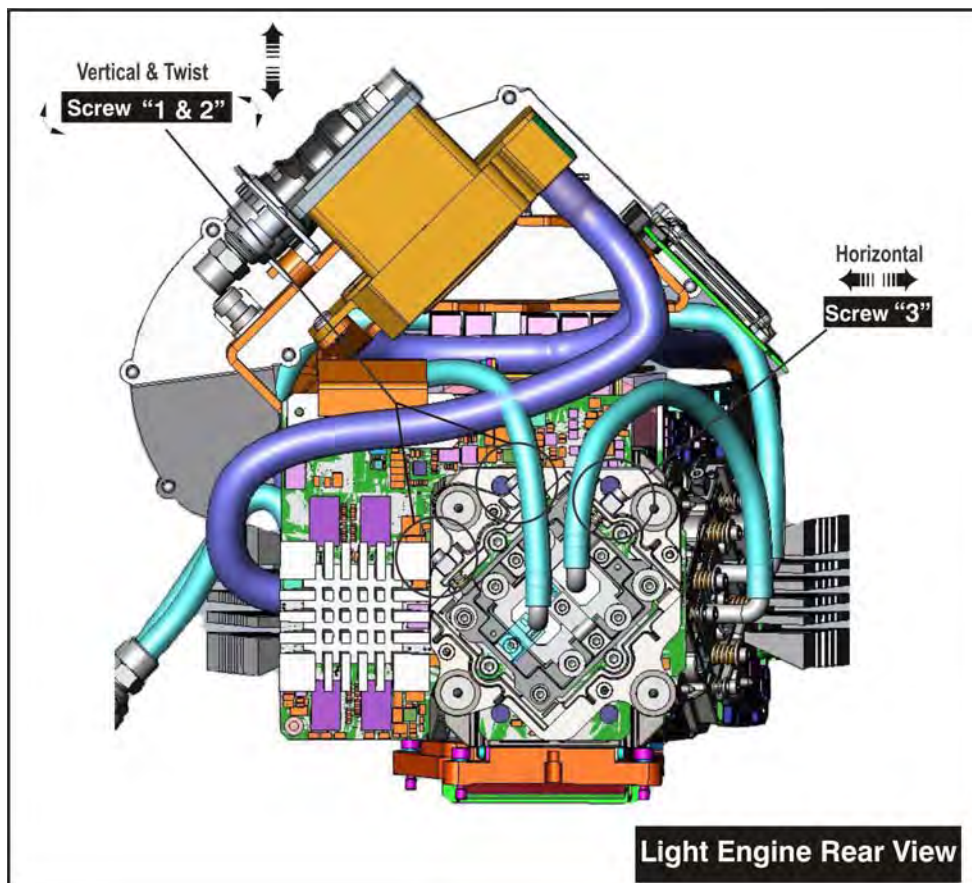


Figure 3-5 DMD Convergence

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 *CP4230 User Manual (P/N: 020-100621-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 **4096 x 2160 no crop** to prevent any scaling of your reference test pattern.
- Use insulated tools to prevent short circuits (**Figure 3-6**):
 - 2.5 mm driver with heat-shrink tubing (2.0 inch and 6.5 inch lengths).

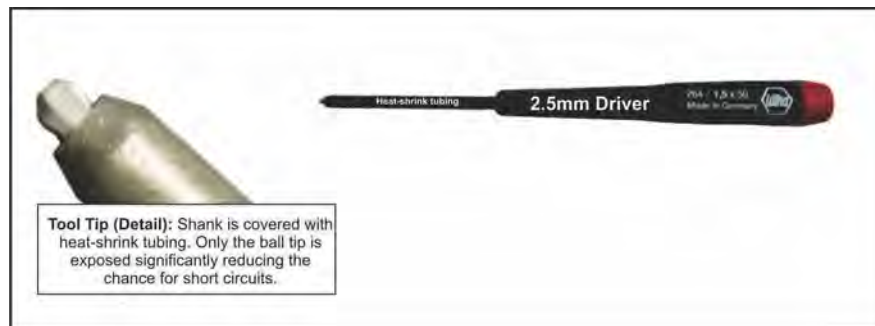


Figure 3-6 Convergence Tools

- Typically the blue image component can be used as the fixed reference, so no adjustment is required. However, if you need to adjust the blue image component it is easy to adjust, but the side panel must be removed. The recommended normal convergence adjustments are from green to blue and red to green.
- It is recommended that the vertical and rotation adjustment be done first, as they work dependently together and the horizontal adjustment done last.
- Use extreme caution to not damage any components on the board.
- **DO NOT** force the adjustment, there is no reason the board 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.

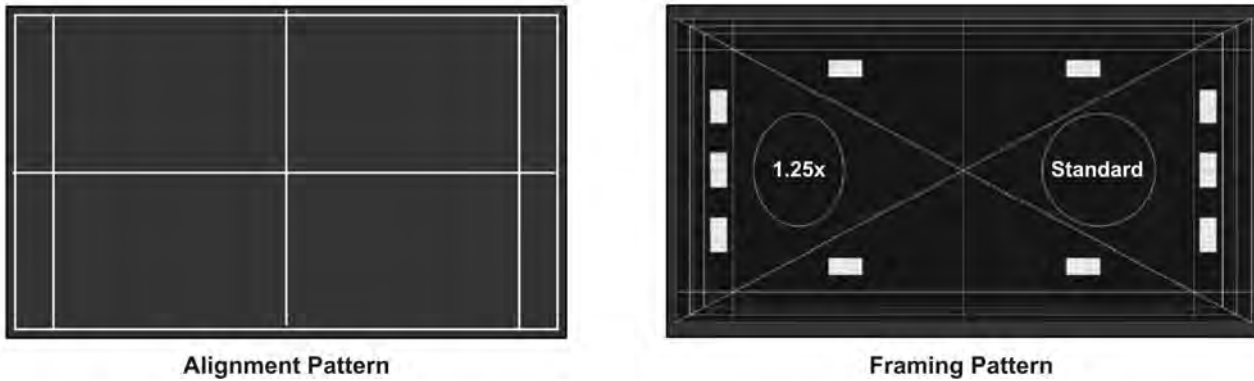


Figure 3-7 Alignment and Framing Pattern

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

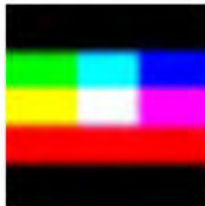
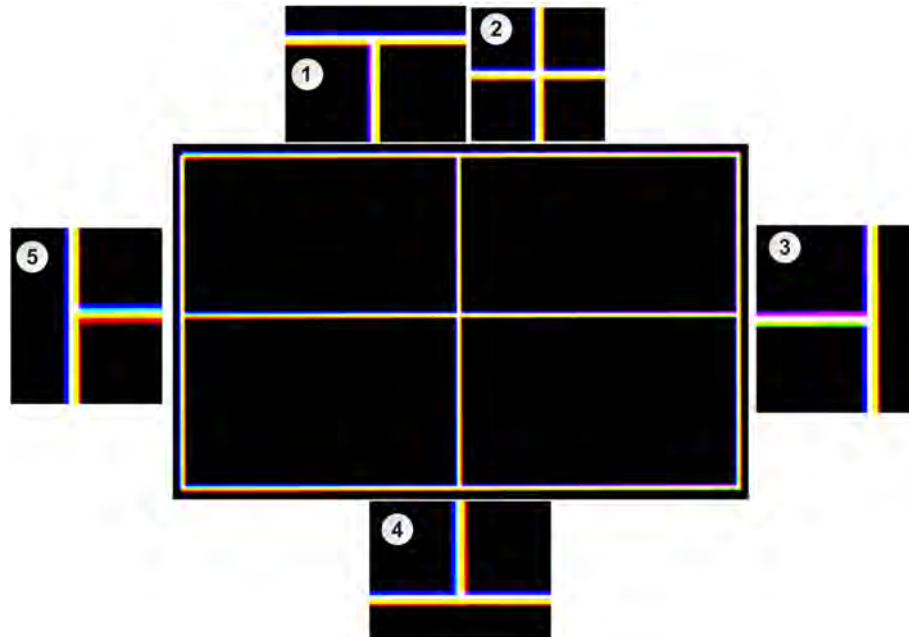


Figure 3-8 Seven Color Possibilities

- 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.



- 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.
- Center:** Shows that Blue is high and to the left and Red is twisted.
- 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.
- 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.
- 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 Red/Green/Blue Formatter Convergence Adjustment Description

⚠ CAUTION

Remove all jewelry (rings, watches, necklaces, bracelets etc.) before adjusting convergence.

NOTE: Do not apply excessive force on the adjustment screws. This might cause the convergence adjustment to become misaligned once you remove the adjustment tool.

The Red and Green Formatters are identical in physical layout and adjuster function. The Blue formatter board is slightly different in physical layout, but the adjustment functions are the same. The vertical and twist adjustments interact with each other on the horizontal axis, as described in **Figure 3-10**.

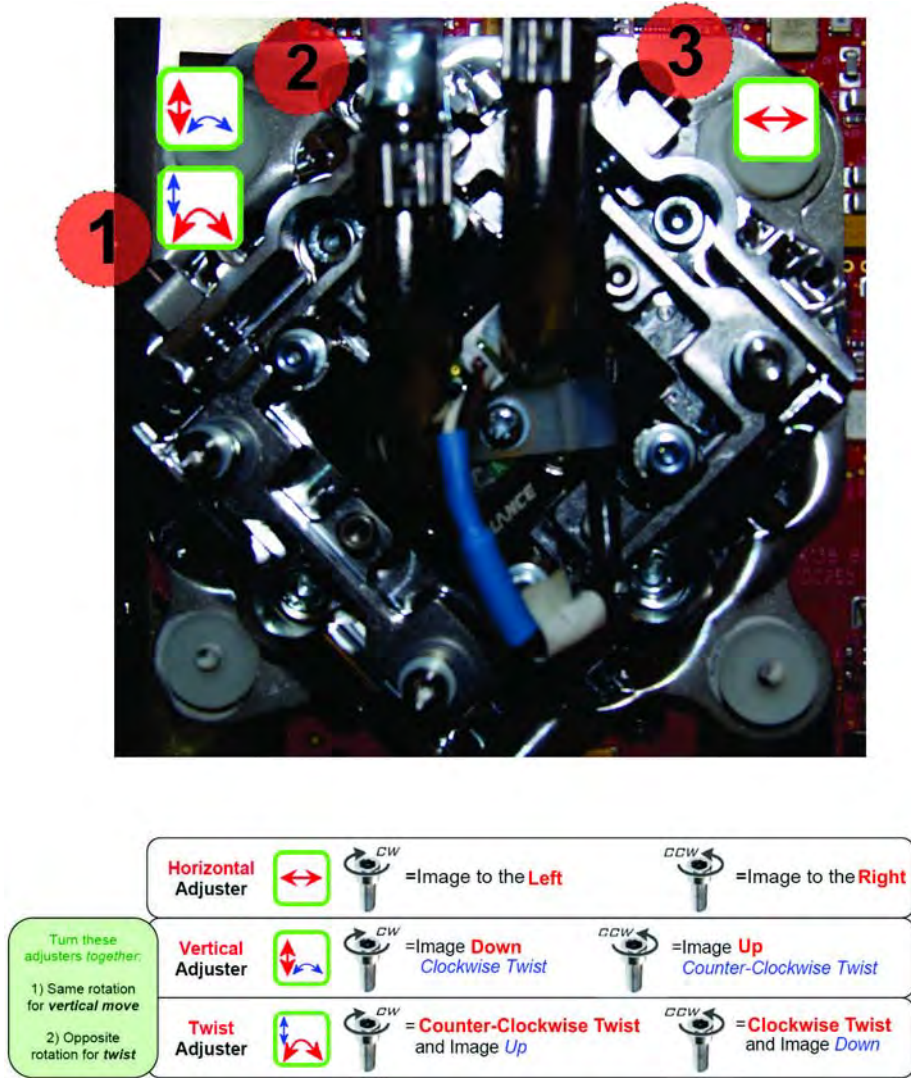


Figure 3-10 Red/Green/Blue Formatter Convergence Adjustment

The physical layout of the 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.

- Remove the Light engine air filter and fan pack to access the blue convergence adjustment screws. For details, refer to *5.5.1 Light Engine Air Filter, on page 5-12* and *5.6.2 Light Engine Fan Pack (4 fans), on page 5-14*. **NOTE:** Cooling is greatly affected by removing the filter and fan pack assembly.

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.

It is a good idea to locate the shorter blade 2.5mm driver on adjusting screw #2 (especially on the red), and use the longer blade 2.5mm driver for screw#1 and horizontal (screw #3).

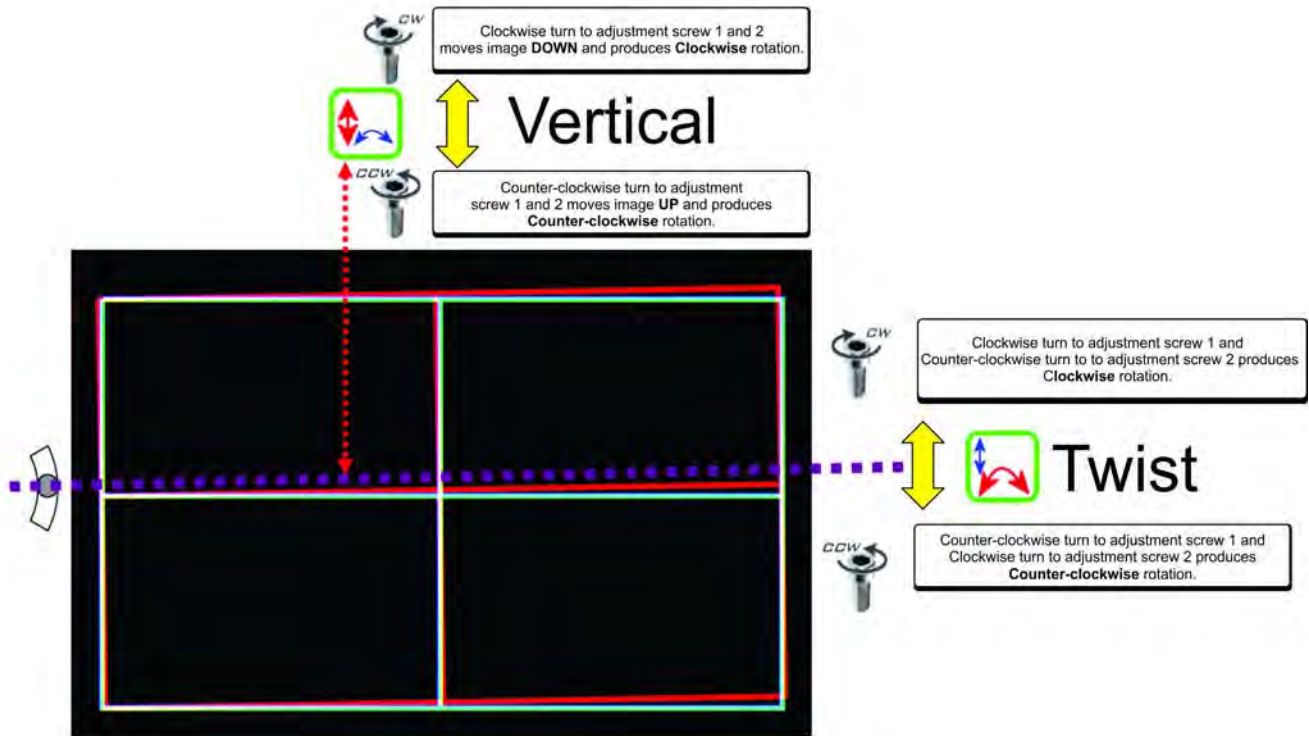


Figure 3-11 Red/Green/Blue Formatter Twist and Vertical Adjustments

Section 3: Service Setups

- The horizontal adjustment screw is independent of the vertical and twist adjustments.
- It is a good idea to locate the twist adjustment screw with the 2.5mm Allen® driver and leave it in place, resting against the lens mount/formatter board.
- A second driver can be inserted and removed to adjust the horizontal/twist adjustment screw or the vertical adjustment screw.

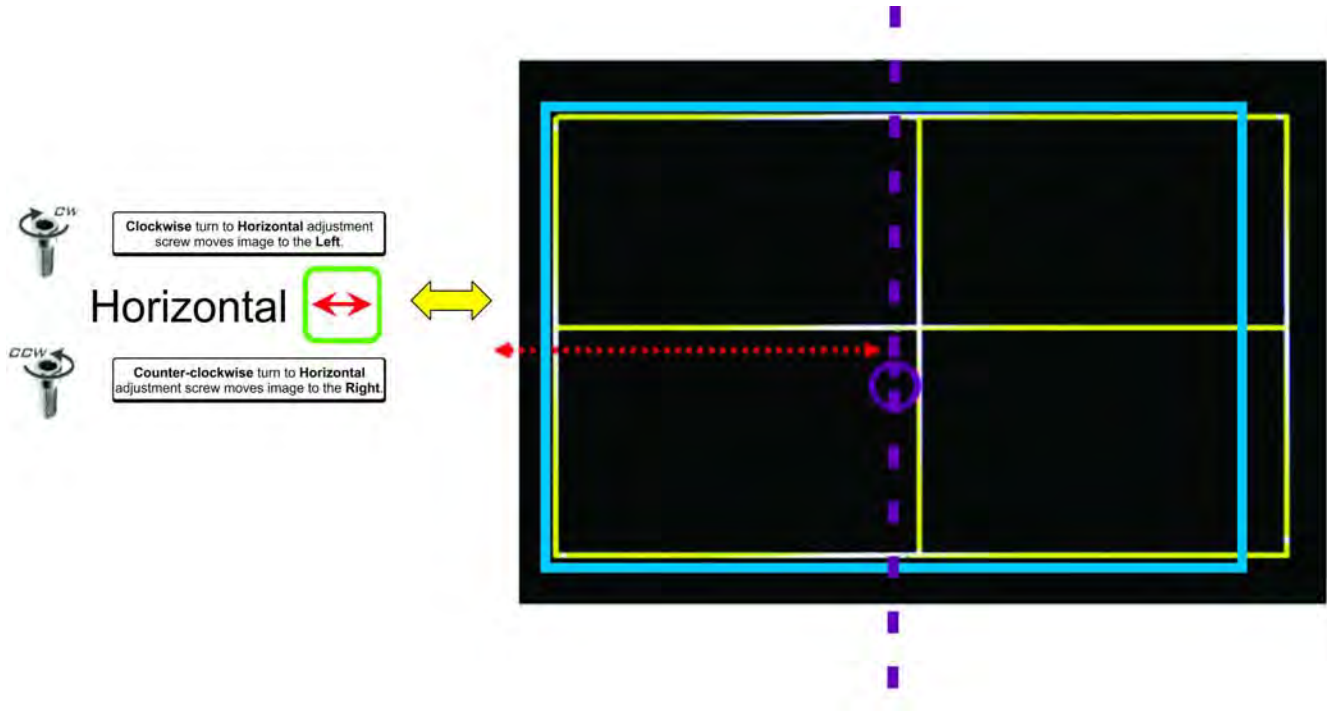


Figure 3-12 Red/Green/Blue Formatter Horizontal Adjustments

3.5.4 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 3-13** should be perfectly aligned showing solid white pixels, as shown in the simplified diagram. (**Figure 3-13**)
 - b. The Red should be evenly 1/4 to 1/2 a pixel out all the way around the outer area not highlighted in **Figure 3-13**, showing cyan (green+blue) towards the center of the screen, as shown in the simplified diagram. (**Figure 3-13**)
 - c. Green and Blue should always be perfectly aligned to each-other (to within 1/4 pixel total in one or a combination of directions.)

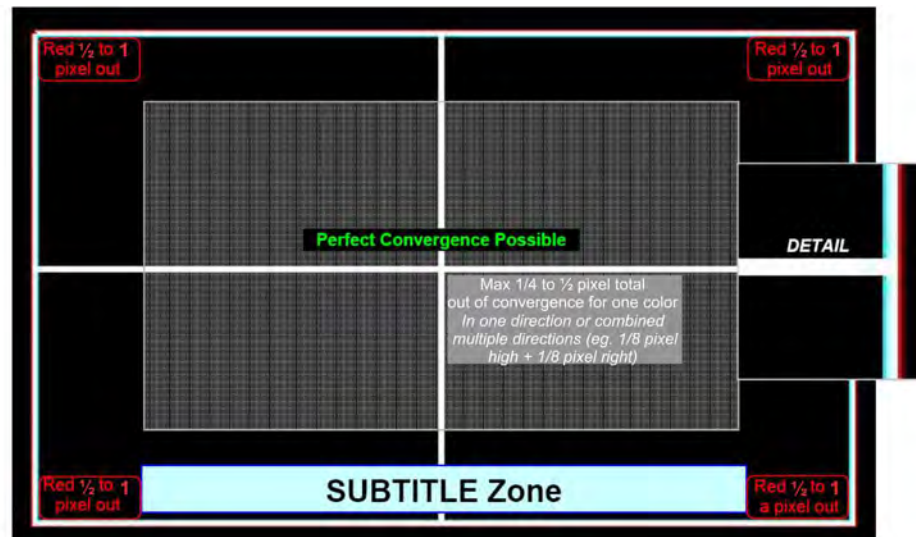


Figure 3-13 Best Possible Convergence

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 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 engage the projector's married condition. The left column of the **Marriage** window shows which state you're currently at in the marriage process. (Figure 3-14) Tap the **Next/Prev** buttons to navigate the series of steps.

NOTE: Only Christie authorized service technicians can engage the projector's 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. Tap the **Next** button to proceed to the **Marriage Checklist** window.
2. In the **Marriage Checklist** window (Figure 3-14), 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. Tap the **Next** button to proceed to the **Arming** window.

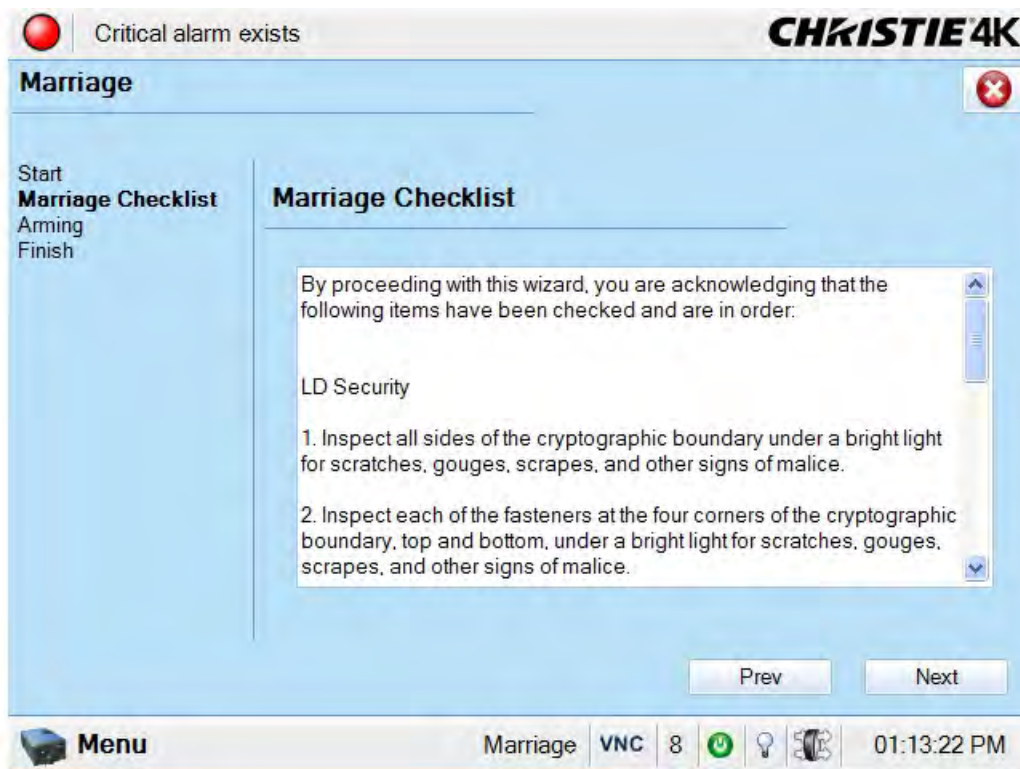


Figure 3-14 Administrator Setup: Marriage Checklist Window

- In the **Arming** window, tap the **Arm Marriage** button. (Figure 3-14). A 30 second count-down timer begins. (Figure 3-15). 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.

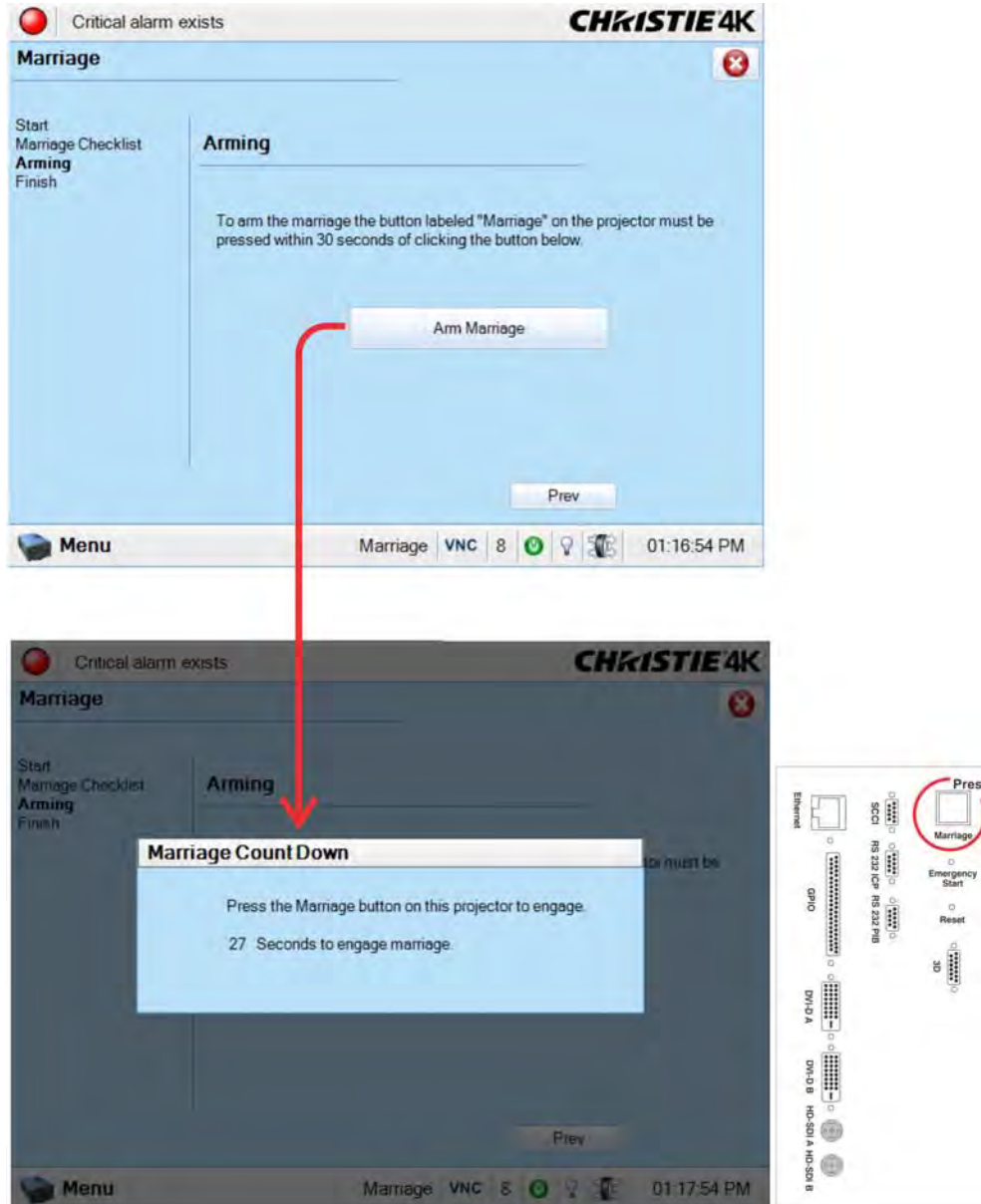


Figure 3-15 Press Marriage Button on PI Board after tapping Arm Marriage Button

- The **Finish** window states if the marriage was successful or not. Tap 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. Tap the **Next/Prev** buttons to navigate the series of steps.

3.7.1 Steps to Install an Upgrade Package

1. Access the Upgrade Package using ONE of the following processes:
 - Insert the USB drive containing the upgrade package into one of the USB ports at the back of the TPC. Open the back cover to reveal the USB ports. Navigate to the **Administrator Setup: Marriage** window and tap the **Upload** button. (**Figure 3-16**). 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 (ftpuser) and password (cds-ftp). 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 3-16**). Select the upgrade package and tap the **Next** button to advance to the **Extraction** window.
2. The **Extraction** window shows the progress of extracting, decrypting, and verifying the files. On any failure, the upgrade process will display an error dialog and then bring you back to the **File Selection** window. On successful extraction of the package, the upgrade process will automatically advance to the **Package Details** window. Once the extraction is complete, you can remove the USB drive.
3. The **Package Details** window shows the versions of all components installed in the projector. (**Figure 3-17**). Select the type of install to perform: **Upgrade Different Packages Only**, **Force Upgrade All**, or **Factory Defaults Install** and tap the **Next** button to advance to the **Installation** window.
4. The **Installation** window displays the state of the upgrade progress. (**Figure 3-18**). On successful completion or failure of the installation, a dialog will display indicating the state of the upgrade. Tap 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, tap the **Finish** button to return to the **Main** panel.

3.7.2 Upgrade: File Selection Window

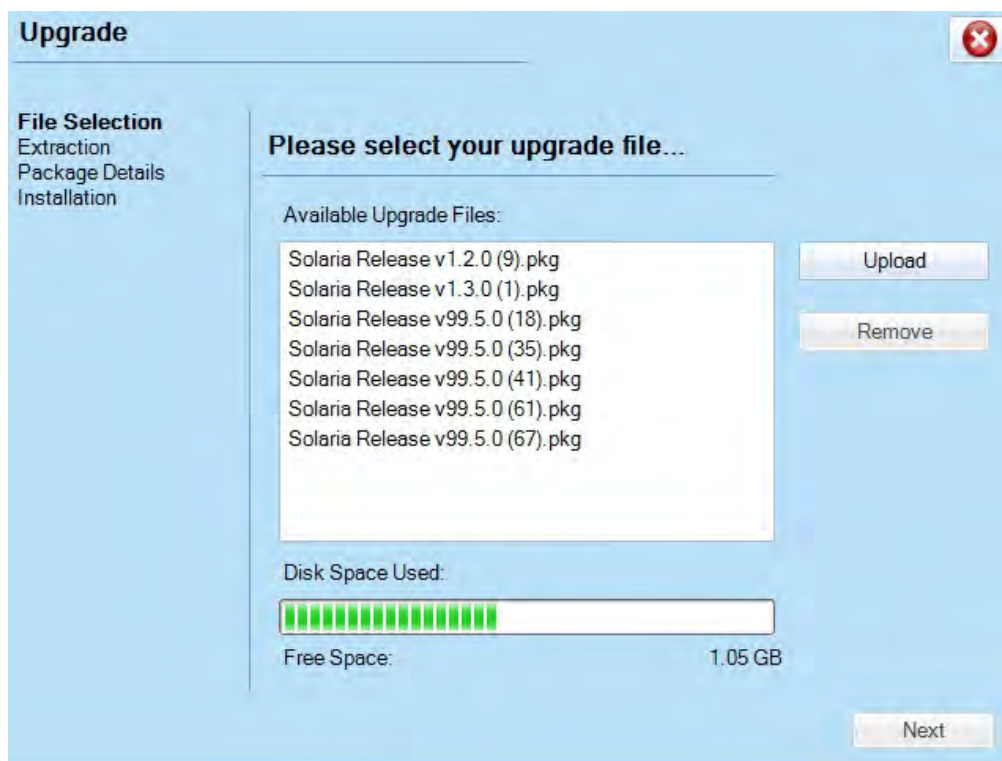


Figure 3-16 Upgrade: File Selection Window

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	Tap 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 tap 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

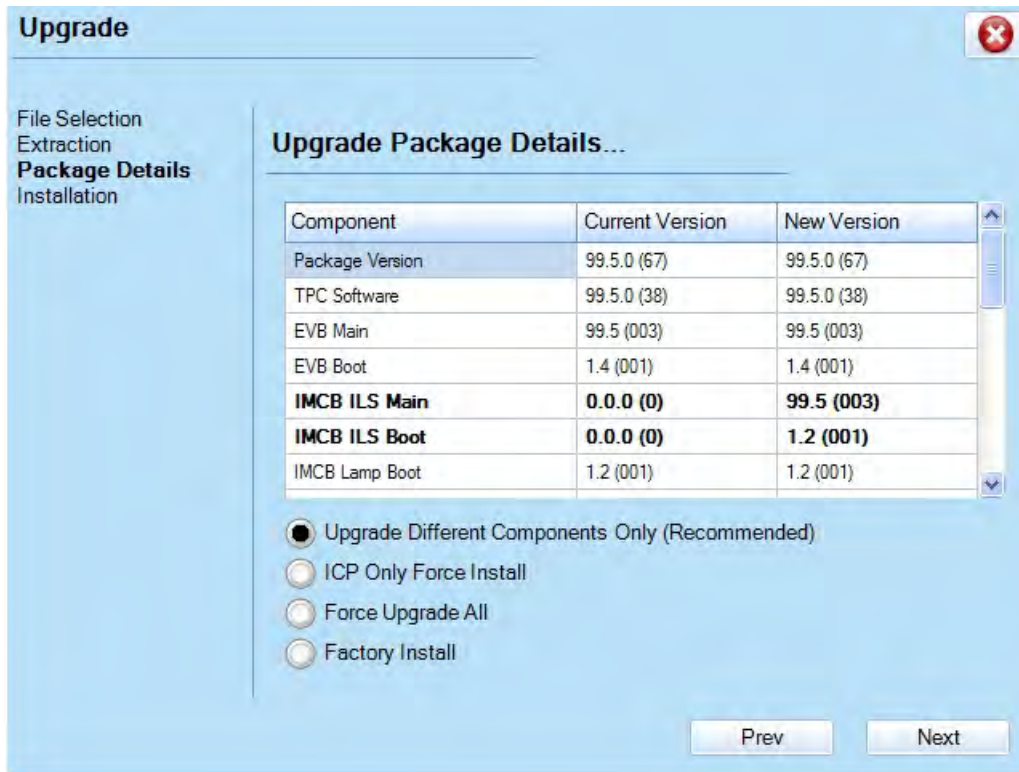


Figure 3-17 Upgrade: Package Details Window

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 Packages Only	This selection instructs the upgrade system to only upgrade components that are newer or older than the currently installed version. This is the default and recommended upgrade method.
Force Upgrade All	This selection instructs the upgrade system to upgrade all components found in the upgrade package. Components with the same version will also be upgraded.
Force Defaults Install	This selection instructs the upgrade system to clear all configurations and upgrade all components on the system. This is equivalent to the projector when it's released from the factory.

3.7.4 Upgrade: Installation Window

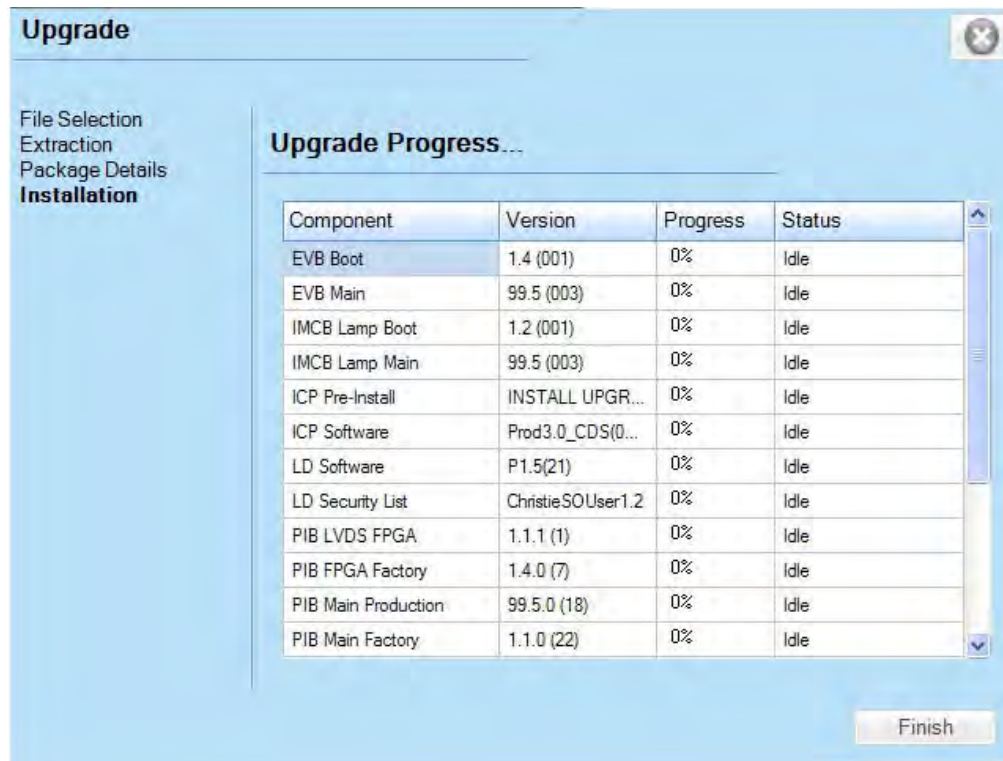


Figure 3-18 Upgrade: Installation Window

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 3-19**) 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 3-19 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 CP4230 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 Christie authorized 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.

4.1 Projector Does Not Power ON

1. Check the wall circuit breaker to see if it's ON. If there is a problem with the wall circuit breaker "tripping" OFF, have a certified electrician investigate any electrical problem.
2. Check the status of the LEDs on the rear corners of the projector. (**Figure 4-1**). If there is no activity, see #3.
3. Verify power by looking through the rear, right side grill. One LED should be present in the upper right. This indicates the LVPS has power. Another LED should be seen in the lower left indicating Main input.

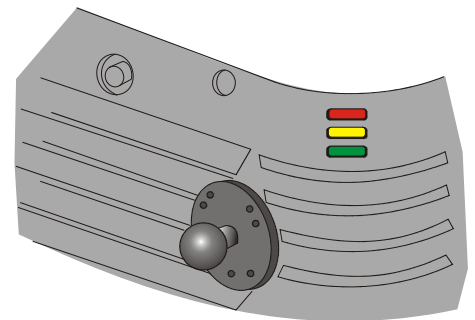
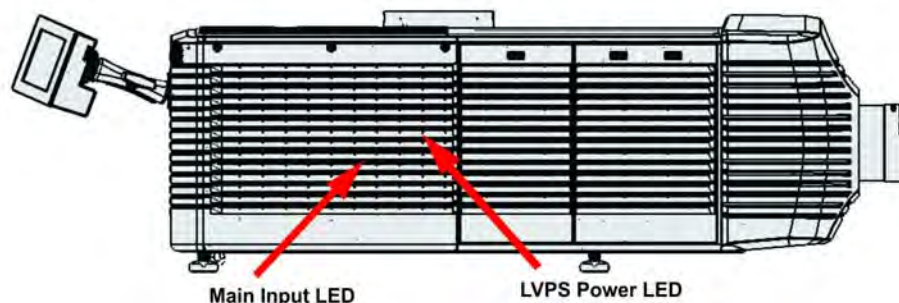


Figure 4-1 Projector Status LEDs



- On the TPC, verify in the **Operational Status** region of the **Main** panel that there is no failure with PIB communication (PIB Status).

4.2 Lamp

4.2.1 Lamp Does Not Ignite

- Verify the hours currently on the lamp. If the hours are close to the typical lamp life, replace the lamp.
- Check for interlock failures. From the Main panel on the TPC, tap the LED in the top, left corner to open the Status window. Alternatively, tap the Menu button and select Status. With the Status window open, tap Interlocks. If a failure is shown, interlock needs to be cleared before the lamp will light.
- For EVB communication failures, re-boot and try again.
- If the **All Alarms** field of the **Status** window shows a Lamp Power Supply (LPS) communication problem, re-boot the projector and try turning the lamp ON again.
- Check for an alarm condition. From the Main panel, tap the LED in the top, left corner to open the Status window. Tap Temperatures. If a DMD temperature is too high, the lamp will not ignite. Cool the projector and try again. Ensure there is proper ventilation, air filters are not blocked and liquid cooling reservoir has coolant and is circulating.
- Listen for a “clicking” noise to indicate the LPS is attempting to strike the lamp. If the lamp does not ignite after the second attempt, check the power level of the lamp in the Advanced Setup: Lamp Power/LiteLOC Setup window. The lamp power may be too low, especially if the bulb is old. If the lamp power is acceptable, replace the lamp. For more information, refer to [Figure 5-59 Install New Lamp, on page 5-40](#). Alternatively, if you hear a brief “click”, but no light appears, the lamp likely needs replacement. If you do not hear anything, it may indicate a problem with the LPS (Christie-trained service required).



4.2.2 Lamp Suddenly Goes OFF

1. Check the lamp power in the **Advanced Setup: Lamp Power / LiteLOC Setup** window. Try increasing the lamp power. **NOTE:** *Older lamps may not reliably operate at significantly lower than rated power.*
2. An interlock may be interrupting lamp function. From the **Main** panel, tap the LED in the top, left corner to open the **Status** window. Tap **Interlocks**. If a failure is shown, interlock needs to be cleared before the lamp will light. Also, ensure that extractor fans are powered.
3. The DMDs may be overheated. Check for an alarm condition. From the **Main** panel, tap the LED in the top, left corner to open the **Status** window. Tap **Temperatures**. If a DMD temperature is too high, the lamp will not ignite. Cool the projector and try again. Ensure there is proper ventilation, air filters are not blocked and liquid cooling reservoir has coolant and is circulating.
4. Replace the lamp. For more information, refer to [Figure 5-59 Install New Lamp, on page 5-40](#).

4.2.3 Flicker, Shadows Or Dimness

1. Ensure the douser is OPEN completely.
2. LampLOC™ may need re-adjustment.
3. LampLOC™ may be in the middle of its adjustment. Wait until LampLOC™ completes.
4. Adjust LampLOC™. In the **Advanced Setup: LampLOC Setup** window, tap the **Do Auto** button.
5. Check the lamp power in the **Advanced Setup: Lamp Power / LiteLOC Setup** window to see if the power is consistent or varying. Try to increase lamp power, if possible. Lamps which are near end of life may not operate reliably at lowest power range.
6. Fold mirror misalignment (Christie service required).
7. Integrator rod misalignment (Christie service required).

4.2.4 LampLOC™ Does Not Seem to Work

1. If the **Do Auto** button of the LampLOC™ function does not work in the **Advanced Setup: LampLOC Setup** window, try adjusting the lamp position manually by tapping the **up/down/left/right/in/out** buttons in the LampLOC region. Watch the light level for changes indicating lamp movement, both on the TPC readout and on screen with a white test pattern.
2. If the motors do not respond, you can position the lamp manually. **UV danger. Qualified service technician only.** Turn OFF and cool down the lamp completely. Open the door with the proper safety equipment and then manually adjust the motors to ensure that they are free and moving smoothly.
3. If the lamp runs dim or the image displays poor uniform brightness, do the following:
 - Check that the anode yoke (lamp yoke) is in the correct position. (Figure 4-2)
 - Check that the flat part of the anode end of the lamp (if applicable) faces up in the anode yoke. For CDXL-20 and CDXL-30 lamps, the flat part of the anode end of the lamp should be positioned at the 2 or 10 o'clock position.

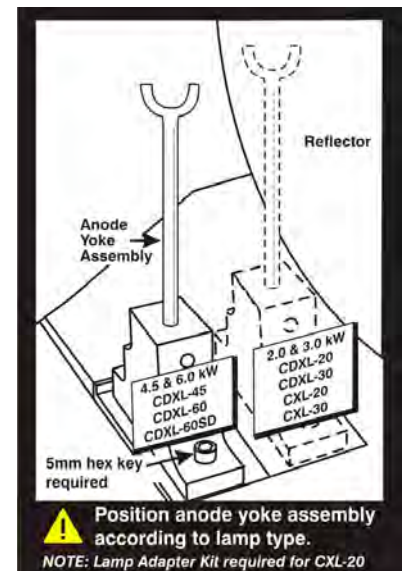


Figure 4-2 Lamp Yoke Position

4.2.5 LiteLOC™ Does Not Seem to Work

1. In the **Advanced Setup: Lamp Power/LiteLOC™ Setup** window, ensure LiteLOC™ is enabled.
2. If the lamp power has increased to its maximum in order to maintain a LiteLOC™ setting, LiteLOC™ is automatically terminated. If the values shown in the **Advanced Setup: Lamp Power/LiteLOC™ Setup** window indicate that the lamp power has reached this “over-drive” state, either reduce your LiteLOC™ setting or install a new lamp.

4.3 TPC

1. If the TPC fails to initialize, re-boot the projector.
2. A failed TPC usually indicates a system failure requiring service.
3. If the TPC display is blank, touch the display screen to disable the screen saver. If the display screen is still blank, ensure the TPC is on by opening the flap at the back of the TPC and verify the grey button in the bottom left corner is ON. Also ensure that the connector is securely plugged into the back of the projector.
4. If the locations of button presses on the screen seem to be misinterpreted, the TPC screen may need recalibrating. In the **Administrator Setup: Preferences** window, tap the **Calibrate Screen** button and follow the onscreen instructions.

4.4 Ethernet

4.4.1 Trouble Establishing Communication with Projector

Ensure Ethernet settings are valid for the site. All devices should have the same subnet mask yet unique IP addresses.

4.5 Displays

Some of the following troubleshooting entries assume the use of a third-party input source for displaying alternative “non-cinema” material. Before proceeding, ensure to consult the documentation supplied with the external equipment.

4.5.1 Blank Screen, No Display of Cinema Image

1. Ensure the lens cap is not on either end of the lens.
2. Ensure the lamp is **ON**.
3. Confirm all power connections are still OK.
4. Ensure the douser is **OPEN** by verifying the state of the douser on **Main** panel as well as the state of the douser switch at the back of the projector in the top, left corner.
5. Ensure any test pattern other than the full black test pattern displays properly.
6. Is the correct display file selected?
7. Is the correct cinema port connected for this display file (i.e., 292-A or 292-B)?
Check connections.

4.5.2 Severe Motion Artifacts

Most likely there is a synchronization problem with reversed 3-2 pull-down in 60 Hz-to-24 Hz film-to-digital conversion in your source. The display file needs correction.

4.5.3 Image Appears Vertically Stretched or ‘Squeezed’ into Center of Screen

Source data converted from film and “pre-squeezed” for the CP4230 display format may require use of an anamorphic lens (or resizing) to regain full “scope” image width and proper proportions. Verify the Resolution and Aspect Ratio settings in the **Advanced Setup: Source File Setup** window as well as the Lens Factor in the **Advanced Setup: Screen File Setup** window.

4.5.4 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.

4.5.5 No Image, Just Solid Black or Green Display

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.

4.5.6 Colors in the Display are Inaccurate

The color, tint, color space and/or color temperature settings may require adjustment at your input source or in the **Channel Setup: Config 2** window. Ensure the correct **PCF**, **TCGD** and **Color Space** file for the source are used.

4.5.7 Display is Not Rectangular

1. Check the leveling of the projector. Ensure the lens surface and screen are parallel to one another.
2. Check the vertical offset. Adjust as necessary using the vertical offset knob or ILS.
3. Check that the anamorphic lens is straight. Rotate to orient aperture correctly.
4. Check the screen file. For more information, refer to the *CP4230 User Manual (P/N: 020-100621-xx)*.

4.5.8 Display is "Noisy"

1. Display adjustment at your input source may be required. From a DVD player or an input module setting, adjust pixel tracking, phase and filter. Noise is particularly common on YPbPr signals from a DVD player.
2. The video input may not be terminated. Ensure the video input is terminated (75 ohms). If it is the last connection in a loop-through chain, the video input should be terminated at the last source input only.
3. The input signal and/or signal cables carrying the input signal may be of poor quality.
4. If the distance between the input source device and the projector is greater than 25 feet, signal amplification/conditioning may be required.
5. If the source is a VCR or off-air broadcast, detail may be set too high.

4.5.9 Display has Suddenly Frozen

If the screen blacks out inexplicably, it is possible that excessive voltage noise on the AC or ground input has interrupted the projector's ability to lock on to a signal. Power down the projector and then power back up again.

4.5.10 Data is Cropped from Edges

To display the missing material, reduce image size to fill the display area available in the projector, then stretch vertically to fill the screen from top to bottom. Add the anamorphic lens to regain image width. Cropping could also be due to the screen file selected that has cropping configured. In both scenarios, refer to the *CP4230 User Manual (P/N: 020-100621-xx)* for more information.

4.5.11 The Projector is ON, but There is No Image

1. Ensure AC power is connected.
2. Make sure the lens cover is removed from the lens.
3. Make sure the douser is **OPEN**.
4. If the lamp is not ignited, tap the **LAMP ON** button. If the lamp does not strike, refer to [4.2.1 Lamp Does Not Ignite, on page 4-2](#).
5. Ensure the correct channel is selected with the appropriate configurations in the **Channel Setup: Config 1** window.
6. Ensure an active source is connected properly. Check the cable connections and make sure the alternative source is selected.
7. Can you access test patterns? If so, check your source connections again.

4.5.12 The Display is Jittery or Unstable

1. If the non-cinema display is jittery or blinking erratically, ensure that the source is properly connected and is offering adequate quality for detection. With a poor quality or improperly connected source, the projector will repeatedly attempt to display an image, however briefly.
2. The horizontal or vertical scan frequency of the input signal may be out of range for the projector. Refer to *Section 9 Specifications* for scan frequency ranges.
3. The sync signal may be inadequate. Correct the source problem.

4.5.13 The Display is Faint

1. The source may be double terminated. Ensure the source is terminated only once.
2. The source (if non-video) may need sync tip clamping.

4.5.14 The Upper Portion of the Display is Waving, Tearing or Jittering

This can occur with video or VCR sources. Check your source.

4.5.15 Portions of the Display are Cut OFF or Warped to the Opposite Edge

Resizing may need adjustment. Adjust until entire image is visible and centered. For more information, refer to the *CP4230 User Manual (P/N: 020-100621-xx)*.

4.5.16 Display Appears Compressed (Vertically Stretched)

1. The frequency of the pixel sampling clock is incorrect for the current source.
2. Sizing and positioning options may be adjusted poorly for the incoming source signal.
3. Use an anamorphic lens for typical HDTV and anamorphic DVD sources that have been re-sized and vertically stretched, via 3rd-party software.

4.5.17 Display Quality Appears to Drift from Good to Bad, Bad to Good

1. The source input signal may be of low quality.
2. The H or V frequency of the input may have changed at the source end.

5 Parts and Module Replacement

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

- Projector Model
- Projector Serial Number
- Manufacture Date

5.1 INDEX OF PARTS AND MODULES

All replacement parts and accessories for CP4230 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-45SP (4.2KW Xenon)	003-004253-02
CDXL-45 (4.2KW Xenon)	003-000600-03
CDXL-60SP (6.0kW Xenon)	003-004254-02
CDXL-60 (6.0kW Xenon)	003-000601-03
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)	003-003303-01
AC Line Filter (30A)	003-000323-02
AC Relay (230V AC 30A)	003-001209-01
Igniter 7kW	003-120085-01
Lamp Power Supply, 7kW	003-000320-02
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	03-005027-52P
Fold Mirror	03-005028-51P
Illumination Optics System (IOS) (does not include integrator or LiteLoc™)	003-101789-02
Integrator Assembly (includes holder & nitrile gloves)	003-102035-01
UV Filter	03-008003-61P
Yellow Notch Filter (1 filter & disposable nitrile gloves)	03-008004-52P
Light Engine	003-102043-01
Lamp Adjust Assembly	003-101631-01

Table 5.4 PCB Assemblies

Part Name/Description	Christie Service Kit Part #
Backplane PCB	003-111469-01
Environmental Board (EVB)	003-111059-02
ICP PCB	003-101342-04
Integrated Motor Control Board (IMCB)	003-111426-01
Light Engine Quick Disconnect PCB (LEQD2)	003-102056-XX
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)	003-110827-02
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)	003-110827-02
Fan - Main AC Blower (230V)	03-000158-61P
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)	003-101618-01
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	003-003795-01
Flex Cables	003-003630-01
Interlock Switch	003-001559-01
Lamp Door Interlock	003-001526-01
Lamp Reflector	03-240115-51P

Part Name/Description	Christie Service Kit Part #
Lens Mount Manual	003-102333-01
Liquid Cooling Assembly	003-101327-01
Low Security Lock	003-003081-01
Pump Assembly (12VDC)	003-111198-01
Slide Assembly (10mm, part of lens mount)	003-101198-01
Stepper Motor	003-111326-01
Touch Panel Controller (TPC)	003-102075-01
TPC Harness	003-111169-01
Vane Switch - Exhaust	003-001208-01
Extractor Duct	003-003699
Vane Blower Bracket	003-003700-XX

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
1.45-1.8:1 DLPCine HB Zoom Lens	108-275101-01
1.6-2.4 DLPCine HB Zoom Lens	108-336103-01
1.8-2.4:1 DLPCine HB Zoom Lens	108-276101-01
1.8-3.0 DLPCine HB Zoom Lens	108-337104-01
2.15-3.6 DLPCine HB Zoom Lens	108-278101-01
2.15-3.6:1 DLPCine HB Zoom Lens	108-338105-01
2.2-3.0:1 DLPCine HB Zoom Lens	108-277101-01
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)	38-809054-01/51
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
High-Contrast Internal Aperture Kit	38-813028-51
Motorized Auxiliary Lens Mount	108-111101-xx/ 108-111102-xx
Protective Clothing Safety Kit (Kevlar gloves, flack jacket, face shield)	598900-095
Rack Stand	108-282101-02

5.2 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.

5.3 REPLACEMENT PROCEDURES

5.3.1 Tools Required

- Keys for security locks (includes Low and High Security Keys)
- Convergence Tool Set
- Long and stubby neck magnetic-tip Phillips™ screwdrivers - #1, #2
- Hex keys: 3mm, 5mm
- Nut driver: 7mm
- Ratchet: 17mm
- 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

5.3.2 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.

5.4 Removing Projector Covers

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

5.4.1 Shroud

Remove the shroud as follows:

1. Using finger pressure, push down on the locations specified (Red Arrows). See **Figure 5-1**.
2. Carefully slide the shroud sideways and forward away from the MLM and lens.
3. Place the shroud covers on a clean service to prevent scratches.

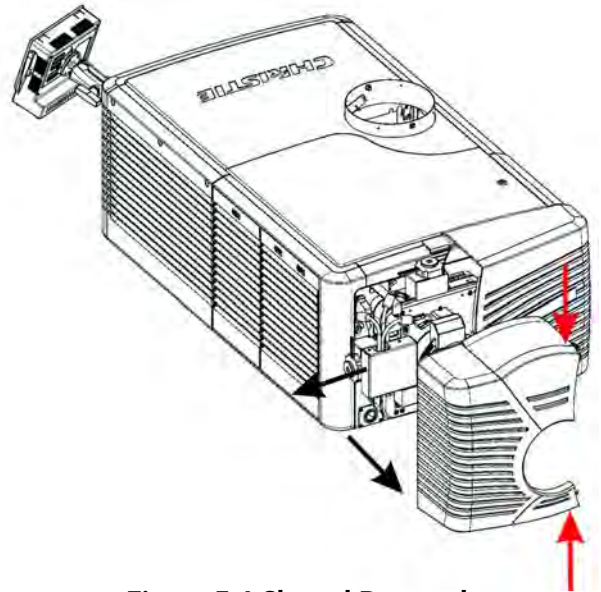


Figure 5-1 Shroud Removal

5.4.2 Front Top Lid

Remove the top lid to gain access to the liquid cooling system, the IOS for integrator adjustments and the high security lid.

(Estimated Replacement Time: 2 minutes)

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

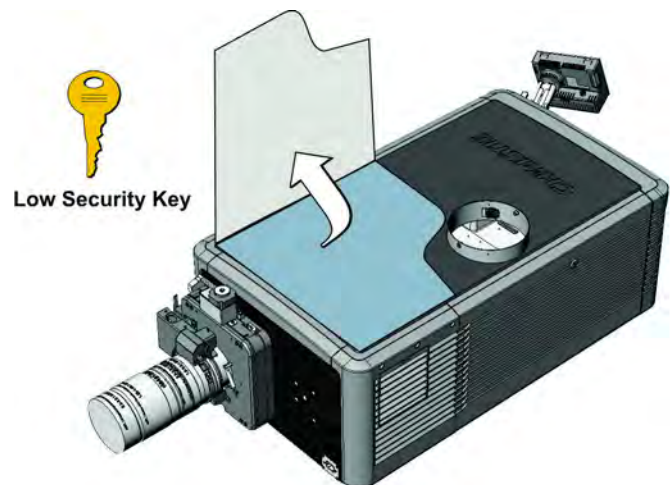


Figure 5-2 Front Top Lid

5.4.3 High Security Lid

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.**

(Estimated Replacement Time: 2 minutes)

1. Remove front top lid. Refer to [5.4.2 Front Top Lid, on page 5-6](#).
2. Using the high security key, unlock the high security lid. **(Figure 5-3)**
3. Lift the lid up and remove.



High Security Key

Figure 5-3 High Security Lid

5.4.4 Rear Right Skin (ignitor/blower compartment)

The rear right skin is held in place by three captive screws. Removing this skin provides access to the igniter, lamp blower, lamp blower interlock, LVPS and AC relay.

(Estimated Replacement Time: 2 minutes)

1. Using a #2 Phillips™, loosen the three captive screws. **(Figure 5-4)**
2. Lift the skin up and out to remove.



Figure 5-4 Rear Right Skin

5.4.5 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 XP-based operating system.

(Estimated Replacement Time: 4 minutes)

1. Disconnect the TPC harness from the connector on the projector's back cover.

Note: Disconnecting the TPC harness will also reset the TPC.
2. Loosen the TPC mounting arm just enough to remove the TPC assembly from the ball joint at the back of the projector.
3. When replacing, repeat instructions in reverse. **(Figure 5-5)**



Figure 5-5 TPC

5.4.6 Rear Skin

(Estimated Replacement Time: 4 minutes)

1. Remove the TPC. Refer to [5.4.5 Touch Panel Controller \(TPC\)](#), on page 5-8.
2. Using a #2 Phillips™, loosen the three screws securing the back cover to the chassis. **(Figure 5-6)**
3. Tilt and lift the back cover just enough for the bottom tabs to clear the frame and remove.
4. When reinstalling, align the bottom tabs and reverse the above instructions.

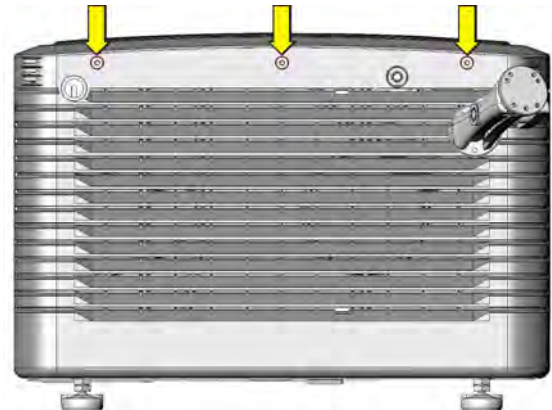


Figure 5-6 Remove Back Cover

5.4.7 Left Access Cover

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

(Estimated Replacement Time: 4 minutes)

1. Using a #2 Phillips™, loosen the three captive screws at the top of the cover. **(Figure 5-7)**
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.

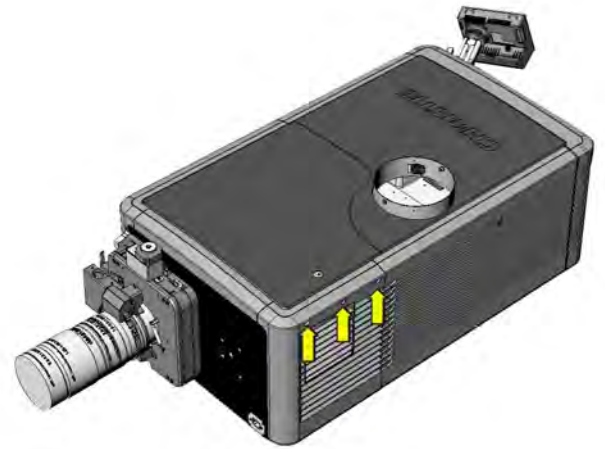


Figure 5-7 Remove Left Access Cover

5.4.8 Lamp Door

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.

(Estimated Replacement Time: 4 minutes)

1. Unlock and open the lamp door. **(Figure 5-8)**
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) towards the inside of the door.

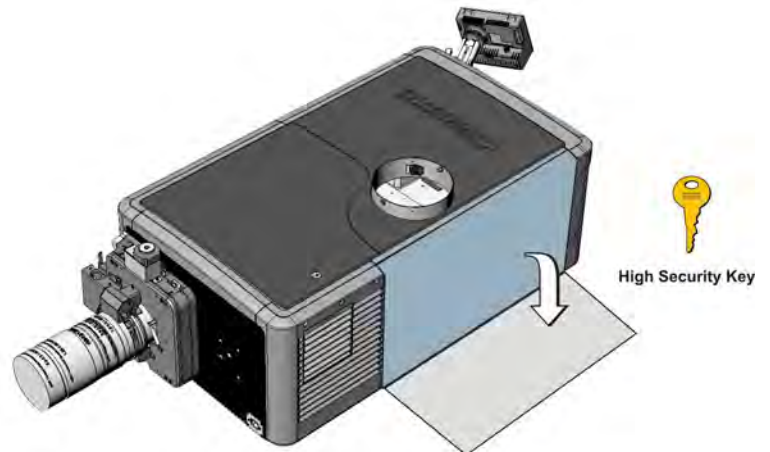


Figure 5-8 Open Lamp Door

5.4.9 LVPS/LPS Cover

Remove the LVPS/LPS cover on the operator side (right) of the projector to access the lamp power supply (LPS) connections, AC Relay and LVPS.

(Estimated Replacement Time: 4 minutes)

1. Using a #2 Phillips™, loosen the three captive screws from the top of the cover. **(Figure 5-9)**
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 5-9 LVPS/LPS Cover

5.4.10 PIB/ICP Cover

Remove the PIB/ICP cover to access the projector's communications/input panel.

(Estimated Replacement Time: 1 minute)

1. Push down on the cover's center tab. **(Figure 5-10)**
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 the top tab clips into place.

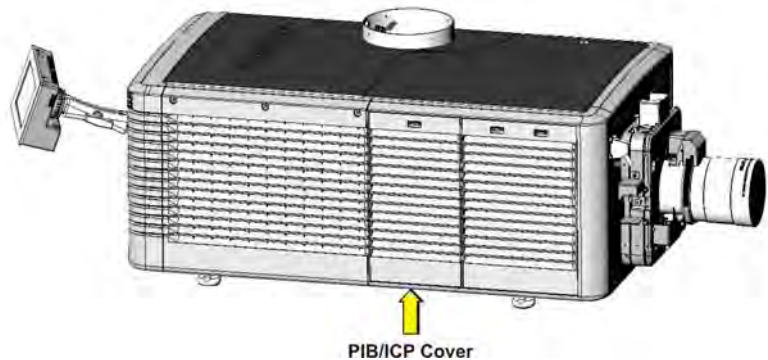


Figure 5-10 PIB/ICP Cover

5.4.11 Access Panel Frame

The Access Panel Frame is located on the operator 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.

(Estimated Replacement Time: 8 minutes)

1. Remove PIB/ICP Cover. **(Figure 5-10)**
2. Remove the light engine air filter cover (including filter). **(Figure 5-13)**
3. Remove the four, #2 Phillips™ screws from the top of the access panel frame securing it to the chassis. **(Figure 5-11)**
4. Tilt the access panel frame a little to the front (lift left side) to clear the LVPS/LPS cover and remove.



Figure 5-11 Access Panel Frame

5.4.12 Rear Top Lid

The rear top lid can be rotated around the exhaust opening. To remove the rear top lid completely the exhaust must be removed.

(Estimated Replacement Time: 10 minutes)

1. Remove external ducting.
2. Remove the front top lid. Refer to [5.4.2 Front Top Lid](#), on page 5-6.
3. Open the lamp door. Refer to [5.4.8 Lamp Door](#), on page 5-9.
4. Remove lamp (if installed). Refer to [5.12.5 Lamp Replacement](#), on page 5-38.
5. Remove the rear right skin. Refer to [5.4.9 LVPS/LPS Cover](#), on page 5-10.
6. Remove the two screws securing the rear lid to the chassis. **(Figure 5-12)**

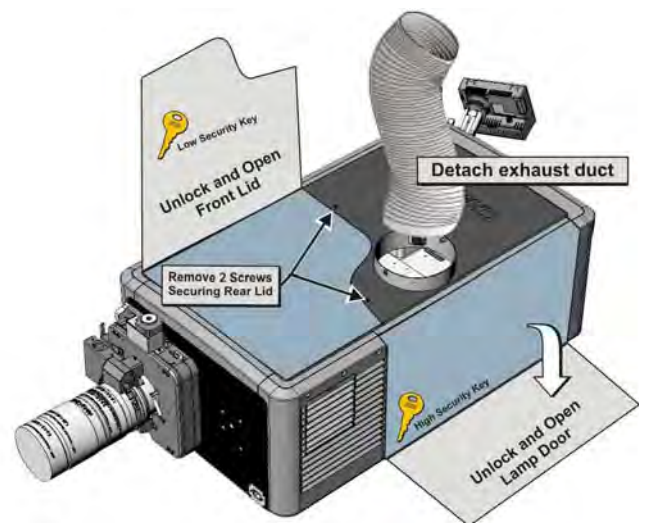


Figure 5-12 Rear Lid

5.5 Air Filters

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.

5.5.1 Light Engine Air Filter

The main air filter of the projector is located on the operator side (right) 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.

(Estimated Replacement Time: 3 minutes)

1. Push down on the two snap tabs at the top of the cover. **(Figure 5-13)**
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.
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.

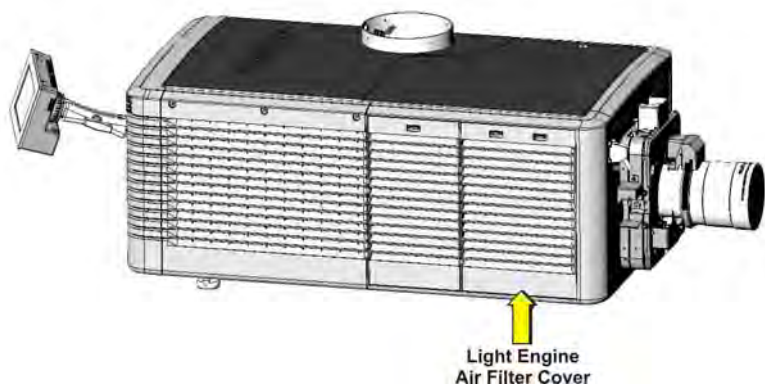


Figure 5-13 Light Engine Air Filter Cover

5.5.2 Radiator Air Filter

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.

(Estimated Replacement Time: 2 minutes)

1. Press down on the snap tab to remove the filter cover. **(Figure 5-14)**
2. Pull cover out and up to remove.
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.

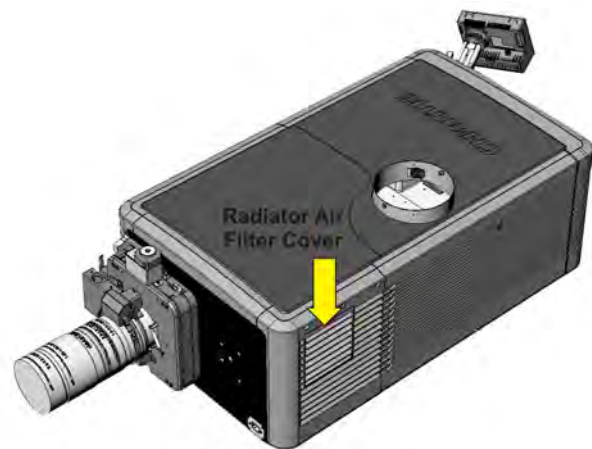


Figure 5-14 Radiator Air Filter Cover

5.5.3 LAD Filter

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.

(Estimated Replacement Time: 4 minutes + 2 minute calibration)

1. Remove the front top lid. Refer to [5.4.2 Front Top Lid](#), on page 5-6.
2. Remove the high security lid. Refer to [5.4.3 High Security Lid](#), on page 5-7.
3. Pull the LAD filter out. **(Figure 5-15)**
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.

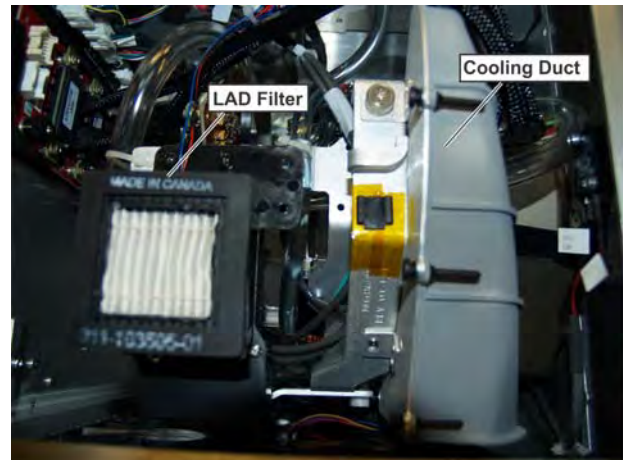


Figure 5-15 LAD Filter

5.6 Fans

5.6.1 LAD Fan

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

(Estimated Replacement Time: 10 minutes + 2 minute calibration)

1. Remove the front top lid. Refer to [5.4.2 Front Top Lid](#), on page 5-6.
2. Remove the high security lid. Refer to [5.4.3 High Security Lid](#), on page 5-7.
3. Using a #2 Phillips™, loosen the two screws securing the LAD fan assembly to the light engine assembly handle. **(Figure 5-16)**
4. Remove the #1 Phillips™ screws securing the filter housing to the plastic frame.
5. Disconnect the LAD Fan harness (Fan 4) from the inline connector.
6. Install a new LAD fan repeating the above instructions in reverse
7. 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.



Figure 5-16 Remove LAD Fan Assembly

8. Re-connect the three LAD hoses.

5.6.2 Light Engine Fan Pack (4 fans)

The light engine fan pack (**Figure 5-17**) is located in the engine compartment behind the access panel frame. A hole in the fan pack allows the bottom screw on the light engine assembly to be loosened without removing the fan pack. It also allows access to the horizontal green convergence screw. The fan pack can also be mounted to the side of the projector once removed.

NOTE: Do not run the projector with the Light Engine Fan Pack removed. This will cause overheating of the SFB FPGA's.

(Estimated Replacement Time: 16 minutes)

1. Remove the front top lid. Refer to [5.4.2 Front Top Lid, on page 5-6](#).
2. Remove the high security lid. Refer to [5.4.3 High Security Lid, on page 5-7](#).
3. Remove the PIB/ICP cover. Refer to [5.4.10 PIB/ICP Cover, on page 5-10](#).
4. Remove the light engine air filter cover and filter. Refer to [5.5.1 Light Engine Air Filter, on page 5-12](#).
5. Remove the access panel frame. Refer to [5.4.11 Access Panel Frame, on page 5-11](#).
6. Remove the two screws from the side of the fan pack. (**Figure 5-18**)
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 bolt screw 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 5-18**)

NOTE: Install a fan with the label side facing into the projector,.



Figure 5-17 Light Engine Fan Pack

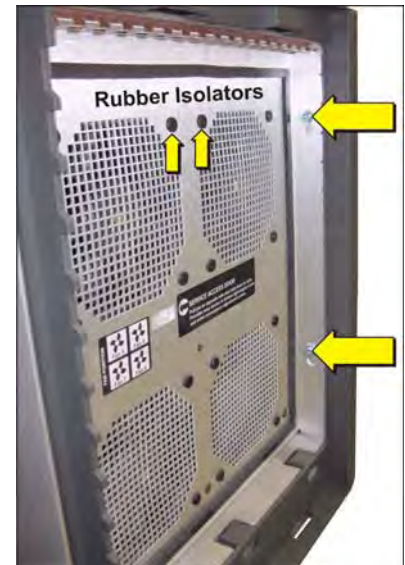


Figure 5-18 Remove Light Engine Fan Pack

5.6.3 Cardcage Intake Fans - Top (2 fans)

The cardcage intake fans are located on top of the cardcage. These fans draw in air responsible for cooling the cardcage electronics. Both fans are plugged into the EVB board and can be replaced individually.

(Estimated Replacement Time: 4 minutes per fan)

1. Remove the front top lid. Refer to [5.4.2 Front Top Lid, on page 5-6](#).
2. Remove the high security lid. Refer to [5.4.3 High Security Lid, on page 5-7](#).
3. Disconnect the two fan harnesses from the EVB board. (**Figure 5-19**)
4. Cut the cable ties and remove the fans from the rubber isolators.

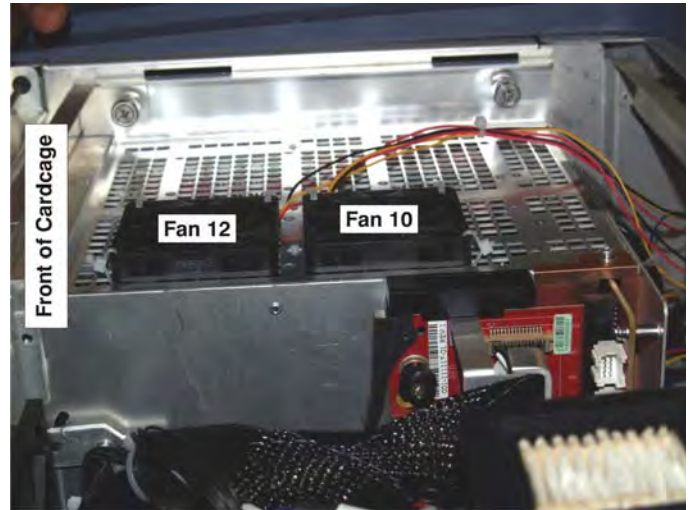


Figure 5-19 Cardcage Intake Fans

5.6.4 Cardcage Exhaust Fans - Bottom (2 fans)

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.

(Estimated Replacement Time: 35 minutes)

1. Remove the front top lid. Refer to [5.4.2 Front Top Lid, on page 5-6](#).
2. Remove the high security lid. Refer to [5.4.3 High Security Lid, on page 5-7](#).

3. Remove PIB/ICP cover. Refer to [5.4.10 PIB/ICP Cover, on page 5-10](#).

4. Remove the cardcage assembly. Refer to [5.9.1 Cardcage Assembly, on page 5-23](#).

5. Using a 3mm hex key, remove the two screws securing the fan compartment cover plate to the base. **(Figure 5-20)**

6. Using a 3mm hex key, remove the four screws securing the bottom cover/fan assemblies to the base. **(Figure 5-20)**

7. Pull the fans off the bottom cover's rubber isolators.

8. Reverse instructions to re-install the bottom cardcage fans. Use needle-nose pliers to pull the rubber isolators through the fan mounting holes.

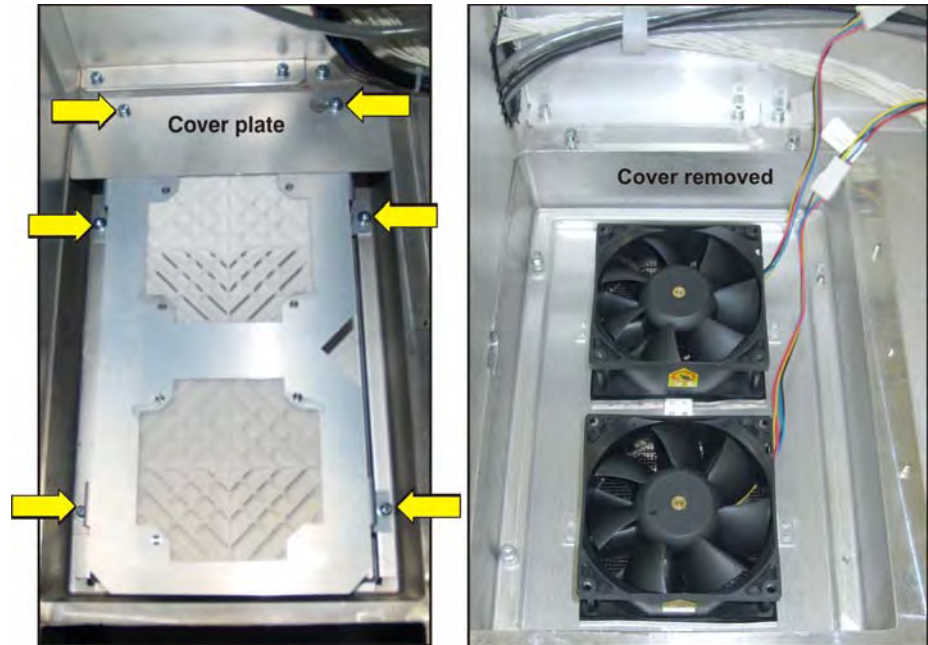


Figure 5-20 Cardcage Exhaust Fans

5.7 Feet

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

(Estimated Replacement Time: 12 minutes average between front and rear + 15 minutes for image adjustment)

1. Using a 19mm wrench, loosen the foot lock nut. **(Figure 5-21)**
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.

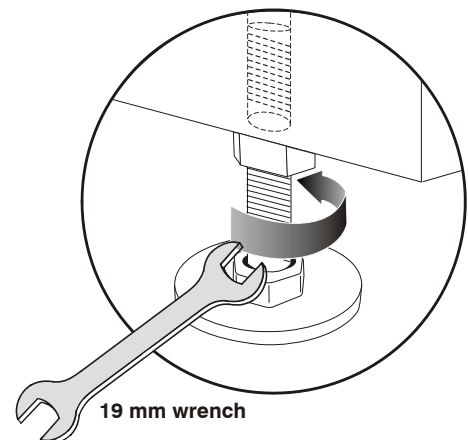


Figure 5-21 Replace Feet

5.8 Illumination Optics and Liquid Cooling Compartment

5.8.1 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.

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

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

1. Remove the front top lid. Refer to [5.4.2 Front Top Lid, on page 5-6](#).
2. Remove the light sensor module. Refer to [5.8.6 Light Sensor Module](#).
3. Loosen the two, 2.5mm screws from the bottom tab securing the cold mirror.
4. From the other two tabs, *loosen* one 2.5mm screw from each and *remove* one 2.5mm screw from each. This allows the tabs to be swung out of the way without fully removing them. (**Figure 5-25 Compartment, on page 5-19**)



Figure 5-22 Reflective vs. Non-Reflective Surfaces

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 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 5-22**)
7. After installation, LampLOC™ alignment and Measured Color Gamut Data (MCGD) calibration is required.

5.8.2 Fold Mirror

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

(Estimated Replacement Time: 30 minutes + 15 minute calibration)

1. Remove the four, 3mm screws securing the fold mirror cover plate under the front portion of the projector. Remove cover plate. **(Figure 5-23)**

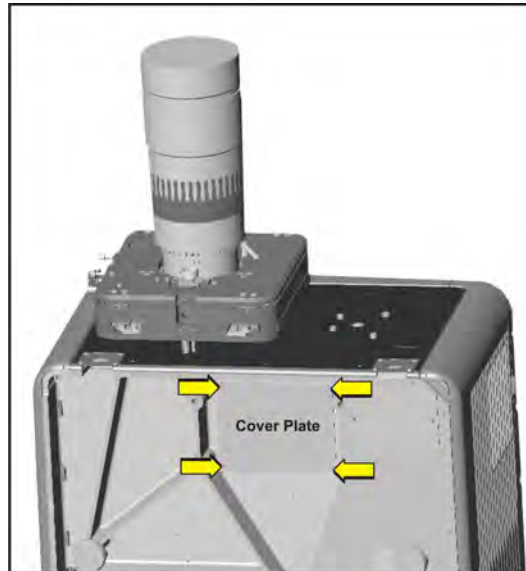


Figure 5-23 Remove Cover Plate

2. Remove one, 2.5mm screw from each of the three tabs. **(Figure 5-24)**
3. Loosen the other 2.5mm screw from each of the three tabs.

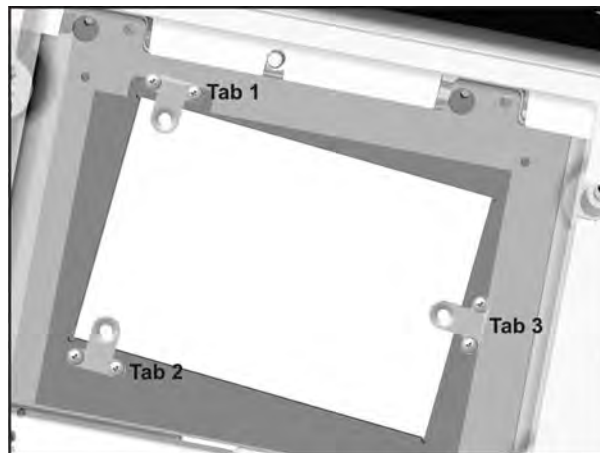


Figure 5-24 Fold Mirror Tabs

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. For details, refer to [3.1 Fold Mirror Alignment, on page 3-2](#).

5.8.3 Illumination Optic System (IOS)

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.

(Estimated Replacement Time: 70 minutes + 60 minute calibration)

1. Remove the front top lid. Refer to [5.4.2 Front Top Lid, on page 5-6](#).
2. Remove the high security lid. Refer to [5.4.3 High Security Lid, on page 5-7](#).
3. Disconnect the light sensor module harness and the thermal harness on the integrator.
4. Remove the lens. Refer to [5.14 Primary Lens Mount, on page 5-47](#).
5. Remove the light engine. Refer to [5.10 Light Engine, on page 5-29](#).

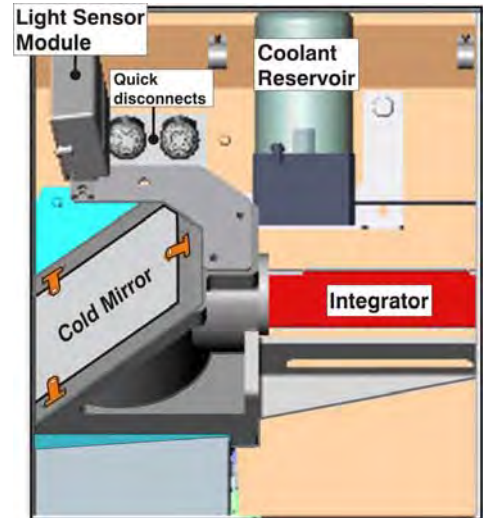


Figure 5-25 Compartment

6. Remove the front plate of the projector by removing the 10 M6 screws (eight along front and two inside the projector housing) and loosening the two thumbscrews on the front bracket (behind the front plate). **(Figure 5-26)**

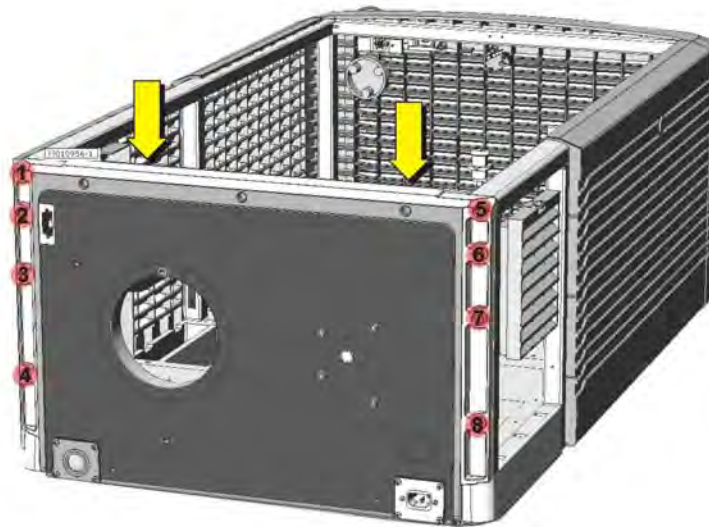


Figure 5-26 Remove Front Projector Plate

7. Using a 5mm hex key, remove the four screws securing the IOS to the base plate.
8. Remove the IOS.
9. When installing the IOS, repeat instructions in reverse. Reshoot MCGD files, align the aperture and adjust convergence. For details, refer to [Section 3 Service Setups](#).

5.8.4 Snood (Integrator)

The snood is located before the integrator and is removed when the Dolby® filter wheel is used.

(Estimated Replacement Time: 2 minutes)

1. Remove the front top lid. Refer to [5.4.2 Front Top Lid, on page 5-6](#).
2. Remove the hex screw securing the snood. **(Figure 5-27)**
3. Remove the snood.



Figure 5-27 Screw Securing Snood

5.8.5 Integrator Assembly

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

⚠ CAUTION The gloves do not provide heat protection when adjusting the integrator rod and should not be worn when performing this step.

(Estimated Replacement Time: 12 minutes + 15 minute calibration)

The integrator assembly is positioned on the IOS.

1. Remove the front top lid. Refer to [5.4.2 Front Top Lid, on page 5-6](#).
2. Remove the two, 3mm hex screws securing the retaining clip to the rear end of the integrator. **(Figure 5-28)**
NOTICE! Perform this step with caution to avoid damaging the temperature sensor mounted nearby.
3. Remove the snood. Refer to [5.8.4 Snood \(Integrator\), on page 5-20](#).
4. Wearing the gloves provided with 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. For details, refer to [Section 3 Service Setups](#).



Figure 5-28 Integrator Assembly

5.8.6 Light Sensor Module

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.

(Estimated Replacement Time: 4 minutes + 10 minute calibration)

1. Remove front top lid. Refer to [5.4.2 Front Top Lid, on page 5-6](#).
2. Disconnect the light sensor harness from the inline connector.
3. Remove the two, 4mm 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). For details, refer to [Section 3 Service Setups](#).

5.8.7 Liquid Cooling Assembly

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.

(Estimated Replacement Time: 15 minutes)

1. Remove the front top lid. Refer to [5.4.2 Front Top Lid, on page 5-6](#).
2. Remove the radiator air filter cover. Refer to [5.5.2 Radiator Air Filter, on page 5-12](#).
3. Remove the access panel frame. Refer to [5.4.11 Access Panel Frame, on page 5-11](#).
4. Using a 3mm hex key, 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 5-29)**
6. Disconnect the two quick disconnect hoses. **(Figure 5-29)**
7. Disconnect the pump inline and radiator fan inline connectors.
8. Remove liquid cooling assembly.

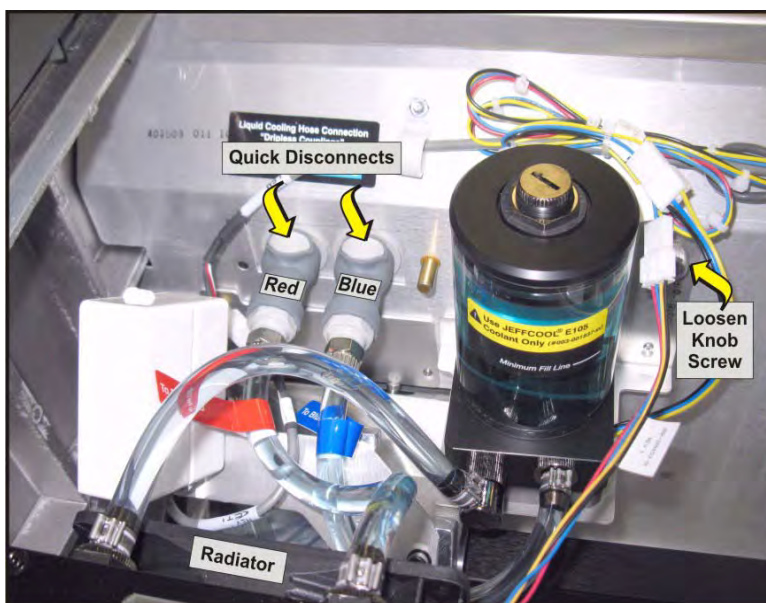


Figure 5-29 Liquid Cooling Assembly

5.8.8 Yellow Notch Filter (YNF)

The YNF is situated in the IOS assembly, near the contrast aperture. It is removed via a hole in the firewall.

(Estimated Replacement Time: 15 minutes + 30 minute calibration)

1. Remove the front top lid. Refer to [5.4.2 Front Top Lid, on page 5-6](#).
2. Remove the high security lid. Refer to [5.4.3 High Security Lid, on page 5-7](#).
3. Disconnect the two hoses from the liquid cooling assembly.
4. Remove the IOS access plate located on the security firewall by loosening the thumbscrew from the light engine compartment. **(Figure 5-30)**

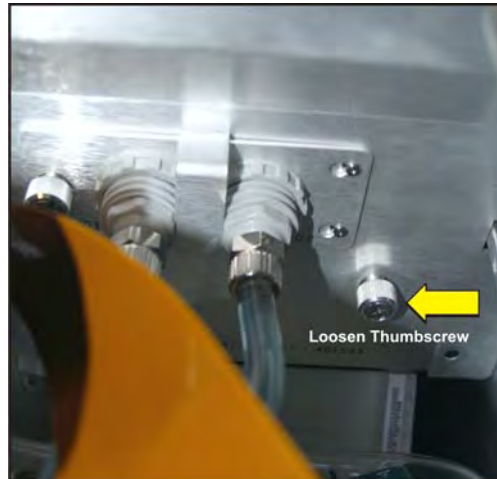


Figure 5-30 Remove IOS Access Plate

5. Remove the two, 2.5mm screws securing the YNF to the IOS. Loosen the center nut if necessary. **(Figure 5-31)**

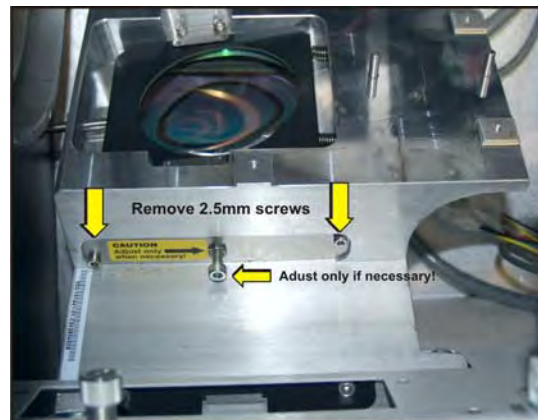


Figure 5-31 Remove YNF

6. Carefully, pull the YNF out of the IOS.
7. When installing, repeat above instructions in reverse. Calibrate green primary and MCGD. For details, refer to [Section 3 Service Setups](#).

5.9 Projector PCB's

5.9.1 Cardcage Assembly

The cardcage assembly is located in the light engine compartment. It consists of the PIB, ICP, Link Decrypter and Backplane. The LEQD is connected on the outside of the cardcage.

(Estimated Replacement Time: 35 minutes)

1. Remove the front top lid. Refer to [5.4.2 Front Top Lid, on page 5-6](#).
2. Remove the high security lid. Refer to [5.4.3 High Security Lid, on page 5-7](#).
3. Remove the PIB/ICP cover. Refer to [5.4.10 PIB/ICP Cover, on page 5-10](#).
4. Release the security ring by pressing down on the latch located on the inside of the cardcage.
(Figure 5-32) NOTES: 1) Marriage is broken when this latch is toggled. 2) Only Christie authorized service technicians should remove the security ring.

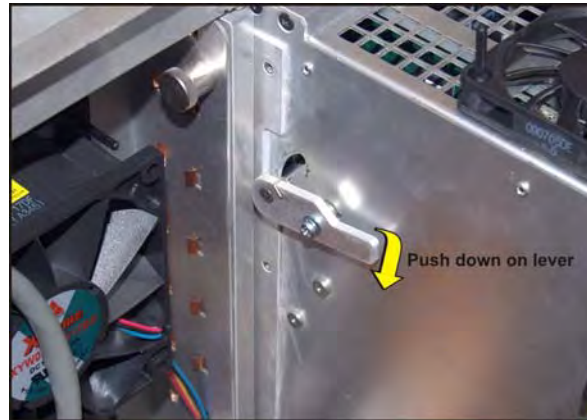


Figure 5-32 Spring Latch for Security Ring

5. Remove the security ring by pressing down on the latch on the right-side of the cardcage. **(Figure 5-33)**



Figure 5-33 Remove Security Ring

6. Swing the security ring out and disengage from the hinge.
7. Remove the four screws securing the hex driver holder plate above the cardcage assembly. **(Figure 5-34)**

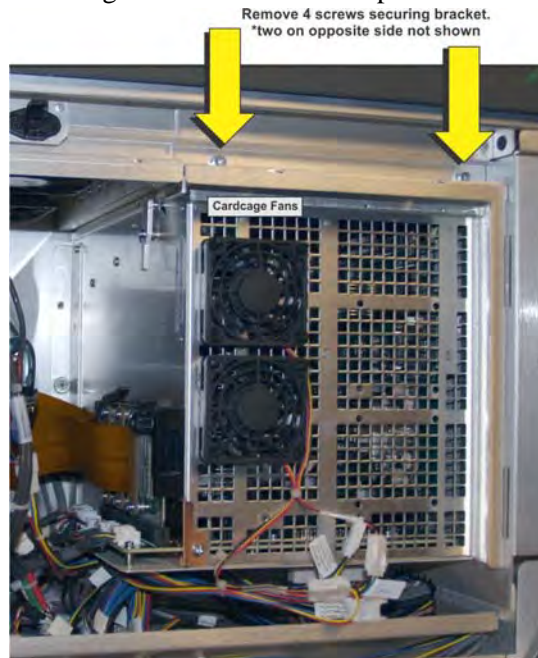


Figure 5-34 Top of Cardcage

8. Disconnect the harnesses from the cardcage fans. **(Figure 5-34)**
9. Disconnect the seven connectors from the Backplane PCB and LEQD. **NOTE:** *The large power connector is located at the rear of the 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.
12. When installing, repeat the 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 reset by Christie authorized service technicians. Refer to [3.6 Performing Marriage, on page 3-14](#).

5.9.2 Backplane PCB

The Backplane PCB is located at the back of the cardcage. The PIB and ICP boards are connected directly to the Backplane board.

(Estimated Replacement Time: 55 minutes)

1. Remove the front top lid. Refer to [5.4.2 Front Top Lid, on page 5-6](#).
2. Remove PIB/ICP Cover. Refer to [5.4.10 PIB/ICP Cover, on page 5-10](#)
3. Remove the high security lid. Refer to [5.4.3 High Security Lid, on page 5-7](#).
4. Remove the security ring by pressing down on the latch located on the side of the cardcage. (**Figure 5-33 Remove Security Ring**)
5. Remove the blank faceplate, PIB and ICP PCBs from the Backplane.
6. Remove the hex driver holder plates from the top of the cardcage assembly. (**Figure 5-35**)
7. Disconnect the LEQD board from the Backplane. (**Figure 5-40 Remove LEQD, on page 5-28**)
8. Disconnect all eight harnesses 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 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 15 screws securing the Backplane to the cardcage. (**Figure 5-36**)
13. Slide the Backplane out of the cardcage.
14. When installing, repeat the 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 reset by Christie authorized service technicians. Refer to [3.6 Performing Marriage, on page 3-14](#).

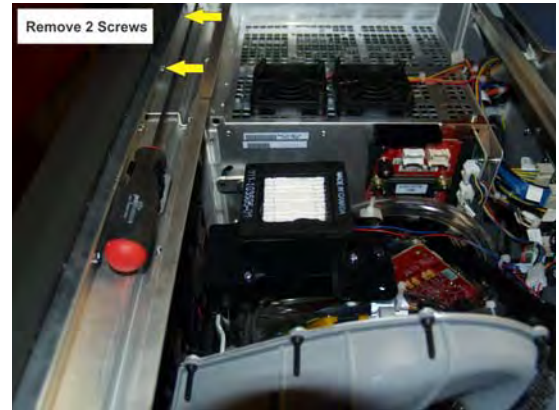


Figure 5-35 Tool Holder



Figure 5-36 Cardcage with Backplane

5.9.3 Integrated Cinema Processor (ICP)

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

(Estimated Replacement Time: 15 minutes)

1. Remove the front lid. Refer to [5.4.2 Front Top Lid, on page 5-6](#).
2. Remove the high security lid. Refer to [5.4.3 High Security Lid, on page 5-7](#).
3. Remove PIB/ICP cover. Refer to [5.4.10 PIB/ICP Cover, on page 5-10](#).
4. Remove the security ring from the front of the cardcage. (**Figure 5-33 Remove Security Ring, on page 5-23**)
5. Push in the red tabs on the top and bottom ICP ejector tabs. Then, push the top and bottom black tabs in to release the ICP board from the Backplane. (**Figure 5-37**)
6. Pull the ICP out of the cardcage.
7. 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 until the ejector tabs are engaged (a “click” sound should be heard).
8. When installing, repeat the 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 reset by Christie authorized service technicians. Refer to [3.6 Performing Marriage, on page 3-14](#).



Figure 5-37 Remove ICP

5.9.4 Image Media Block (IMB)

The IMB is located in the cardcage on the operator side (right) of the projector.

(Estimated Replacement Time: 15 minutes)

1. Remove the front lid. Refer to [5.4.2 Front Top Lid, on page 5-6](#).
2. Remove the high security lid. Refer to [5.4.3 High Security Lid, on page 5-7](#).
3. Remove PIB/ICP cover. Refer to [5.4.10 PIB/ICP Cover, on page 5-10](#).
4. Remove the security ring from the front of the cardcage. (**Figure 5-33 Remove Security Ring, on page 5-23**)
5. Push in the red tabs on the top and bottom IMB ejector tabs. Then, push the top and bottom black tabs in to release the IMB board from the Backplane. (**Figure 5-38**)
6. Pull the IMB out of the cardcage.



Figure 5-38 Remove IMB

7. When installing the IMB, 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 IMB pushed up against the right wall, and the black ejector tabs positioned horizontally, push the IMB all the way into the cardcage until the ejector tabs are engaged (a “click” sound should be heard).
8. When installing, repeat the 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 reset by Christie authorized service technicians. Refer to [3.6 Performing Marriage, on page 3-14](#).

5.9.5 Projector Intelligence Board (PIB)

The PIB is located in the cardcage on the operator side (right) of the projector. It is the main controller for the Serial and Ethernet connections, video and 3D applications for the projector. The Marriage status light on the PIB board turns OFF when the high security lid is unlocked. To rearm the board, refer to [3.6 Performing Marriage, on page 3-14](#).

(Estimated Replacement Time: 15 minutes)

1. Remove the front lid. Refer to [5.4.2 Front Top Lid, on page 5-6](#).
2. Remove the high security lid. Refer to [5.4.3 High Security Lid, on page 5-7](#).
3. Remove PIB/ICP cover. Refer to [5.4.10 PIB/ICP Cover, on page 5-10](#).
4. Remove the security ring from the front of the cardcage by pressing down on the latch located on the side of the cardcage. (**Figure 5-33 Remove Security Ring, on page 5-23**)
5. 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.
6. Pull the PIB assembly out of the cardcage. (**Figure 5-39**)
7. When installing, repeat the above instructions in reverse. Verify the software version installed. For details, refer to the *CP4230 User Manual (P/N: 020-100621-xx)*. Once the projector is up and running, Service Marriage must be performed to continue playing encrypted content. Marriage should only be reset by Christie authorized service technicians. Refer to [3.6 Performing Marriage, on page 3-14](#).

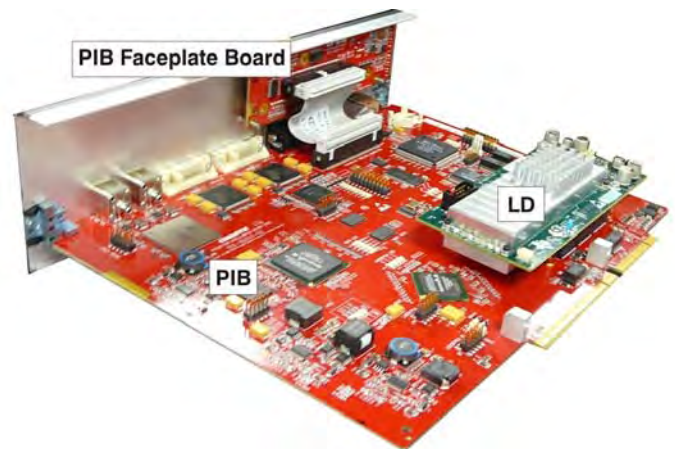


Figure 5-39 PIB, PIB Faceplate and LD

5.9.6 Light Engine Quick Disconnect (LEQD)

The LEQD is part of the light engine assembly. It is attached to the outside of the cardcage and connects to the Backplane. The LVDS and power are routed to the light engine from the LEQD.

(Estimated Replacement Time: 8 minutes)

1. Remove the front top lid. Refer to [5.4.2 Front Top Lid, on page 5-6](#).
2. Remove the high security lid. Refer to [5.4.3 High Security Lid, on page 5-7](#).
3. Loosen the thumbscrew securing the LEQD in place. **(Figure 5-40)**
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 5-40 Remove LEQD

5.9.7 Environmental Board (EVB)

The EVB is mounted to the wall inside the light engine assembly compartment. The fans, pump, temperature sensors and motor control harnesses plug into the EVB.

(Estimated Replacement Time: 15 minutes)

1. Remove the front top lid. Refer to [5.4.2 Front Top Lid, on page 5-6](#).
2. Remove the high security lid. Refer to [5.4.3 High Security Lid, on page 5-7](#).
3. Loosen the single thumbscrew securing the EVB in place. **(Figure 5-41)**
4. Disconnect the 10 harnesses from the EVB.
5. Remove the EVB.
6. When re-installing the EVB, repeat the above instructions in reverse. Refer to [Section 7 Interconnections](#) when reconnecting the harnesses.

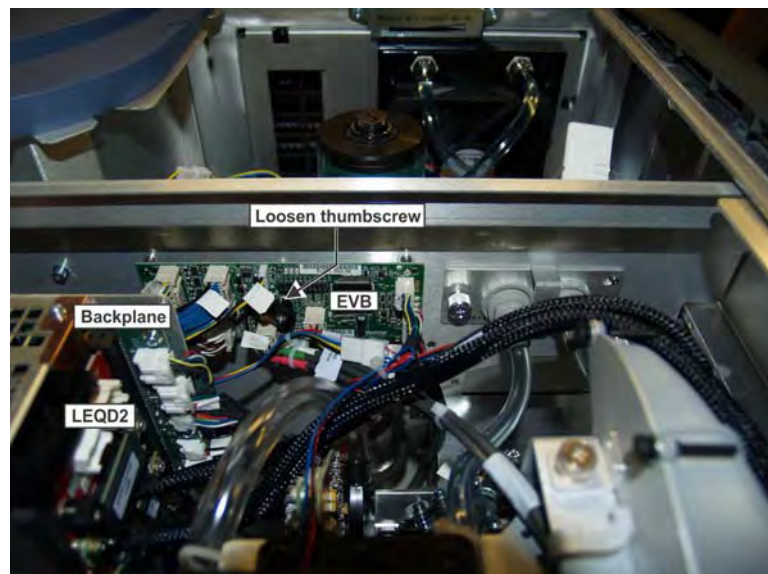


Figure 5-41 Remove EVB

5.9.8 Integrated Motor Control Board (IMCB)

The IMCB is held in place by a single thumbscrew and is easily accessible within the lamp compartment.

(Estimated Replacement Time: 16 minutes + 10 minute calibration)

1. Open the lamp door. Refer to [5.4.8 Lamp Door, on page 5-9](#).
2. Remove the lamp. Refer to [5.12.5 Lamp Replacement, on page 5-38](#).
3. Disconnect the nine harnesses from the IMCB.
4. Loosen the thumbscrew securing the IMCB. **(Figure 5-42)**
5. Remove the IMCB.

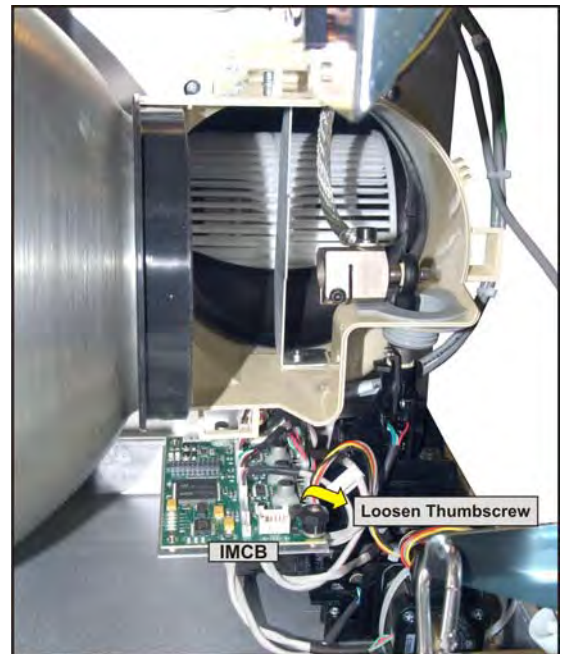


Figure 5-42 Remove IMCB

5.10 Light Engine

The light engine can be removed as an assembly with the LAD fan assembly, liquid cooling assembly, snood and LEQD still attached.

(Estimated Replacement Time: 25 minutes + 60 minute calibration)

1. Remove the front top lid. Refer to [5.4.2 Front Top Lid, on page 5-6](#).
2. Remove the high security lid. Refer to [5.4.3 High Security Lid, on page 5-7](#).
3. Remove the PIB/ICP cover.
4. Remove the projection lens. Refer to the *CP4230 User Manual (P/N: 020-100621-xx)*.
5. Disconnect the two coolant hoses from the quick disconnects. Then loosen the thumbscrew located on the bracket next to the disconnects. **(Figure 5-43)**
6. Disconnect the temperature and LAD fan connections from the EVB (P39, P40).
7. Disconnect the LEQD from the Backplane.
8. Secure the LEQD to the light engine handle by tightening the thumbscrew and the two clips.
9. Remove the light engine air filter cover and air filter 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 5-13 Light Engine Air Filter Cover, on page 5-12)**
10. Loosen the thumbscrew securing the cooling duct, and carefully remove the cooling duct.

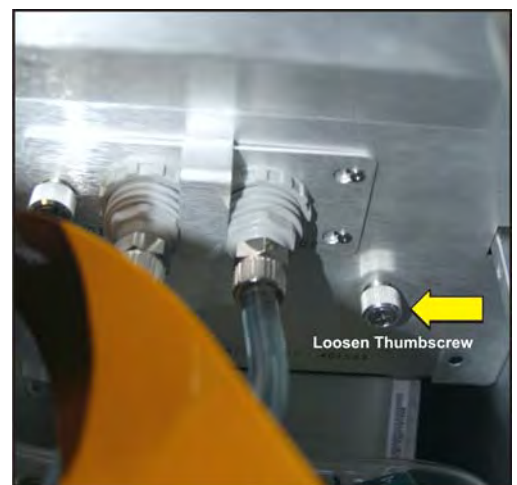


Figure 5-43 Liquid Cooling Quick Disconnects

Section 5: Parts and Module Replacement

- 11. Loosen the single thumbscrew securing the light dump and remove.
- 12. Using the hex tool provided, loosen the three captive screws securing the light engine in place.
- 13. Using the built-in light engine handle, carefully lift the light engine assembly out of the projector. (Figure 5-44)
- 14. When installing, repeat above instructions in reverse. Reshoot MCGD files, align the aperture and adjust convergence. For details, refer to *Section 3 Service Setups*.

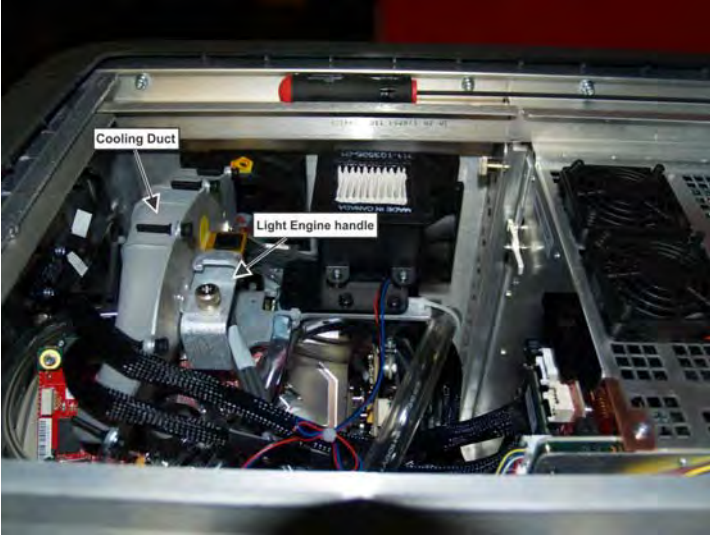


Figure 5-44 Top View of Light Engine

5.11 Power Supplies

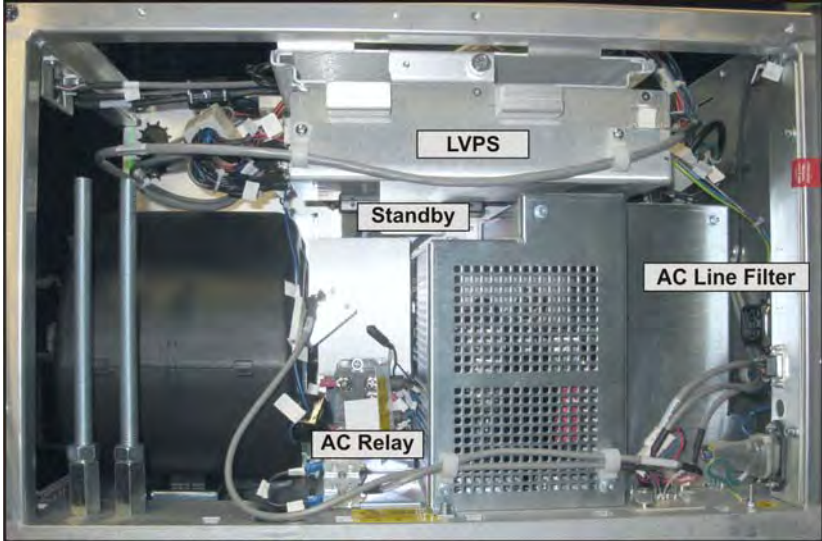


Figure 5-45 LVPS Compartment

5.11.1 AC Line Filter

(Estimated Replacement Time: 15 minutes)

1. Remove the rear right skin. Refer to [5.4.4 Rear Right Skin \(ignitor/blower compartment\)](#), on page 5-7.
2. Remove the front top lid. Refer to [5.4.2 Front Top Lid](#), on page 5-6.
3. Open the lamp door. Refer to [5.4.8 Lamp Door](#), on page 5-9.
4. Rotate the rear top lid to gain access to the igniter/blower compartment. Refer to [5.4.12 Rear Top Lid](#), on page 5-11.
5. Remove the two hex nuts from the bracket the AC line filter is secured to, which is secured to the firewall. (**Figure 5-46**)
6. Disconnect the two harnesses from the AC line filter.
7. Remove the AC line filter.

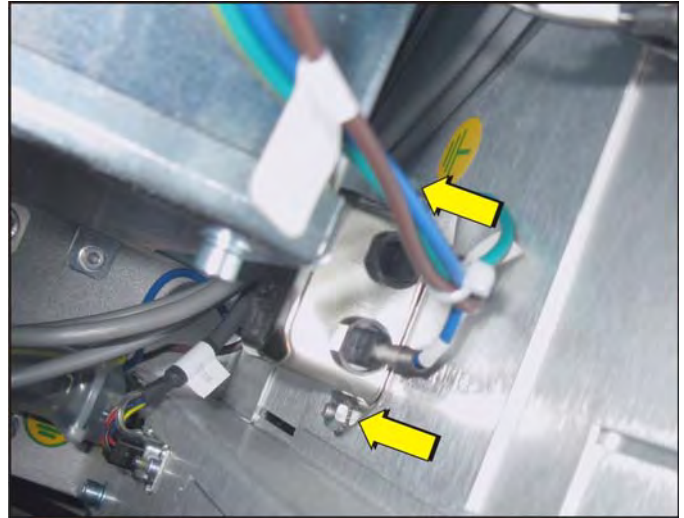


Figure 5-46 Remove AC Line Filter

5.11.2 AC Relay

(Estimated Replacement Time: 40 minutes)

The AC relay is located between the blower and igniter shielding with the fire alarm interlock directly in front of it, the PVC cover over the relay has cutouts for access to the 3mm hex screws.

1. Remove the rear right skin. Refer to [5.4.4 Rear Right Skin \(ignitor/blower compartment\)](#), on page 5-7.
2. Remove the front top lid. Refer to [5.4.2 Front Top Lid](#), on page 5-6.
3. Open the lamp door. Refer to [5.4.8 Lamp Door](#), on page 5-9.
4. Rotate the rear top lid to gain access to the igniter/blower compartment. Refer to [5.4.12 Rear Top Lid](#), on page 5-11.
5. Using a 3mm hex key, remove the screw closest to the blower and loosen the screw closest to the igniter shield. (**Figure 5-47**)
6. Lift the PVC shield to one side to gain access to the AC relay.
7. Tilt the AC relay and use a #2 Phillips™ to loosen the six screws securing the harnesses.
8. Disconnect the eight harnesses.
9. Remove the AC relay.

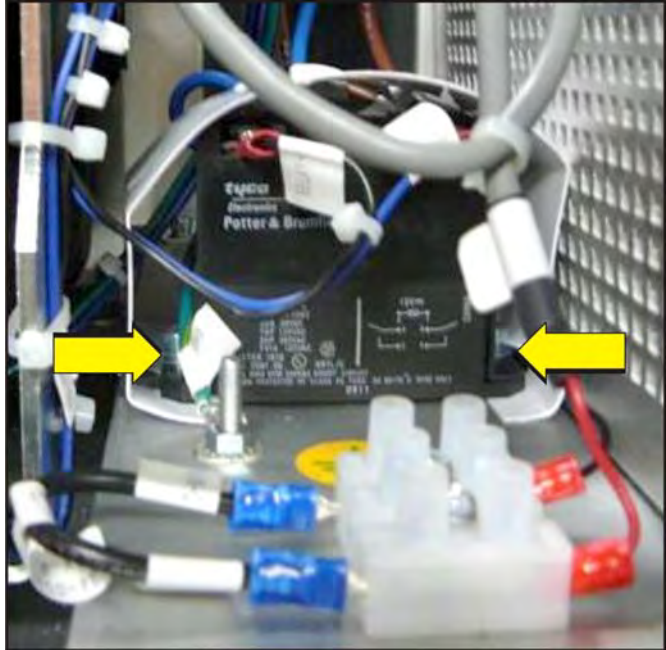


Figure 5-47 Remove AC Relay

5.11.3 AC Terminal Block

The AC Terminal Block is located under the IOS and is accessible from the bottom of the projector. **(Estimated Replacement Time: 20 minutes)**

1. Loosen the two screws securing the cover plate to the bottom of the projector.
2. Disconnect the four AC connections and the ground connector.
3. Using a #2 Phillips™, remove the two screws securing the AC terminal block to the baseplate. **(Figure 5-48)**

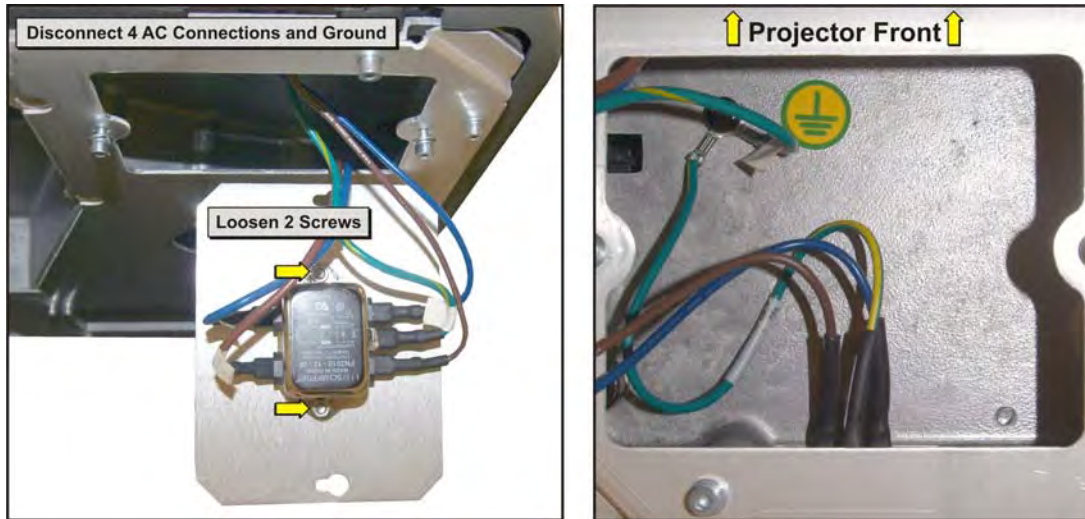


Figure 5-48 AC Terminal Block

5.11.4 Standby Power Supply

The Standby Power Supply is mounted on the back side of the LVPS. The Standby Power Supply powers the PIB, EVB, IMCB and the TPC when the projector is in STANDBY mode.

(Estimated Replacement Time: 16 minutes)

1. Remove the rear right skin. Refer to [5.4.4 Rear Right Skin \(ignitor/blower compartment\)](#), on page 5-7.
2. Remove the LVPS drawer.
3. Remove the LVPS/LPS cover. Refer to [5.4.9 LVPS/LPS Cover](#), on page 5-10.
4. Disconnect both DC and AC cables from the standby power supply.
5. Loosen the thumbscrew at the bottom of the standby power supply. **(Figure 5-49)**
6. Remove the standby power supply.



Figure 5-49 Standby Power Supply

5.11.5 Low Voltage Power Supply (LVPS)

The LVPS is located in the ignitor/blower compartment of the projector. It is held in place by a bracket above the ignitor. The LVPS slides in and out along two guide rails at the top of the bracket.

(Estimated Replacement Time: 15 minutes)

1. Remove the rear right skin. Refer to [5.4.4 Rear Right Skin \(ignitor/blower compartment\)](#), on page 5-7.
2. Loosen the thumbscrew. **(Figure 5-50)**
3. Disconnect the five DC harnesses via the inline connectors.
4. Disconnect the AC harness via the inline connectors.
5. Slide the LVPS out along the bracket.

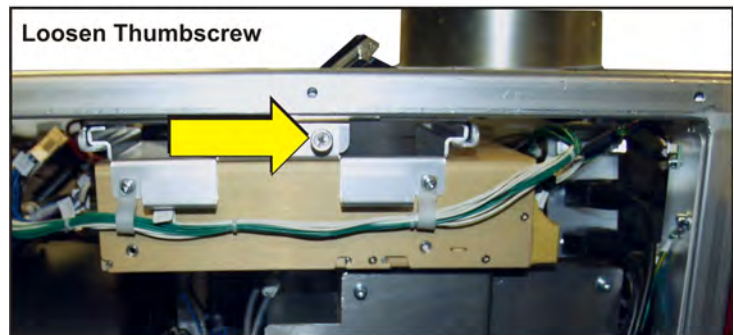


Figure 5-50 Thumbscrew

5.11.6 Dolby® 3D System

For information on how to install Dolby® 3D kits, refer to the instruction manual supplied by Dolby®. Be aware that in order to install this system the M4 screw located behind the cardcage must be removed. **(Figure 5-51)** This screw secures the two firewalls and must be removed in order to create a gap for the cable to run to the side break out panel. To remove the screw, use the 3mm hex driver provided with the projector.

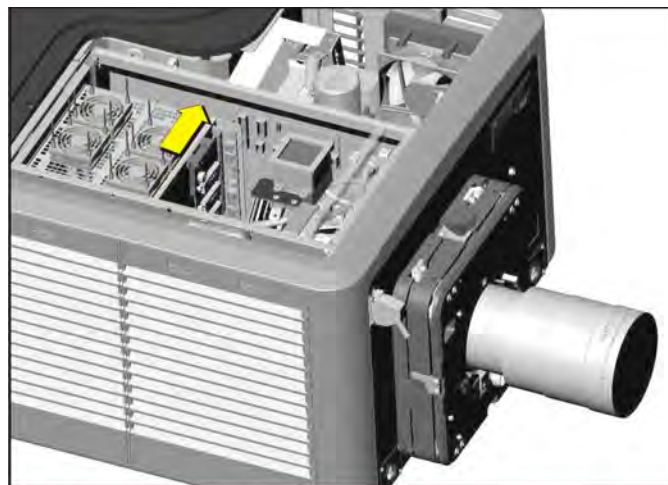


Figure 5-51 Remove Screw Behind Cardcage

5.12 Lamp Compartment

5.12.1 Anode Yoke

The anode yoke is located directly in front of the reflector and its position is adjustable depending on the lamp being installed.

(Estimated Replacement Time: 4 minutes)

1. Open the lamp door. Refer to [5.4.8 Lamp Door](#), on page 5-9.
2. Remove the lamp (if installed). Refer to [5.12.5 Lamp Replacement](#), on page 5-38.
3. Using a 5mm hex key, remove the two screws and lock washers from the yoke base. **(Figure 5-52)**

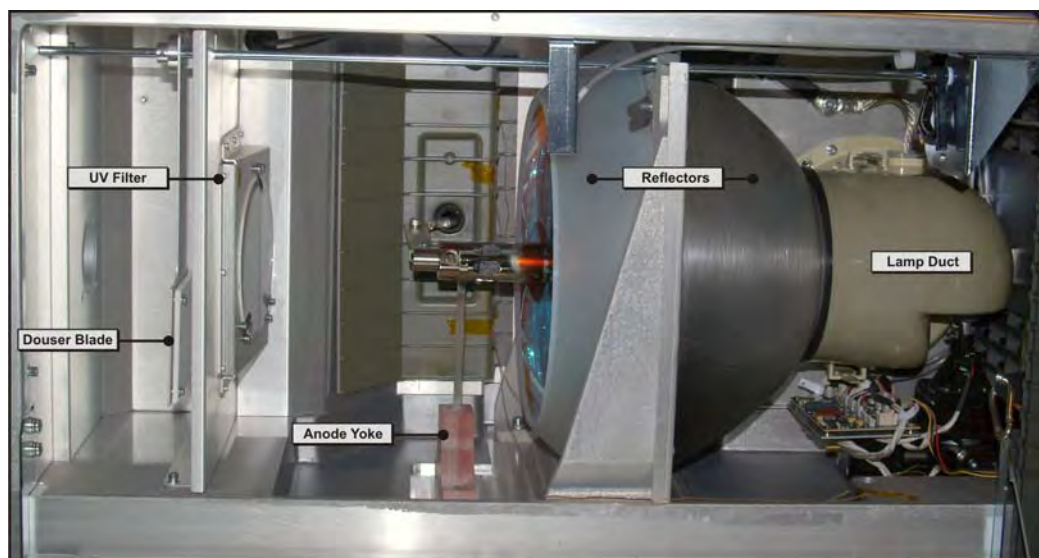


Figure 5-52 Front of Lamp Compartment

5.12.2 Douser Motor

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

(Estimated Replacement Time: 12 minutes + 10 minute LampLOC™ Alignment)

1. Remove front top lid. Refer to [5.4.2 Front Top Lid](#), on page 5-6.
2. Rotate the rear top lid to gain access to the douser bracket.
3. Remove the rear skin. Refer to [5.4.6 Rear Skin](#), on page 5-8.
4. Using a 3mm hex key, remove the three screws securing the douser bracket. **(Figure 5-53)**
5. Disconnect the harness from the IMCB.
6. Slide the douser assembly back, and lift up and out from the top of the projector.
7. When installing, repeat instructions in reverse. Once installed, perform LampLOC™ alignment. See [3.3 Adjusting Lamp Position \(LampLOC™\)](#), on page 3-3.

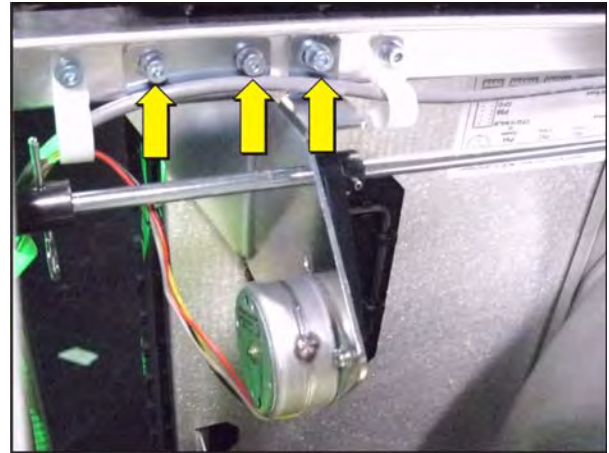


Figure 5-53 Douser Motor

5.12.3 Ceramic Plate on Douser Blade

The ceramic plate is located in the lamp compartment and is mounted to the douser blade. It is used to absorb heat from the light emitted by the lamp.

(Estimated Replacement Time: 4 minutes + 10 minute LampLOC™ Alignment)

1. Open the lamp door. Refer to [5.4.8 Lamp Door](#), on page 5-9.
2. Remove the lamp (if installed). Refer to [5.12.5 Lamp Replacement](#), on page 5-38.
3. Using a #2 Phillips™, remove the four screws securing the ceramic plate to the douser blade. **(Figure 5-54)**
4. When installing, repeat instructions in reverse. Once installed, perform LampLOC™ alignment. See [3.3 Adjusting Lamp Position \(LampLOC™\)](#), on page 3-3.

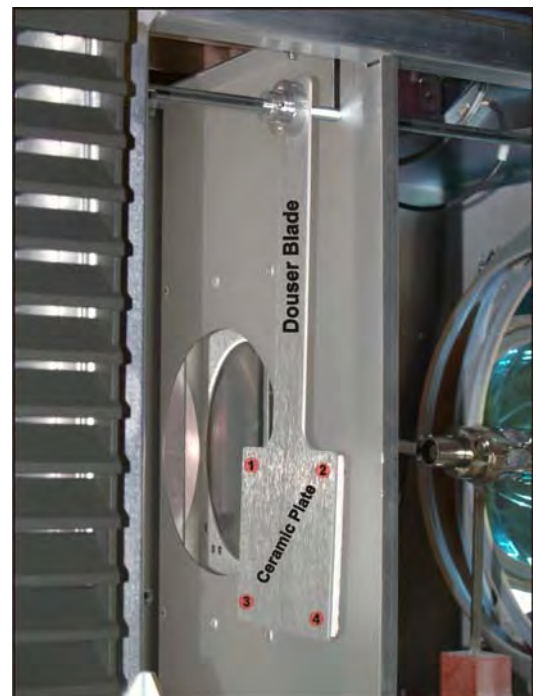


Figure 5-54 Ceramic Plate

5.12.4 Igniter

The igniter is located within the EMI shielding beneath the LVPS and next to the AC relay and lamp blower. **(Estimated Replacement Time: 50 minutes + 10 minute LampLOC™ Alignment)**

NOTICE! When installing the positive and negative lamp power supply (LPS) leads to the igniter, DO NOT over tighten the M10 screw to avoid bending the metal connection plates attached to the igniter.

1. Remove the rear-right skin (ignitor/blower compartment). Refer to [5.4.4 Rear Right Skin \(ignitor/blower compartment\)](#), on page 5-7.
2. Using a 3mm hex key, remove the four screws from the EMI shield cover.
3. Disconnect the anode lead (red power cable to LPS).
 - a. Using a 17mm ratchet, remove the bolt from the anode lead.
 - b. Remove the lock washer and washer.
 - c. Remove the capacitor lug ring and the washer.
 - d. Remove the cathode harness.
4. Disconnect the cathode lead (black power cable to LPS).
 - a. Using a 17mm wrench, remove the nut from the cathode lead.
 - b. Remove the lock washer and washer.
 - c. Remove the lamp cathode harness.
5. Disconnect anode lead (igniter to lamp anode).
 - a. Remove the bolt, washer and lock washer.
 - b. Remove anode braid cable.

** An alternative removal for the anode lead (igniter to lamp anode) is to remove the anode clamp and leave the harness attached to the igniter.*

- c. Using a 5mm hex key, remove the two screws securing the LPS to the base plate.
- d. Using a 3mm hex key, remove the screw securing the ground to the base plate.
- e. Remove the igniter.

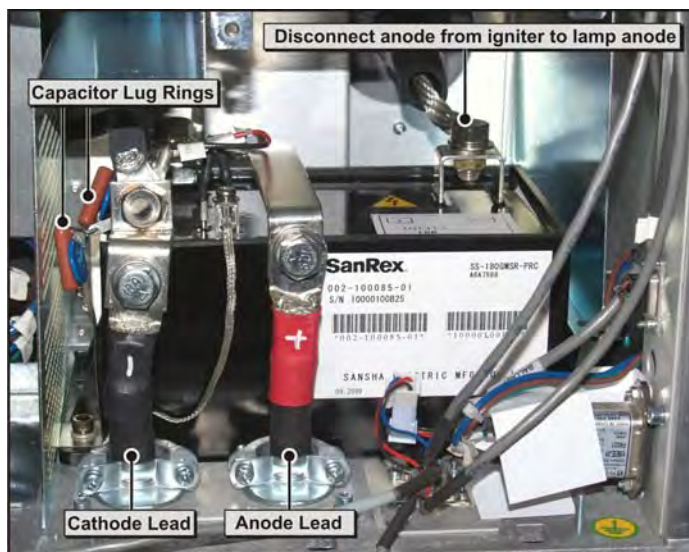


Figure 5-55 CP4230 Igniter

5.12.5 Lamp Replacement

⚠ DANGER

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



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: 10 minutes + 5 minute LampLOC™ Alignment)

1. Wearing authorized protective safety gear, unlock and open the lamp door.
2. Remove the lamp:
 - a. Remove the cathode lamp duct via the three clips. (Figure 5-56)

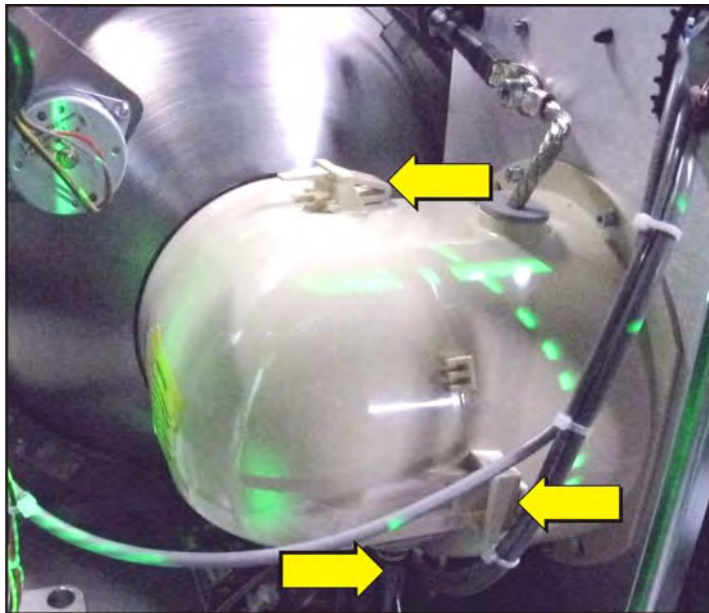


Figure 5-56 Front Lamp Duct

- b. Loosen the screw on the cathode nut and anode clamp. (Figure 5-57)

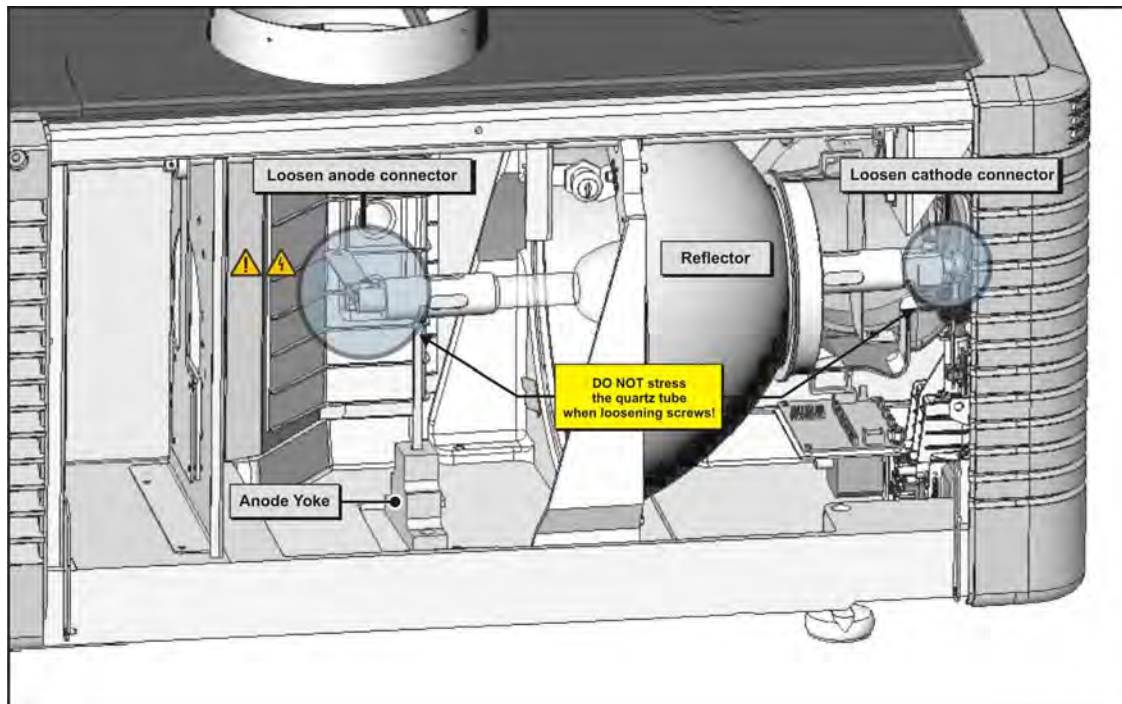


Figure 5-57 Remove Lamp

- c. Carefully slide the clamp off of the lamp.
 - d. Handling by the cathode end only, unscrew the lamp from the cathode connector while supporting the anode end. Carefully guide the lamp through the reflector to remove it from the projector. Immediately place it inside the protective cover or original packaging. **CAUTION! Handle the lamp by the cathode/anode end shafts only, never the glass.**
 - e. Place the lamp on the floor where it cannot fall or be bumped. **WARNING! Handle box with extreme caution - the lamp is hazardous even when packaged. Dispose of lamp box according to safety regulations for your area.**
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 5-58)**
- c. Insert the threaded cathode (-) end of the lamp into the negative lamp connector nut located in the rear of the lamp compartment. **(Figure 5-59)** 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.**

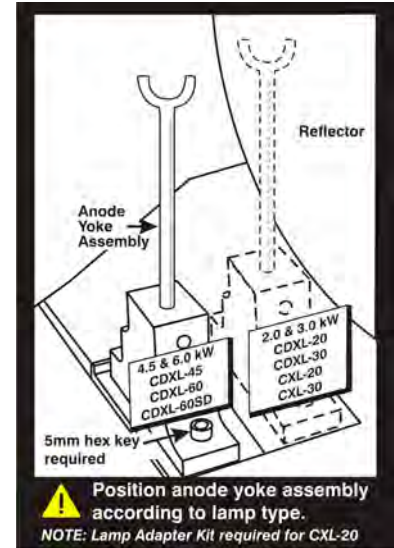



Figure 5-58 Anode Yoke

- d.  **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 5-59)** Using the 5mm Allen key, squeeze together with the anode clamp making sure not to place any torque on the lamp quartz tube.

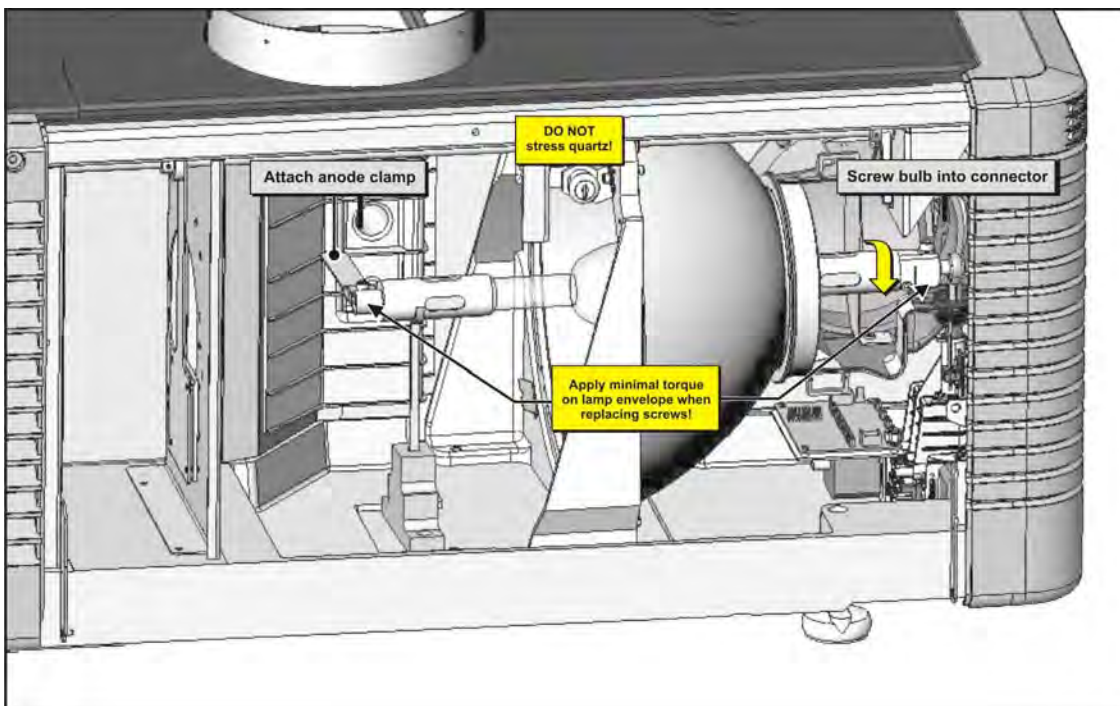



Figure 5-59 Install New Lamp

- e. 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 fire-wall.**
- f. Re-install the front lamp duct.

4. Close the lamp door.
5. Turn wall circuit ON.
6. Perform software adjustments. In the **Advanced Setup: Lamp History** window, tap **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 enter the data. (Figure 5-60)
7. Power the lamp ON.
8. Tap  from the TPC **Main** panel to power the lamp ON.
9. Immediately adjust the lamp position (LampLOC™) via the **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.

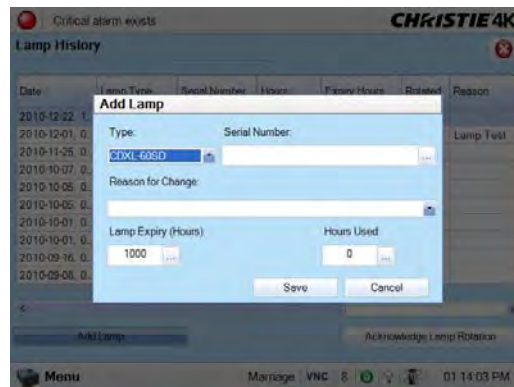


Figure 5-60 Add Lamp Window

5.12.6 Lamp Adjust Assembly (including IMCB)

The lamp adjust assembly positions the lamp within the projector's reflector at an optimal position for brightness and uniformity by adjusting the X, Y and Z-axis at the cathode end of the lamp.

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

1. Open the lamp door. Refer to [5.4.8 Lamp Door, on page 5-9](#).
2. Remove the lamp (if installed). Refer to [5.12.5 Lamp Replacement, on page 5-38](#).
3. Remove the rear skin. Refer to [5.4.6 Rear Skin, on page 5-8](#).
4. Using a 5mm hex key, remove the cathode cable. (**Figure 5-61**)
5. Using a 3mm hex key, remove the cathode nut.
6. Using a 3mm hex key, remove the four screws securing the lamp duct.
7. Disconnect the nine harnesses from the IMCB.
8. Using a #2 Phillips™, loosen the four captive securing the lamp adjust to the baseplate.
9. Remove the lamp adjuster assembly through the lamp door.

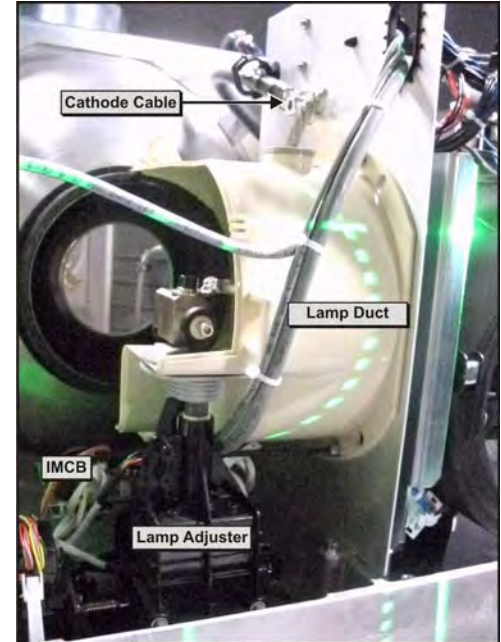


Figure 5-61 Lamp Adjuster

5.12.7 Main AC Blower

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

1. Remove the rear right skin. Refer to [5.4.4 Rear Right Skin \(ignitor/blower compartment\), on page 5-7](#).
2. Remove the rear skin. Refer to [5.4.6 Rear Skin, on page 5-8](#).
3. Open the lamp door. Refer to [5.4.8 Lamp Door, on page 5-9](#).
4. Remove the lamp (if installed). Refer to [5.12.5 Lamp Replacement, on page 5-38](#).
5. Using a #2 Phillips™, remove the four screws securing the blower (two screws on top and two on bottom). (**Figure 5-62**)
6. Disconnect the AC blower harness.
7. Remove the blower through the back of the projector. Ensure the blower is removed on an angle to avoid contacting the interlock switch.
8. When installing, repeat instructions in reverse. Perform LiteLOC™. For details, refer to [Section 3 Service Setups](#).

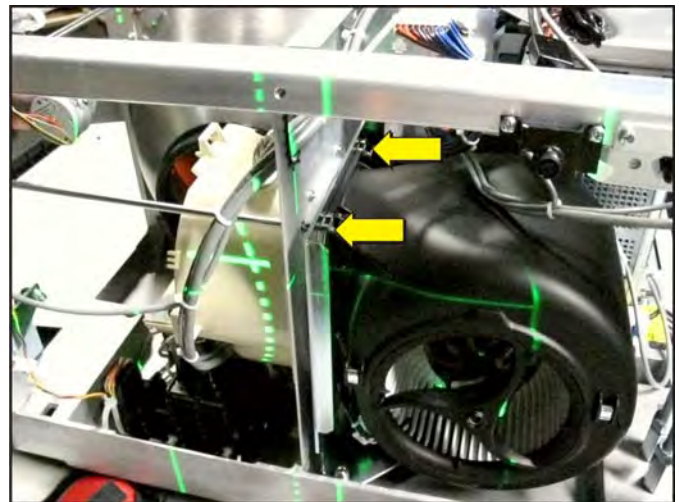


Figure 5-62 Main AC Blower

5.12.8 Main Blower Vane Switch

The Main Blower Vane Switch is located on the bracket that supports the Main AC Blower.

(Estimated Replacement Time: 14 minutes + 10 minute LampLOC™ Alignment)

1. Remove the rear right skin. Refer to [5.4.4 Rear Right Skin \(ignitor/blower compartment\)](#), on page 5-7.
2. Remove the black and red leads. **(Figure 5-63)**
3. Using a 3/32" hex key, remove the two screws securing the switch to the bracket.
4. Remove the switch from the bracket.
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.

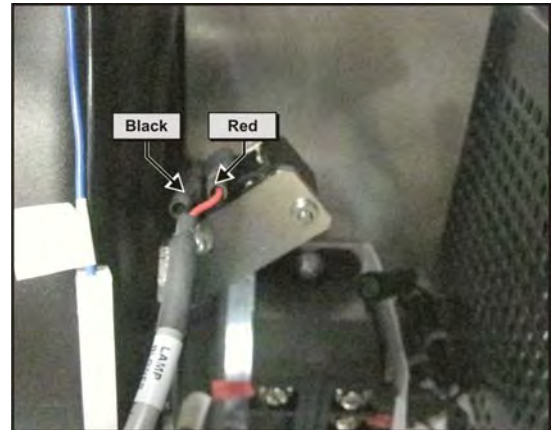


Figure 5-63 Blower Switch Leads

5.12.9 Reflectors (Including Heat Dump)

In the event of a lamp explosion, both glass reflectors will be permanently damaged and need replacement. It is also likely that the metal reflector shield for the rear reflector will be damaged as well.

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

1. Open the lamp door. Refer to [5.4.8 Lamp Door, on page 5-9](#).
2. Remove the lamp (if installed). Refer to [5.12.5 Lamp Replacement, on page 5-38](#).
3. Remove the front top lid. Refer to [5.4.2 Front Top Lid, on page 5-6](#).
4. Remove the rear top lid. Refer to [5.4.12 Rear Top Lid, on page 5-11](#).
5. Remove the thermal sensor harness and interlock harness from the exhaust interlock assembly.
6. Using a 7mm nut driver remove the nut inside the housing before removing the screw on the external metal duct plate, shown in **Figure 5-64**.



Figure 5-64 Remove External Metal Duct

7. Use a 3mm hex key to remove the six other screws on the duct. (**Figure 5-65**)

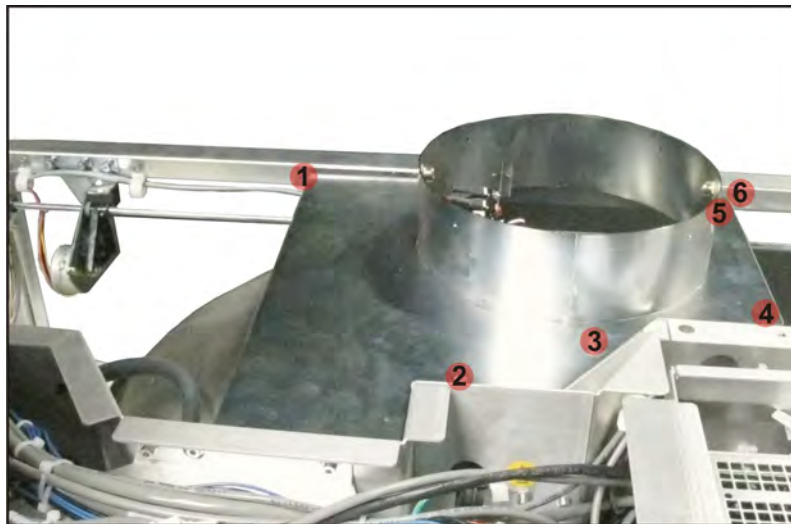


Figure 5-65 Remove Screws Securing Duct

8. Remove the douser assembly. Refer to [5.12.4 Igniter, on page 5-37](#).

9. Using a 3mm hex key, remove the two screws securing the lamp door interlock bracket. (**Figure 5-66**)
10. Using a 5mm hex key, remove the three screws from the base of the reflector and the one screw from the top of the reflector.
11. Rotate and angle the reflector up through the top of the projector.
12. When installing, repeat instruction in reverse. Perform LampLOC™ alignment. For details, refer to [3.3 Adjusting Lamp Position \(LampLOC™\)](#), on page 3-3.

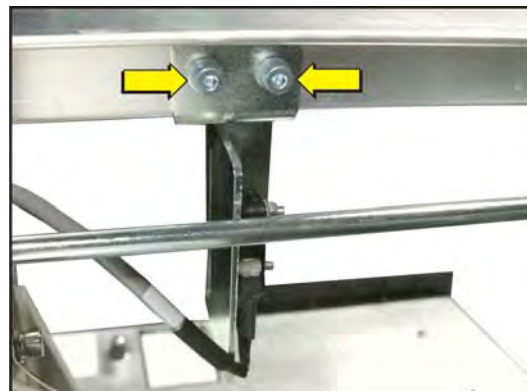


Figure 5-66 Lamp Door Interlock Bracket

5.12.10 UV Filter

⚠ CAUTION Always wear clean, lint free gloves when handling the UV filter. Only handle the filter by its edges.

The UV filter is mounted directly behind the douser and is secured by three clips.

(Estimated Replacement Time: 6 minutes + 10 minute LampLOC™ Alignment)

1. Open the lamp door. Refer to [5.4.8 Lamp Door](#), on page 5-9.
2. Remove the lamp (if installed). Refer to [5.12.5 Lamp Replacement](#), on page 5-38.
3. Using a #2 Phillips™, remove the two screws securing the top tab. (**Figure 5-67**)
4. Loosen the remaining two, #2 Phillips™ screws from the bottom tabs and swing them to the side.
5. Remove the UV filter.
6. When installing, notice the “arrow” marking on the side of the UV filter. This indicates which side of the filter should face the lamp.
7. 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 5-67 UV Filter

5.13 Interlocks and Switches

5.13.1 Exhaust Duct Vane Switch

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.

(Estimated Replacement Time: 15 minutes + 10 minute LampLOC™ Alignment)

1. Remove the lamp door. Refer to [5.4.8 Lamp Door](#), on page 5-9.
2. Remove the lamp (if installed). **This is required for safety reasons only.** Refer to [5.12.5 Lamp Replacement](#), on page 5-38.
3. Disconnect the two harnesses. (**Figure 5-68**)
4. Remove the two nuts (5.5mm) securing the vane switch to the mounting bracket. (**Figure 5-68**)
5. Remove the vane switch.
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.

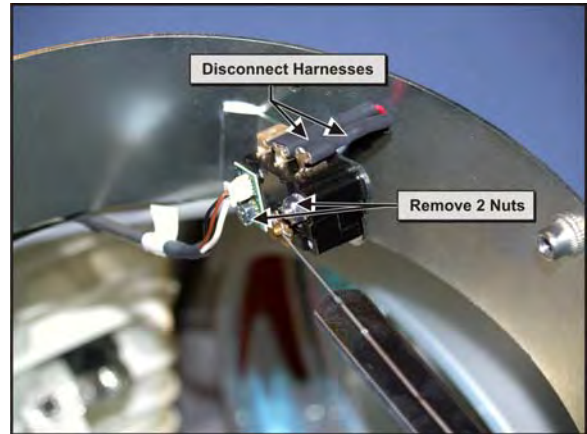


Figure 5-68 Exhaust Duct Vane Switch

5.13.2 High Security Interlock Switch

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

(Estimated Replacement Time: 10 minutes)

1. Remove the front top lid. Refer to [5.4.2 Front Top Lid](#), on page 5-6.
2. Remove the high security lid. Refer to [5.4.3 High Security Lid](#), on page 5-7.
3. Remove the two, #2 Phillips™ screws securing the switch. (**Figure 5-69**)
4. Disconnect the harness from the switch.
5. Remove the two 5.5mm nuts from the switch.
6. Remove the interlock switch.



Figure 5-69 High Security Interlock

5.13.3 Lamp Door Interlock

The lamp door interlock is attached to a bracket that is attached to the frame of the projector. The interlock is tripped by opening the lamp door, which shuts the lamp OFF. It is positioned under the exhaust duct.

(Estimated Replacement Time: 6 minutes + 10 minute LampLOC™ Alignment)

1. Open the lamp door. Refer to [5.4.8 Lamp Door, on page 5-9](#).
2. Remove the lamp (if installed). Refer to [5.12.5 Lamp Replacement, on page 5-38](#).
3. Disconnect the red and black leads from the lamp door interlock. **NOTE:** Red lead to “No” label on interlock and black lead to “COM” label. (Figure 5-70)
4. Remove the two nuts (5.5mm) securing the switch to the bracket.

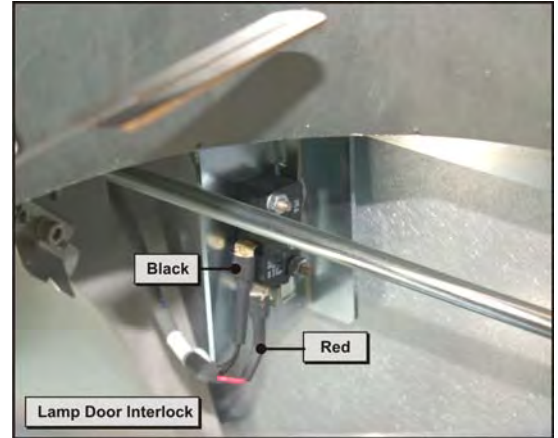


Figure 5-70 Lamp Door Interlock

5.14 Primary Lens Mount

(Estimated Replacement Time: 16 minutes + 10 minute 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. Remove the primary lens mount.
7. When replacing, repeat instructions in reverse. Once the lens mount is installed, perform Boresight Alignment. For details, refer to the *CP4230 User Manual (P/N: 020-100621-xx)*.

5.15 Lamp Power Supply (LPS)

5.15.1 Line Filter

The line filter is the only accessible assembly that can be serviced by a Christie authorized service technician. If the LPS itself is not functioning correctly the entire unit would be replaced.

(Estimated Replacement Time: 16 minutes)

1. Using a #2 Phillips™, loosen the six screws from the front skin on the LPS. **(Figure 5-71)**
2. Slide the skin to the left in order to remove it.



Figure 5-71 Remove LPS Front Skin

3. Using a #2 Phillips™, remove the six screws securing the 10 harnesses on the line filter. **(Figure 5-72)**
4. Remove the 10 harnesses.
5. Using a #2 Phillips™, remove the four screws securing the line filter to the LPS. **(Figure 5-72)**
6. Remove the line filter.

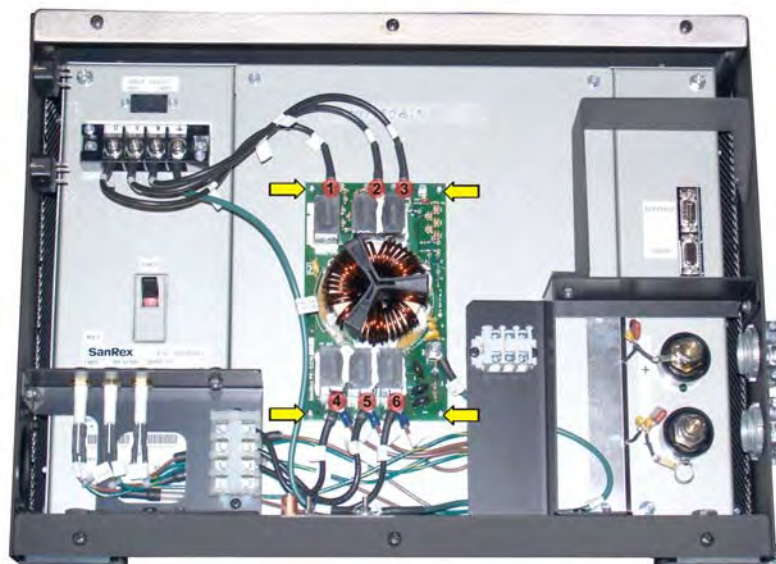


Figure 5-72 Remove Line Filter

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)

Section 6: Cleaning Projector Optics

- 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 [Section 6.3.1 Prepare the Projector for Service](#).
2. Remove the light engine and set it on a clean, lint free cloth. See [Section 5.10 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 [Section 6.3.1 Prepare the Projector for Service](#).
2. Remove the lamp. See [Section 5.12.5 Lamp Replacement](#).
3. Put on a pair of powder free latex gloves.
4. Remove the UV filter and set on a clean, lint free cloth. See [Section 5.12.10 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 [Section 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

Section 6: Cleaning Projector Optics

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 [Section 6.3.1 Prepare the Projector for Service](#).
2. Remove the lamp. See [Section 5.12.5 Lamp Replacement](#).
3. Remove the reflector. See [Section 5.12.9 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 [Section 6.3.1 Prepare the Projector for Service](#).
2. Remove the integrator. See [Section 5.8.5 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.

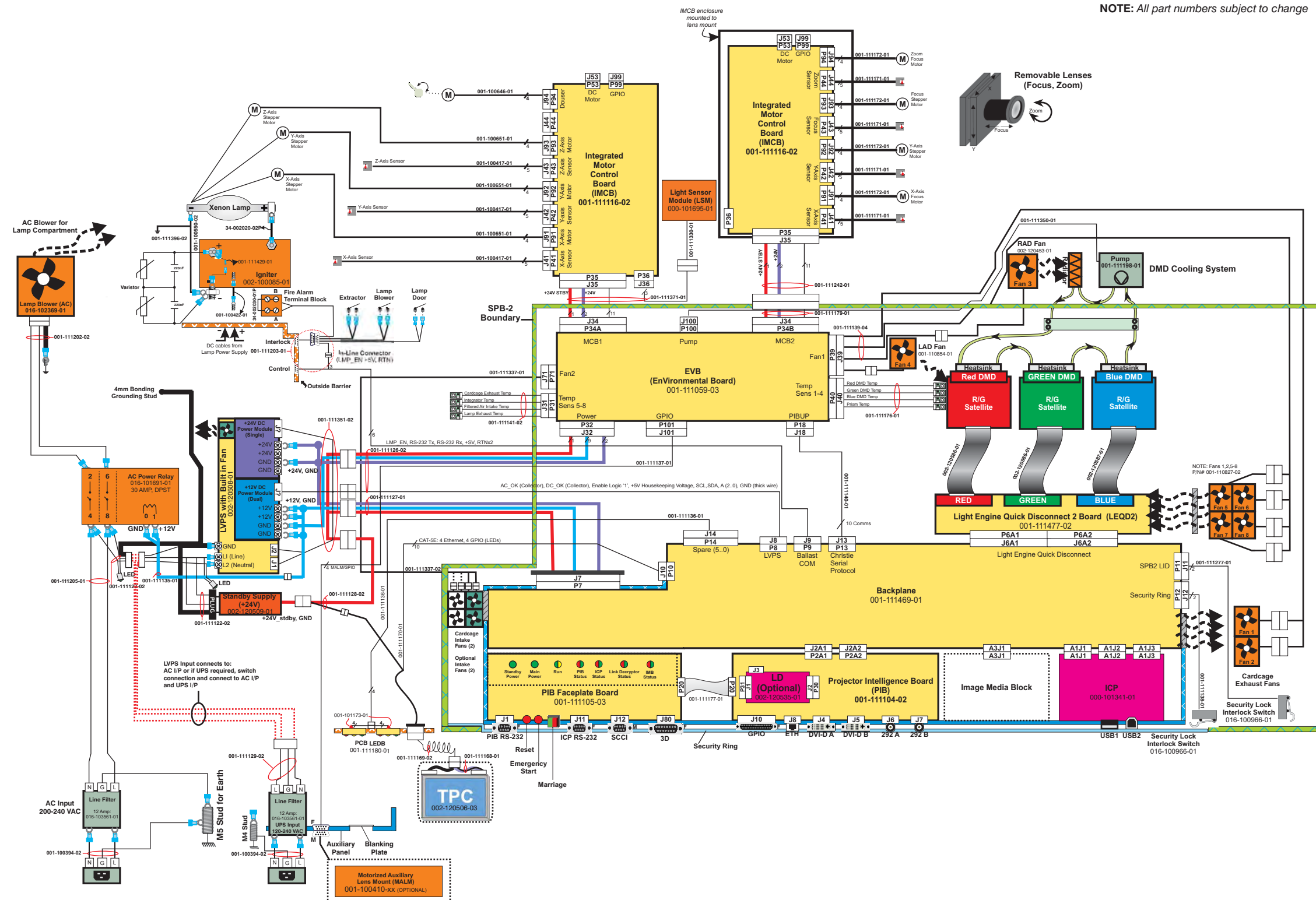
You must hold the Techspray 1671-10S canister vertically. Holding the canister at an angle can release liquid refrigerant and contaminate the projector optics.

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 *CP4230 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 CP4230 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.
<p>EXAMPLES: (BDR+PRTA6) Set baud rate on port A to 115200 bits per second (BDR+PRTA?) Get baud rate (BDR+PRTA!006 "115200)</p>	
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
<p>EXAMPLES: (CHA?) Get current active channel (CHA 108) Set channel 108 as active channel</p>	
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.
<p>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.</p>	
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
<p>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</p>	

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: (DEF 111) Restore all preference, configuration, and user controls to default. (DEF+USER 111) Clear all users and restore factory default user (DEF+CONF 111) Reset all configuration controls (DEF+PREF 111) Reset all preference controls (DEF+CHAN 101) Restore Channel 101 (DEF+CHAN 0) Restore all channels</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. Levels are: 0 = Trace: Level test output, threading info, protocol. 1 = Debug: Debug messages. 2 = Info: Informational messages. 3 = Notices: Event of importance 4 = Warning: Warnings 5 = Error: An error has occurred 6 = Clear: An error has been cleared</p>	
SUBCODE	DESCRIPTION OF USE
NONE	Set/get the minimum log level to write to the log.
EXLG	Extract entries from log files. Requires 3 parameters: "startdate", "enddate", "logtype". The data parameters require the date in the format "yyymmdd". The logtype parameter can have the following values: "ENG" (engineering), "SEC" (security), "OPR" (operational), "MAI" (maintenance), "EVE" (event), "SYS" (system), "ALL".
<p>EXAMPLES: (DLG "20091108" "20091110" "ALL") (DLG+EXLG!"Log data extracted to filename 'logextract.txt' on FTP root") (DLG 2) Set current logging level to 2 (DLG?) Get current logging level. Response is (LDG!00002 "Info")</p>	

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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)	
<p>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> <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.
<p>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</p>	
Gamma Control (GAM)	
<p>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.</p>	
SUBCODE	DESCRIPTION OF USE
Cxxx	Replace xxx with the channel number. Valid range is 101 - 164.
NONE	Select gamma for the current channel.
<p>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</p>	

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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 JJJ 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: (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)	
<p>Get help on serial commands.</p>	
SUBCODE	DESCRIPTION OF USE
NONE	Request entire command help listing or list for a single command
<p>EXAMPLES: (HLP?) Retrieve entire command help listing (HLP? "DLG") Retrieve all subcodes/descriptions for DLG control</p>	
ILS File (ILF)	
<p>Set or get the current ILS file for the current or a specific channel.</p>	
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: (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)	
<p>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.</p>	
SUBCODE	DESCRIPTION OF USE
DEVT	Set device type from the list of devices.
None	Set or query installed state of IMB.
<p>EXAMPLES: (IMI 1) Set to IMB installed. (IMI+DEVT?L) List valid device types. (IMI+DEVT?) Query current device type.</p>	
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 3 values: currently running (2 if running) and result file.
<p>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.</p>	
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
<p>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</p>	
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 re-calibration.*

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.

<p>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.</p>	
<p>Link Decrypter Installed (LDI)</p>	
<p>Access Level: Advanced Min Power Level: Power Down Set LD to installed or not installed.</p>	
SUBCODE	DESCRIPTION OF USE
None	Set to 1 to installed and 0 to not installed.
<p>EXAMPLES: (LDI 1) Set LD installed.</p>	
<p>Lamp Intensity Calibration (LEN)</p>	
<p>Define model and serial number for primary installed lens and auxiliary lens.</p>	
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
<p>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</p>	
<p>Lens Horizontal Position Adjustment (LHO)</p>	
<p>Adjust lens offset to specific horizontal position with a specified direction. NOTE: <i>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.</i> 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 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: (LHO 500 1) Move lens to position 500 along horizontal axis with positive approach (LHO 500 -1) Move lens to position 500 along horizontal axis with negative approach (LHO+C101 -500 1) Set lens horizontal position for channel 1 to -500 with positive approach (LHO ?) Return current motor position along horizontal axis and direction (-1 or 1) (LHO+CALB 1) Calibrate the horizontal axis (LHO+RSET 1) Reset the horizontal axis (LHO+STRT 1) Starts motor moving in positive direction (LHO+STOP) Stops motor (LHO+MOVR -100) Move motor 100 steps in negative direction (LHO+MOVR 200) Move motor 200 steps in positive direction</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: (LID?L) List supported lamp IDs (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 ±250.
MTRY	Moving Y-axis motor manually. Data range from ±250.
MTRZ	Moving Z-axis motor manually. Data range from ±175.
NONE	Not Available
STAT	Provides feedback (status) on the progress of the Auto mode. Read-only command. Data range from 0 to 100, where 100 indicates the LampLOC™ is finished.
<p>EXAMPLES: (LLM+MTRX 100) Move motor X to position 100 (LLM+AUTO 1) Do LampLOC™ automatically (LLM+AUTO 0) Abort LampLOC™. It will restore the motors to previous position automatically (LLM+AUTO?) Get running status. (LLM+AUTO!000) indicates finished, (LLM+AUTO!001) indicates running (LLM+STAT ?) Get the progress feedback of the Auto mode (0-100%)</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

<p>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</p>	
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
<p>EXAMPLES: (LPH?) Get usage in hours (LPH+FLSK?) Get lamp strikes</p>	
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: <i>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.</i>	
SUBCODE	DESCRIPTION OF USE
Cxxx	Replace Cxxx with the channel number. Valid range is 101-164.
NONE	Set lamp intensity for the current channel.
<p>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</p>	
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.

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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.

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 1080/4096 x 2160
Processing path	23.97 - 120Hz
3D (24 fps per eye input, DLP Cinema® Processing), Full Image (2048 x 1080)	144 Hz (frame tripled)

9.1.2 Maximum Lumen Output (Center Lumens)

	<u>Maximum</u>
2.0 kW (CDXL-20LB)	8,000 lumens
2.0 kW (CDXL-20SP)	10,000 lumens
2.0 kW (CDXL-20)	10,000 lumens
3.0 kW (CDXL-30SP)	19,000 lumens
3.0 kW (CDXL-30)	19,000 lumens
4.5 kW (CDXL-45SP)	26,000 lumens
4.5 kW (CDXL-45)	26,000 lumens
6.0 kW (CDXL-60SP)	34,000 lumens
6.0 kW (CDXL-60)	34,000 lumens

9.1.3 Achievable Contrast Ratio

450:1 ANSI, 1850:1 Full Frame ON/OFF

9.1.4 Color and Grayscale Resolution

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

9.1.5 White Point

Theatres:	$x = 0.314 \pm 0.002$
Nominal White (full white, after calibration to Telecine mode)	$y = 0.351 \pm 0.002$
Review Rooms:	$x = 0.314 \pm 0.002$
Nominal White (full white, after calibration to Telecine mode)	$y = 0.351 \pm 0.002$

9.1.6 Gamma

Theater (nominal)	$2.6 \pm 5\%$
Review Rooms (nominal)	$2.6 \pm 2\%$

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)
	640x 480	up to 60	Progressive	up to 60
	720 x 525	up to 60	Interlaced	up to 60
SMPTE 296M	1280 x 720	23.98 / 24	Progressive	23.98 / 24
SMPTE 296M	1280 x 720	25	Progressive	25
SMPTE 296M	1280 x 720	29.97 / 30	Progressive	29.97 / 30
SMPTE 296M	1280 x 720	48	Progressive	48
SMPTE 296M	1280 x 720	50	Progressive	50
SMPTE 296M	1280 x 720	59.94 / 60	Progressive	59.94 / 60
SMPTE 274M	1920 x 1080	23.98 / 24	Progressive	23.98 / 24
SMPTE 274M	1920 x 1080	25	Progressive	25
SMPTE 274M	1920 x 1080	29.97 / 30	Progressive	29.97 / 30
SMPTE 295M	1920 x 1080	50	Interlaced	25
SMPTE 274M	1920 x 1080	50	Interlaced	25
SMPTE 274M	1920 x 1080	59.94/60	Interlaced	29.97/30
SMPTE RP 211	1920 x 1080	23.98/24	Progressive (sF)	23.98/24
SMPTE RP 211	1920 x 1080	25	Progressive (sF)	25
SMPTE RP 211	1920 x 1080	29.97/30	Progressive (sF)	29.97/30
SMPTE RP 428-9	2048 x 1080	24	Progressive	24
SMPTE RP 428-9	2048 x 1080	24	Progressive (sF)	24
SMPTE RP 428-19	2048 x 1080	25	Progressive	25
SMPTE RP 428-19	2048 x 1080	25	Progressive (sF)	25

Source Standard	Original Source Resolution	Vertical Frequency (Hz)	Scan Type	Display Frame Rate (Hz)
SMPTE RP 428-19	2048 x 1080	30	Progressive	30
SMPTE RP 428-19	2048 x 1080	30	Progressive (sF)	30

Table 9.2 Dual-link SMPTE 372M Formats

Source Standard	Original Source Resolution	Vertical Frequency (Hz)	Scan Type	Display Frame Rate (Hz)
	640x 480	up to 60	Progressive	up to 60
	720 x 525	up to 60	Interlaced	up to 60
SMPTE 296M	1280 x 720	23.98 / 24	Progressive	23.98 / 24
SMPTE 296M	1280 x 720	25	Progressive	25
SMPTE 296M	1280 x 720	29.97 / 30	Progressive	29.97 / 30
SMPTE 296M	1280 x 720	48	Progressive	48
SMPTE 296M	1280 x 720	50	Progressive	50
SMPTE 296M	1280 x 720	59.94 / 60	Progressive	59.94 / 60
SMPTE 274M	1920 x 1080	23.98 / 24	Progressive	23.98 / 24
SMPTE 274M	1920 x 1080	25	Progressive	25
SMPTE 274M	1920 x 1080	29.97 / 30	Progressive	29.97 / 30
SMPTE 295M	1920 x 1080	50	Interlaced	25
SMPTE 274M	1920 x 1080	50	Interlaced	25
SMPTE 274M	1920 x 1080	59.94/60	Interlaced	29.97/30
SMPTE RP 211	1920 x 1080	23.98/24	Progressive (sF)	23.98/24
SMPTE RP 211	1920 x 1080	25	Progressive (sF)	25
SMPTE RP 211	1920 x 1080	29.97/30	Progressive (sF)	29.97/30
SMPTE RP 428-9	2048 x 1080	24	Progressive	24
SMPTE RP 428-9	2048 x 1080	24	Progressive (sF)	24
SMPTE RP 428-19	2048 x 1080	25	Progressive	25
SMPTE RP 428-19	2048 x 1080	25	Progressive (sF)	25
SMPTE RP 428-19	2048 x 1080	30	Progressive	30
SMPTE RP 428-19	2048 x 1080	30	Progressive (sF)	30
SMPTE 292 x 2	2048 x 1080	24 x 2	Progressive	96 or 144

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NOTES: 1) All formats supported at 10 bit 4:2:2 YCbCr or lower. **** DCI formats (SMPTE 428-9)** are supported at 12 bit 4:4:4 XYZ. **2)** When both SMPTE 292M inputs are used together in a dual-link configuration they will support all the formats listed in Table 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 9.3 Format for Generic Inputs to DVI-D Ports, Single-Link

NOTE: All formats listed are 4:4:4 RGB.

Source Pixel Format	Bits / Comp	Vertical Rates
640 x 480	8	59.94 / 60 Hz
1280 x 720	8	59.94 / 60 Hz
1920 x 1080	8	59.94 / 60 Hz
720 x 480	8	59.94 / 60 Hz
1280 x 720	8	50 Hz
1920 x 1080	8	50 Hz
1440 x 480	8	59.94 / 60 Hz
1920 x 1080	8	59.94 / 60 Hz
1440 x 576	8	50 Hz
1920 x 1080	8	23.98 / 24 Hz
1920 x 1080	8	25 Hz
1920 x 1080	8	29.97 / 30 Hz

Table 9.4 Format for Generic Inputs to DVI-D Ports, Twin Link

NOTE: All formats listed are 4:4:4 RGB.

Source Pixel Format	Bits / Comp	Vertical Rates
640 x 480	10	59.94 / 60 Hz
1280 x 720	10	59.94 / 60 Hz
1920 x 1080	10	59.94 / 60 Hz
1280 x 720	10	50 Hz
1920x1080	10	50 Hz
1440 x 480	10	59.94 / 60 Hz
1920 x 1080	10	59.94 / 60 Hz
1440 x 576	10	50 Hz
1920 x 1080	10	50 Hz

Table 9.4 Format for Generic Inputs to DVI-D Ports, Twin Link

NOTE: All formats listed are 4:4:4 RGB.

Source Pixel Format	Bits / Comp	Vertical Rates
1920 x 1080	10	23.98 / 24 Hz
1920 x 1080	10	25 Hz
1920 x 1080	10	29.97 / 30 Hz

9.3 Control Signal Compatibility

9.3.1 Ethernet Port

Interface	10Base-T/100-Base-TX
Connector	Female RJ-45
Bit Rate	100 Mbps

9.3.2 RS232-PIB

Interface	TIA-232
Connector	9-pin subminiature D, female
Bit Rate	115,200 bps
Data Format	1 start bit, 8 data bits, 1 stop bit, no parity
Communication Protocol	Christie Serial Protocol

9.3.3 RS232-ICP

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

9.3.4 GPIO Port

Interface	Opto-LED inputs, transistor outputs
Connector	37-pin subminiature D, female
Number of I/O Lines	16 - 8 inputs, 8 outputs including 1 health signal output
Type of Connection	Opto-isolated
Input Current	5mA nominal, 50mA maximum
Output Current	50mA maximum
Input Forward Voltage Drop	1.1V nominal, 1.4V maximum (@5mA)

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 nominal, 1.4V maximum (@5mA)

9.3.6 3D Port

Interface	Proprietary 3D connector
Connector	15-pin subminiature D, female
Bit Rate	1,200 bps
Flow Control	Software
Data Format	1 start bit, 8 data bits, 1 stop bit, no parity
Communication Protocol	RS232 and GPIO

9.3.7 Lamp Power Supply (LPS)

Control Port

Interface	RS232
Connector at Lamp Power Supply End	9-pin subminiature D, male

Interlock Port

Interface	+5V TTL-compatible, opto-isolated at LPS end
Connector at Lamp Power Supply End	9-pin subminiature D, female
Number and Type of Signals	1 - lamp enable (low = enable lamp) 3 - safety interlock (high = disable lamp) 1 - +5V to power opto-isolation interface

9.3.8 MALM (located on Auxiliary Input Panel)

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

9.4 Touch Panel Controller (660E)

Type of Display	Color VGA TFT LCD, backlit
Display Size	144.8 mm (5.7 inches) diagonal
Display Resolution (H x V pixels)	640 x 480
Maximum Dimensions (W x H x D)	195 mm x 148 mm x 44.4 mm
Integrated Operating System	Microsoft Windows® XPe
Communication Interface with Projector	10/100BaseT Ethernet
Power Requirement	1.02 A maximum at 24VDC \pm 10%
Interface Connector	12-pin Circular connector (push-pull)

9.5 Touch Panel Controller (650H)

Type of Display	Color VGA TFT LCD, backlit
Display Size	144.8 mm (5.7 inches) diagonal
Display Resolution (H x V pixels)	640 x 480
Maximum Dimensions (W x H x D)	195 mm x 148 mm x 58 mm
Integrated Operating System	Microsoft Windows® XPe
Communication Interface with Projector	10/100/1000 BaseT Ethernet
Power Requirement	0.71A maximum at 24VDC \pm 10%
Interface Connector	12-pin Circular connector (push-pull)

9.6 Power Requirements

9.6.1 Projection Head

AC Input

Voltage Range	200 - 240 VAC
Line Frequency	50 Hz - 60 Hz nominal
Inrush Current	70 A maximum
Current Consumption	6 A maximum (at 200 VAC)
Power Consumption	120 W maximum
Current Rating of AC Input	10-15 A maximum (Specified Wall Breaker)

Lamp (DC)

Operating Voltage Range	18-46 VDC
Start-up Voltage (Open Current)	135-175 VDC
Operating Current Range	50-180 A
Connector Type	Field Wireable Lugs

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9.6.2 7kW Lamp Power Supply

Nominal Voltage Range	Low line: 200-230 VAC High line: 380-415 VAC
Operating Voltage Range	Low line: 180-253 VAC High line: 342-456 VAC
Number of Phases	3
Line Frequency	50-60Hz nominal
Inrush current	120 A max.
Current per Phase	Low line: 35 A max. High line: 23 A max.
Power Consumption	8.8 kW max. (at max. output for 6kW lamp plus head)
Current Rating of 3Phase AC Input	37A

Lamp Power Supply Output to Projection Head

Operating Voltage Range	18-46 VDC
Start-up Voltage (Open Current)	125-155 VDC
Operating Current Range	50-180 A
Ripple	1% max (at 25°C, rated input and rated output)
Connector Type	Field Wireable Lugs

Lamp Power Supply Power Receptacle Output

Operating Voltage Range	200-230 VAC
Operating Current Range - Projection Head	6 A
Operating Current Range - Heat Extractor	1 A
Current Rating of Input	Both run from 15 A breaker (internal)

9.6.3 UPS AC Input

Voltage Range	100 - 240 VAC
Line Frequency	50 Hz - 60 Hz nominal
Inrush Current	70 A maximum
Current Consumption	12 A maximum at 100 VAC
Power Consumption	1200 W maximum
Current Rating of AC Input	15 A maximum (Specified Wall Breaker)

9.7 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	1800W min., 3000W nom., 3300W max.
CDXL-30	1800W min., 3000W nom., 3300W max.
CDXL-45SP	2700W min., 4500W nom., 4950W max.
CDXL-45	2700W min., 4500W nom., 4950W max.
CDXL-60SP	3600W min., 6000W nom., 6600W max.
CDXL-60	3600W min., 6000W nom., 6600W max.

NOTES: 1) The lamp power supply is current regulated to a maximum of 180 A. Therefore the maximum power specification for a given lamp may not be achievable until the lamp has aged, since lamp voltage increases with hours of use.

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

Average Life:	
CDXL-20LB	3500 hours
CDXL-20SP	4000 hours
CDXL-20	3500 hours
CDXL-30SP	2800 hours
CDXL-30	2500 hours
CDXL-45SP	1500 hours
CDXL-45	1200 hours
CDXL-60SP	1100 hours
CDXL-60	900 hours

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.

9.8 Physical Specifications

Overall Size (L x W x H):	1211 mm (47.7 inches) x 635 mm (25.0 inches) x 483 mm
<i>(including lens mount, stack and feet)</i>	<i>(19.0 inches)</i>
Weight:	
As installed with lens	111 kg (245 lbs)
Shipping (includes packaging)	143 kg (315 lbs)
Operating Position:	
Rotation about projection axis	± 15 degrees maximum
Tilt of projection axis from horizontal	± 15 degrees maximum

9.9 Regulatory

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

9.9.1 Safety

CAN/CSA C22.2 No. 60950-1-07, 2007

UL 60950-1, 2nd Edition

IEC 60950-1:2005, 2nd Edition

EN60950:2006+A11:2009

9.9.2 Electro-Magnetic Compatibility

Emissions

FCC CFR47, Part 15, Subpart B, Class A - Unintentional Radiators

CISPR 22:2008-09/EN 55022:2006+A1:2007, Class A - Information Technology Equipment

Immunity

CISPR 24:1997 (Modified) +A1:2001+A2:2002/ EN55024: 1998+A1:2001+A2:2003 EMC

Requirements - Information Technology Equipment

Environmental

EU Directive (2002/95/EC) on the 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)

Japanese industrial standard (JIS C 0950:2005) on marking for the presence of specific chemical substances for electrical and electronic equipment.

China Ministry of Information Industry Order No.39 (02/2006) on the control of pollution caused by electronic information products, hazardous substances concentration limits (SJ/T11363-2006), and the applicable product marking requirements (SJ/T11364-2006)

9.10 Environment

9.10.1 Operating Environment

Temperature	10°C to 35°C (50°F to 95°F)
Humidity (non-condensing)	20% to 80%
Altitude	0 - 3000 meters
Maximum ambient temperature	35°C

9.10.2 Non-Operating Environment

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

9.11 Accessories

9.11.1 Standard (Included with product)

Touch Panel Controller (TPC) with interface cable
User Manual and Setup Guide
Interconnect Diagram
Lens Mount Cover
Motors and Zoom kit for motorized lens mount
Light Engine removal tool
Convergence tool

9.11.2 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 (38-809079-51)
- 1.45-1.8 DLPCine HC Zoom Lens (38-809061-51)
- 1.8 - 2.4 DLPCine HC Zoom Lens (38-809052-01)
- 2.2-3.0 DLPCine HC Zoom Lens (38-809053-01)
- 3.0-4.3 DLPCine HC Zoom Lens (38-809069-01)
- 4.3-6.1 DLPCine HC Zoom Lens (38-809081-01)
- 5.5-8.5 DLPCine HC Zoom Lens (38-809080-01)

Auxiliary Lenses

- 1.25x Anamorphic Lens (38-809054-01, 38-809054-51)
- 1.26x Wide Converter Lens (108-281101-01)

NOTE: *Use of the Anamorphic or Wide Converter Lens requires the Motorized Auxiliary Lens Mount (MALM).*

- Motorized Auxiliary Lens Mount (108-111101-xx & 108-111102-xx)
- Rack Stand (108-282101-02)
- Bracket Foot Lock *used with optional Rack Stand* (116-100101-01)
- High-contrast Internal Aperture Kit (38-813028-51)
- Service Manual (*available online*)
- Replacement Lamps
 - 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--004253-02 CDXL-45SP
 - 003-000600-03 CDXL-45
 - 003-004254-02 CDXL-60SP
 - 003-000601-03 CDXL-60
- Replacement Air Filters
 - 003-001184-01 Light Engine Filter (5-pack)
 - 003-003082-01 Liquid Cooling Radiator Filter
 - 03-001982-51P LAD Filter (3-pack)
- DLP Cinema™ Firmware Installation Program
- Liquid Cooling Kit (003-001837-xx)
- TPC Remote Cable (003-111169-01)
- Link Decrypter (003-120535-01)

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 CP4230 Exploded View Index

EXPLODED VIEW LABEL	PART NAME/DESCRIPTION
1	Lens
2	Lens Mount Manual
3	Knockout Plate
4	Front Faceplate
5	Light Engine Assembly
6	LAD Filter (3 Pack)
7	Fan - LAD (12V DC 50mm)
8	Light Sensor PCB
9	Yellow Notch Filter (1 filter, disposable nitrile gloves)
10	Fold Mirror
11	Cold Mirror
12	Integrator Assembly (includes holder, disposable nitrile gloves)
13	Fold Mirror Cover Plate
14	AC Terminal Block
15	AC Terminal Cover Plate
16	Radiator Fan
17	Radiator Air Filter (1 per kit)
18	Anode Yoke Assembly
19	Left Access Cover
20	Ceramic Plate
21	Douser Motor Assembly
22	Douser Knob
23	Stepper Motor
24	IMCB
25	Lamp Adjuster
26	Cathode Lamp Duct
27	Reflector
28	Lamp
29	UV Filter
30	Liquid Cooling Assembly
31	Quick Disconnects for Liquid Cooling Assembly
32	5mm Hex Key
33	EVB PCB (aka Environmental Board)
34	Vane Switch - Main Blower
35	Rear Crossbar
36	Exhaust Duct

EXPLODED VIEW LABEL	PART NAME/DESCRIPTION
37	Vane Switch - Exhaust
38	Bracket - Main Blower
39	Line Filter
40	Fan - Light Engine Intake (12V .6A 4-wire)
41	Igniter
42	Fan - Main AC Blower
43	Standby Power Supply
44	Low Voltage Power Supply
45	High Security Lid
46	Cardcage Frame
47	Fan - Cardcage Exhaust
48	EMI Shield Cover
49	Fan - Cardcage Exhaust
50	Light Engine Quick Disconnect (LEQD) PCB
51	Backplane PCB
52	Fan - Cardcage Intake
53	PIB PCB
54	ICP PCB
55	Security Ring
56	Cardcage
57	Lamp Power Supply (LPS)
58	Front Baffle
59	Front Top Lid
60	Rear Lid
61	Cover - Left Access
62	Radiator Air Filter Cover
63	Lamp Door
64	Shroud
65	Touch Panel Controller (TPC)
66	Back Panel
67	Cover - LVPS/LPS
68	Access Panel Frame
69	Cover - PIB/ICP
70	Cover - Light Engine Air Filter

A.1 Exploded View - Internal

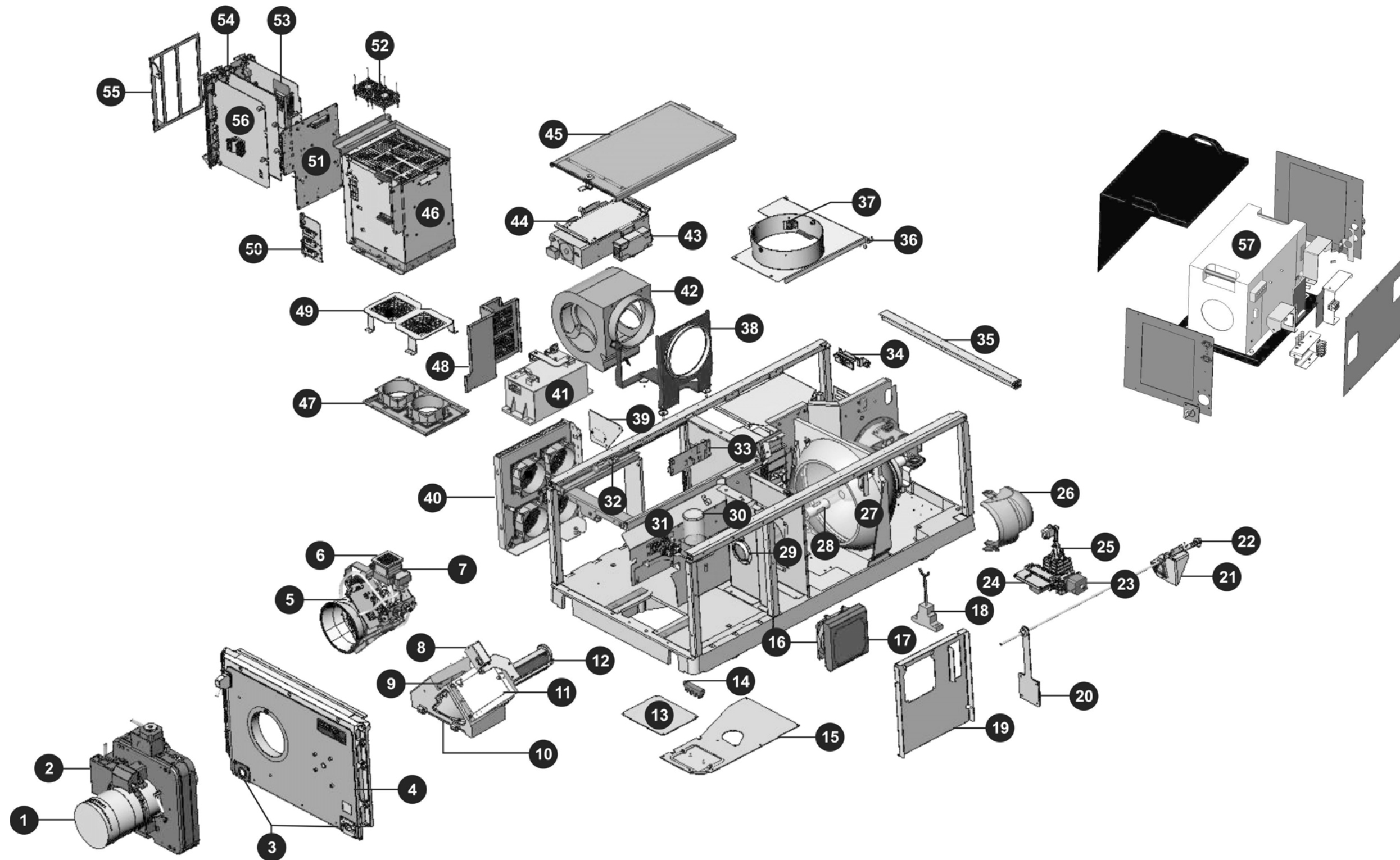


Figure A-1 Exploded View - Internal

A.2 Exploded View - External

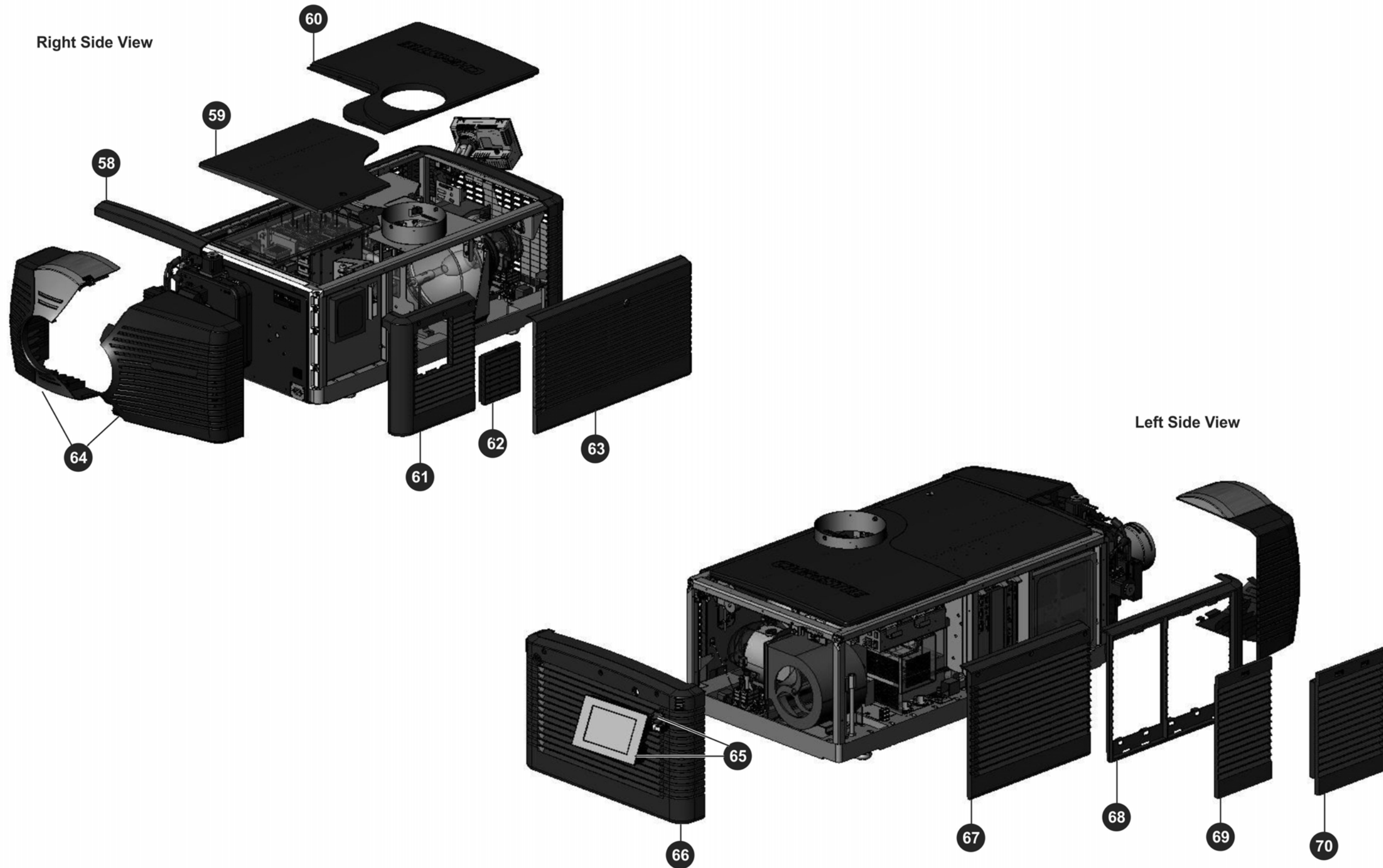


Figure A-2 Exploded View - External

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