Service Guide
020-103980-05

Christie Sapphire® 4K40-RGBH

CHRISTIE®

NOTICES

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For the most current technical documentation and office contact information, visit *https://www.christiedigital.com/*.

Warranty

Products are warranted under Christie's standard limited warranty, the details of which are available at *https://www.christiedigital.com/help-center/warranties/* or by contacting your Christie dealer or Christie.

REGULATORY

The product has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the product is operated in a commercial environment. The product generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of the product in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at the user's own expense. Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment

CAN ICES-3 (A) / NMB-3 (A)

이 기기는 업무용(A급)으로 전자파적합등록을 한 기기이오니 판매자 또는 사용자는 이점을 주의하시기 바라며, 가정 외의 지역에서 사용하는 것을 목적으로 합니다.

ENVIRONMENTAL

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

If printing this document, consider printing only the pages you need and select the double-sided option.

Please help us to conserve the environment we live in!

Notation

Learn the hazard and information symbols used in the product documentation.

Danger messages indicate a hazardous situation which, if not avoided, results in death or serious injury.

Warning messages indicate a hazardous situation which, if not avoided, could result in death or serious injury.

Caution messages indicate a hazardous situation which, if not avoided, could result in minor or moderate injury.

Notice messages indicate a hazardous situation which, if not avoided, may result in equipment or property damage.

Information messages provide additional information, emphasize or provide a useful tip.

Content

Important safety and warning guidelines

Read all safety and warning guidelines before installing or operating the projector.

This projector must be operated in an environment that meets the operating range specification. Use only the attachments and/or accessories recommended by Christie. Use of others may result in the risk of fire, shock, or personal injury.

Warning! If not avoided, the following could result in death or serious injury.

- This product must be operated in an environment that meets the operating range as specified in this document.
- Do not look directly into the lens when the light source is on. The extreme high brightness can cause permanent eye damage.
- EXTREME BRIGHTNESS! When accessing a restricted access location for product service or maintenance, avoid exposure to the product beam path by turning off the product power and disconnecting the product from AC power, or by shuttering the light source to avoid emissions from the front aperture.
- FIRE HAZARD! Keep hands, clothes, and all combustible material away from the concentrated light beam of the projector.
- Keep fingers and other body parts away from the moving parts in the product. Tie back long hair, and remove jewelry and loose clothing before manually adjusting the product.
- FIRE AND SHOCK HAZARD! Use only the attachments, accessories, tools, and replacement parts specified by Christie.
- Do not operate the product without a lens installed.
- Always use a lens plug when installing or moving the product. This prevents contaminants from entering the product.
- UV EXPOSURE! Protective UV safety glasses with side shields and protective safety clothing approved by Christie must be worn when performing optical adjustments or servicing the product.
- RADIATION HAZARD! Use of controls or adjustments, or performing procedures other than those specified may result in hazardous radiation exposure.
- EXPLOSION HAZARD! Replacement battery must be of the correct type.
- EXPLOSION HAZARD! Dispose of the battery according to local area regulations.

Caution! If not avoided, the following could result in minor or moderate injury.

- SHOCK HAZARD! Disconnect the product from AC before installing, moving, servicing, cleaning, removing components, or opening any enclosure.
- Christie products must be installed and serviced by Christie qualified technicians.
- TRIP OR FIRE HAZARD! Position all cables where they cannot contact hot surfaces, be pulled, be tripped over, or damaged by persons walking on or objects rolling over the cables.

Notice. If not avoided, the following could result in property damage.

- SHOCK HAZARD! All harnessing must be properly routed and secured as originally installed, especially in high voltage areas.
- FIRE HAZARD! Do not use a power cord, harness, or cable that appears damaged.

Service precautions

Read all service guidelines before installing or operating the projector.

Warning! If not avoided, the following could result in death or serious injury.

- Only Christie qualified technicians who are knowledgeable about the hazards associated with laser use, high-voltage, and high temperatures generated by the product are authorized to assemble, install, and service the Christie Laser Projection System.
- EXTREME BRIGHTNESS! When accessing a restricted access location for product service or maintenance, avoid exposure to the product beam path by turning off the product power and disconnecting the product from AC power, or by shuttering the light source to avoid emissions from the front aperture.
- SHOCK HAZARD! Disconnect the product from AC before installing, moving, servicing, cleaning, removing components, or opening any enclosure.
- SHOCK HAZARD! Always turn off power when servicing optics or apertures.
- Use protective eye wear and gloves. Follow workplace guidelines for using personal protective equipment when installing, cleaning, and servicing the product.
- Observe all electrostatic precautions. Use a grounded wrist strap and insulated tools when handling, servicing, or cleaning electronic assemblies.
- HIGH VOLTAGE HAZARD! When adjusting the laser optical subsystem (LOS) coupling mirror, use care to avoid the adjustment tool making contact with the 54V power supply.
- Prior to rigging the projector, inspect the quarter-turn fasteners on the covers to make sure they are safely secured.
- Prior to rigging the projector, always tighten the lock nut on the projector feet against the bottom of the projector to lock the feet. Otherwise, the feet must be removed.

Caution! If not avoided, the following could result in minor or moderate injury.

- PERSONAL INJURY HAZARD! Due to weight, use caution when lifting, installing, or moving the laser optical subsystem (LOS).
- PERSONAL INJURY HAZARD! Due to weight, use caution when lifting, installing, or moving the light engine.

Servicing live equipment

Only Christie accredited technicians who are knowledgeable about the hazards associated with hazardous voltage and high temperatures are authorized to assemble, install, and service Christie equipment.

To make sure you remain safe when servicing energized (live) Christie equipment:

- Locate the main AC power shut off prior to servicing the equipment. This allows you to turn off the power quickly in an emergency.

- Disconnect the projector from the communication and management network so it cannot receive commands to turn on the light source, open the shutter, and move the lens.
- Familiarize yourself with all potential safety hazards prior to servicing the equipment. This includes, but is not limited to, the location and accessibility of hazardous voltages.
- Read and understand all written procedures prior to commencing a service procedure.
- Understand and follow all local safety codes and requirements when servicing energized (live) equipment.
- Perform equipment service in a location free of obstructions and other hazards. For example, you must have an unobstructed view of the area being serviced.

Wear personal protective equipment (PPE) clothing appropriate to the service you are performing. This includes, but is not limited to, protective (electrically insulated) footwear, safety glasses, and gloves rated for the working voltage of the equipment you are servicing.

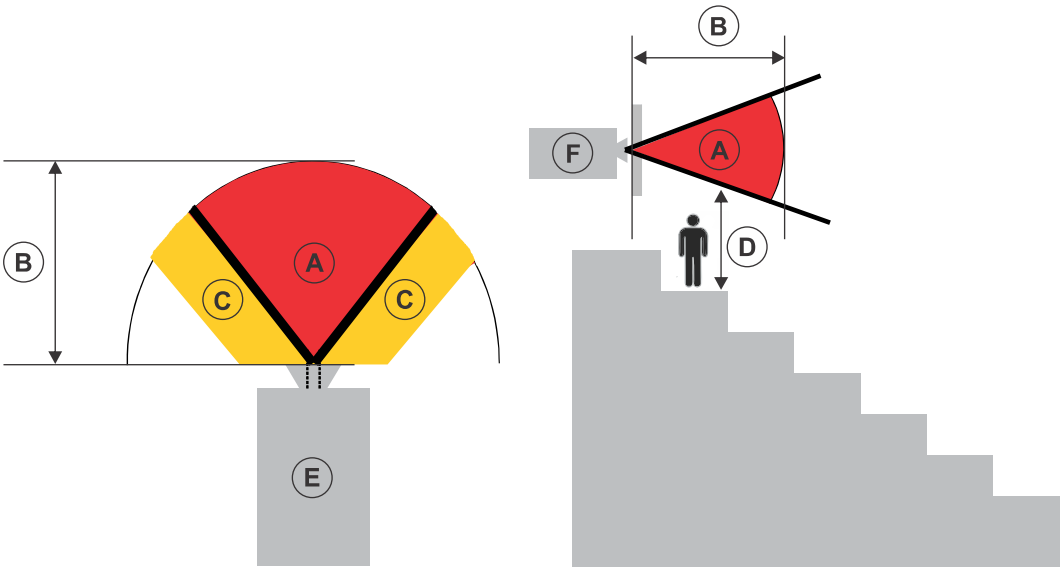
Light intensity hazard distance

This projector has been classified as Risk Group 3 as per the IEC62471 standard due to possible hazardous optical and thermal radiation being emitted.

Warning! If not avoided, the following could result in serious injury.

- PERMANENT/TEMPORARY BLINDNESS HAZARD! No direct exposure to the beam must be permitted. Class 1 Laser Product - Risk Group 3 according to IEC 60825-1:2014 and IEC 62471-5:2015.
- PERMANENT/TEMPORARY BLINDNESS HAZARD! Operators must control access to the beam within the hazard distance or install the product at the height that prevents exposure of spectators' eyes within the hazard distance. The hazard and no access zones are based on the type of venue the projector is installed in. For restrained environments, the hazard zone must be no lower than 2.5 meters/8.2 feet (US installations) or 2.0 meters/6.6 feet (global installations) above any surface upon which any persons are permitted to stand and the horizontal clearance to the hazard zone must be a minimum 1.0 meters (3.3 feet). For unrestrained environments, the hazard zone must be no lower than 3.0 meters (9.8 feet) above the floor and the horizontal clearance to the hazard zone must be a minimum 2.5 meters (8.2 feet).
- EXTREME BRIGHTNESS! Do not place reflective objects in the product light path.

The following show the zones for ocular and skin hazard distances.



- A—Hazard zone. The region of space where the projection light from the projector is above emission limits for Risk Group 2. The light intensity may cause eye damage after a momentary or brief exposure (before a person can avert their eyes away from the light source). The light may cause skin burns to occur.
- B—Hazard distance. Operators must control access to the beam within the hazard distance or install the product preventing potential exposure of the spectators' eyes from being in the hazard distance.
- C—No access zone. The no access zone must be followed based on the type of venue the projector is installed in.
  - For restrained environments like theaters and facilities where the audience is controlled with formal structures, supervision, or physical constraints, the no access zone must be no less than 1.0 meters (3.3 feet).
  - For unrestrained environments like a concert venue or facility that has actions by individuals that are not controlled or guided by formal structures, supervision, or physical constraints and therefore may include unexpected actions that increase the likelihood of accidental hazardous exposure to optical radiation, the no access zone must be no less than 2.5 meters (8.2 feet).
- D—Vertical distance to hazard zone. The hazard zone above the floor must be followed based on the type of venue the projector is installed in.
  - For restrained environments like theaters and facilities where the audience is controlled with formal structures, supervision, or physical constraints, the hazard zone must be no lower than 2.5 meters/8.2 feet (US installations) or 2.0 meters/6.6 feet (global installations) above any surface upon which any persons are permitted to stand.
  - For unrestrained environments like a concert venue or facility that has actions by individuals that are not controlled or guided by formal structures, supervision, or physical constraints and therefore may include unexpected actions that increase the likelihood of accidental hazardous exposure to optical radiation, the hazard zone must be no lower than 3.0 meters (9.8 feet) above the floor.

  If the vertical distance to hazard zone requirement (Zone D) is satisfied, the horizontal clearance distance (Zone C) is not needed.
- E—Represents the top view of the projector.

- F—Represents the side view of the projector.

For information detailing the hazard distance for each lens, refer to the *Christie Sapphire® 4K40-RGBH Installation and Setup Guide (P/N: 020-103979-XX)*.

For Installations in the United States

The following must be in place for laser-illuminated projector installations in the United States:

- Any human access to the hazard zone, if applicable, must be restricted by barriers to enforce the no access zone.
- Permanent show installations containing Risk Group 3 laser-illuminated projectors must meet the following conditions:
  - Installed by Christie or by Christie-authorized and trained installers.

    Refer to the EXTERNAL - Laser safety awareness training (Course code: CS-ELSA-01) on the *http://www.christieuniversity.com* site.
  - Performed according to instructions provided by Christie.
  - Make sure the projection system is securely mounted or immobilized to prevent unintended movement or misalignment of the projections.
- A copy of the FDA variance approval letter must be with the operator or other responsible individual.
- Temporary show installations containing Risk Group 3 laser-illuminated projectors may be installed by Christie or sold or leased only to valid laser light show variance holders (laser light show manufacturers) for image projection applications. Such manufacturers may currently hold a valid variance for production of Class IIIb and IV laser light shows and/or for incorporation of the Risk Group 3 laser-illuminated projectors into their shows. This requirement applies also to dealers and distributors of these laser-illuminated projectors.
- For temporary installations, the FDA variance holder must maintain complete records of all show itineraries with dates, locations, operator name, and contact information clearly and completely identified.
- The Christie Laser Projection System Installation Checklist must be fully completed after the installation and sent to *lasercompliance@christiedigital.com*. A copy can remain on-site. This checklist can be found as a separate document in the accessory box with the manual.
- Certain US states have additional laser regulatory requirements. Contact *lasercompliance@christiedigital.com* for additional regulatory requirements.

Introduction

This manual is intended for professionally trained operators of Christie high-brightness projection systems.

The illustrations in this document are for representation only and may not depict your model exactly.

Only Christie qualified technicians who are knowledgeable about the hazards associated with laser use, high-voltage, and the high temperatures generated by the projector lasers are authorized to assemble, install, and service the projector.

For complete Christie Sapphire® 4K40-RGBH product documentation and technical support, go to *www.christiedigital.com*.

What's new in the guide?

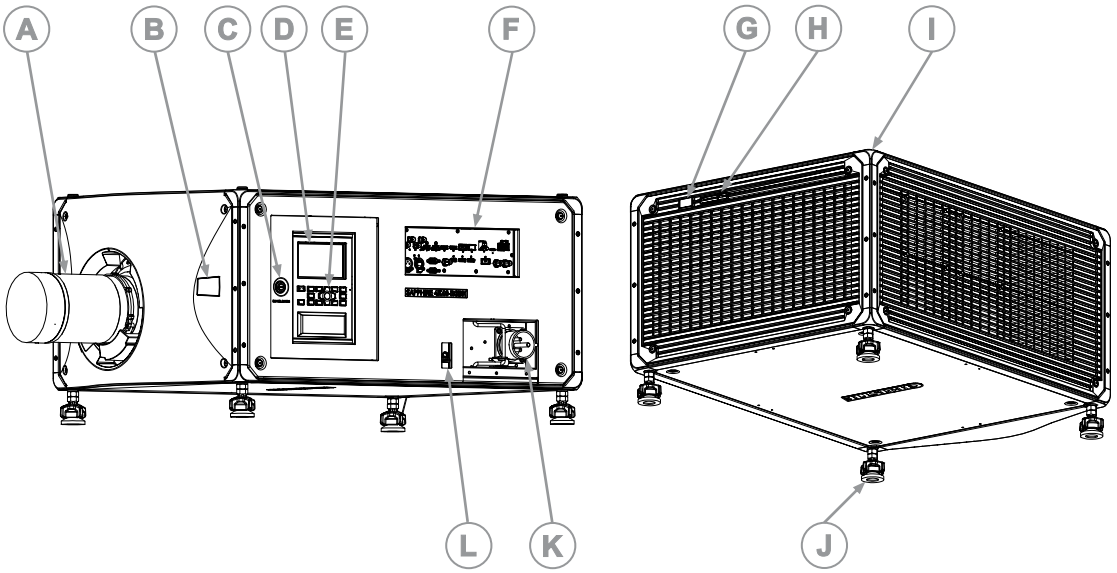
The following updates have been made to the guide.

- Highlighted why optimizing the integrator zoom is a critical adjustment the in the *Optimizing the integrator zoom and focus* (on page 23) topic.
- Added additional light engine part numbers to the *Index of parts and modules* (on page 42), *Optics index of parts and modules* (on page 106), and *Light engine* (on page 112) topics.
- Added the optimizing the integrator zoom notice to the following topics:
  - *Fold mirror adjustment assembly* (on page 108)
  - *Zoom focus assembly* (on page 112)
  - *Light engine* (on page 112)
  - *Blue laser modules 1 and 2* (on page 114)
  - *RGB module* (on page 116)
  - *Phosphor module* (on page 118)

Projector components

Identify the main components of the projector.

The illustrations in this topic are for representation only and may not depict your projector model exactly.



ID	Component	Description
A	Projection lens	A variety of lenses can be used with the projector. Available lenses are listed in the *Christie Sapphire® 4K40-RGBH Service Guide (P/N: 020-103980-XX)*.
B	Front IR	Receives transmissions from the IR remote.
C	Service door	Provides access to the fold mirror, optical zoom/focus, and digital micromirror device (DMD) convergence adjustments as well as the tools for Christie qualified technicians.
D	Display panel	Displays the projector menus and status.
E	Keypad interface	Controls the projector.
F	Communication and input panel	Connects media sources to the Video Input panel.
G	Rear IR	Receives transmissions from the IR remote.
H	LED and shutter LED status indicator	Indicates power status and shutter status.
I	Mounting and rigging holes	M12 x 1.75 holes for projector feet installation and for mounting and rigging points. Four holes located on the top, and four located on the bottom.
J	Adjustable feet	Raise or lower these feet when positioning the projector. Make sure the projector is level on all sides and the displayed image appears rectangular without any keystone.
K	AC receptacle	Use this receptacle to plug in an appropriately rated line cord or optionally hardwire the power connection.
L	Power on/off switch	Switch to power the projector on or off.

Related documentation

Additional information on this product is available in the following documents.

- *Christie Sapphire® 4K40-RGBH Installation and Setup Guide (P/N: 020-103979-XX)*
- *Christie TruLife+ User Guide (P/N: 020-103315-XX)*
- *TruLife+ Supported Video Formats technical reference (P/N: 020-104081-XX)*
- *Christie TruLife+ Status System Guide (P/N: 020-103327-XX)*
- *Christie TruLife+ Serial Commands Guide (P/N: 020-103316-XX)*
- *Sapphire® 4K40-RGBH Line Drawing (P/N: 010-109659-XX)*
- *Sapphire® 4K40-RGBH Interconnect drawing (P/N: 020-103857-XX)*

Accessing product documentation

For installation, user, and service information, see the product documentation available on the Christie website. Read all instructions before installing, using, or servicing this product.

1. Access the documentation from the Christie website:
   - Go to this URL: *https://bit.ly/469r2vF* or *https://www.christiedigital.com/products/projectors/all-projectors/sapphire-4k40-rgbh*.
   - Scan the QR code using a QR code reader app on a smartphone or tablet.
2. To access service information, sign into the Partner Portal.
3. On the product page, switch to the **Downloads** tab.

Downloading interconnect and line drawings

The interconnect diagram illustrates the path of electrical connections between modules. Manufacturer's part numbers are included. Part numbers are subject to change.

Line drawings provide product dimensions and sizes for installation.

To download the latest interconnect diagram or line drawings:

1. Go to *www.christiedigital.com*.
2. Sign into the Partner Portal.
3. Navigate to your model.
4. Switch to the **Downloads** tab and expand **Line drawings** section.

If the interconnect diagram or line drawings are not available on the Christie website, contact Christie Technical Support.

Downloading preventative maintenance schedules

Preventative maintenance is an important part of the continued and proper operation of your product. Failure to perform maintenance as required and according to the maintenance schedule specified by Christie voids the warranty.

If you require more information, contact Christie Technical Support.

To download the latest preventative maintenance schedule:

1. Go to *www.christiedigital.com*.
2. Sign into the Partner Portal.
3. Navigate to your model.
4. Switch to the **Downloads** tab and expand **Service manual** section.

Viewing Christie University product training videos

Christie University provides select product training videos that are helpful for understanding and using your product.

To view the available videos for your product:

1. Go to Christie University: *https://training.christiedigital.com*.
2. Select **I'm a Christie partner or customer**.
3. Log into your profile.
4. Select **Catalog**.
5. Select **Videos**.
6. Select **Product Training Videos**.
7. Navigate to the folder for your product.

Technical support

Technical support for Christie Enterprise products is available at:

- North and South America: +1-800-221-8025 or *Support.Americas@christiedigital.com*
- Europe, Middle East, and Africa: +44 (0) 1189 778111 or *Support.EMEA@christiedigital.com*
- Asia Pacific (*support.apac@christiedigital.com*):
  - China: +86 10 6561 0240 or *tech-supportChina@christiedigital.com*
  - India: +91 (80) 6708 9999 or *tech-India@christiedigital.com*
  - Japan: 81-3-3599-7481
  - Singapore: +65 6877-8737 or *tech-Singapore@christiedigital.com*
  - South Korea: +82 2 702 1601 or *tech-Korea@christiedigital.com*

Service guidelines

Review safety guidelines and information required for replacing modules.

Ordering parts

When ordering replacement parts, quote the part numbers of the items required. Quote the product model number, serial number, and date of manufacture, as indicated on the license label.

Not all parts are available separately. In addition, some parts stocked as inventory are available only while the current supply lasts.

All part numbers are subject to change.

Replacing modules

To make sure you have the correct module, check the module markings and parts lists. To make sure you replace the module correctly, check the relevant disassembly and replacement procedures.

Replace components with exact equivalents or replacement parts approved by Christie. Failure to do so may result in unsafe operation.

Best practices when servicing a projector

Christie recommends the following best practices when servicing Christie Sapphire® 4K40-RGBH projectors.

Prior to servicing

- Download and use the most recent version of the service guide for your projector from the Christie website.
- Review all available courses on Christie University pertaining to your projector model or safety information for the part you are servicing.
- Power off the projector before servicing or opening any enclosure.
- Always carefully observe the original lead dress.

During part replacement

- Partially thread screws into their holes to ensure they are properly aligned and positioned but do not fully tighten until all screws are in place.
- Take precautions to secure all harnessing properly, especially in high voltage circuitry areas.
- Replace any wire that appears to have damaged insulation.

- If handling electronic components and the projector is powered off/unplugged from the wall, use an electrostatic discharge (ESD) strap to avoid damaging the board.
- Make sure cables are properly strain relieved so they do not apply unnecessary force on the board connectors.
- When replacing fans, adhere to the marked airflow direction.

Post part replacement

- If the issue is not resolved after replacing an electrical component, the removed component may still be functional. Try reinstalling the part to further troubleshoot the issue and document the issue for further analysis.
- All components must be re-installed before powering on the projector.
- After replacing an optical component, complete the recommended adjustments listed in the procedure while the projector is running at a minimum brightness.
- If you return a part to Christie under Return Material Authorization (RMA), make sure it is properly packaged in the new part packaging material. If the part includes a printed circuit board (PCB), make sure it is packed in the ESD bag.

Observing original lead dressing

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

Service setups

Understand the 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.

Turning on the projector

When the projector AC power supply is plugged in and the breaker switch is on, the power is on.

Warning! If not avoided, the following could result in death or serious injury.

- SHOCK HAZARD! Do not attempt operation if the AC supply is not within the specified voltage and current, as specified on the license label.

- A qualified electrician must verify the protective earthing connection of the socket-outlet.
- Use a minimum of 12 AWG copper wire, grounding included, for the connection of the AC power supply to the projector's ground lug.

When Christie Sapphire® 4K40-RGBH is turned on for the first time, the factory LiteLOC™ calibration is used. Christie recommends calibrating the projector using the Hawkeye software tool for the environment and application in which the projector is to be operated. For the color comb 3D application, LiteLOC™ calibration using Hawkeye must be performed with the appropriate filter installed in the projector.

1. Turn on the breaker switch.

   When plugged in and the breaker switch is on, the projector automatically powers on to standby mode within 60 seconds. The display panel functionality becomes available.
2. To turn on the light source using the projector keypad, select and hold the **Power** button until a beep sounds.

   To turn on the light source using the remote, select and hold the **ON** button until a beep sounds.

Projector LED status indicators

Identify the LED state colors and meaning.

LED	State		Description
Blue	Solid	Standby	Light source is off. Video electronics are off. Projector status is OK.
	Flashing	Cool down	Projector is moving to one of the two standby states: • Light source is off and video electronics are booting up.

LED	State		Description
			• Light source is off. Video electronics and light source is cooling down.
Green	Solid	Light source on	Light source is on. Projector status is OK.
	Flashing	Startup	Projector is moving to light source on state. Light source is warming up. Video electronics are initializing.
Yellow	Solid	Warning in standby	Projector is in standby state. A problem exists with the projector that does not prevent it from operating.
	Flashing yellow/green	Warning during startup	Projector is in a startup state. A problem exists with the projector that does not prevent it from operating.
	Flashing	Warning with light source on	Light source is on. A problem exists with the projector that will not cause it to shut down.
	Flashing yellow/blue	Warning during cool down	Projector is in a cool down state. Light source is off. Video electronics and light source are cooling down. A problem exists with the projector that does not prevent it from operating.
Red	Solid	Error in standby	Projector is in standby. An error exists that prevents the projector from starting up.
	Flashing	Error	An error with the projector exists during startup, cool down, or when the light source is off. Projector will proceed to shut down.
Off		AC off	The AC power is off.

Projector LED shutter indicators

Identify the shutter LED state colors and meaning.

LED	State	Description
Solid magenta	Shutter closed	The shutter is closed. In standby, the shutter is always automatically closed and the magenta light is muted.
Off	Shutter open	The shutter is open.

Turning off the projector

When powering off in preparation for inspection or maintenance, always disconnect from AC.

1. To turn off the light source using the projector keypad, select and hold the **Power** button until a beep sounds.

   To turn off the light source using the remote, select and hold the **OFF** button until a beep sounds.

When powering off the projector, allow the projector to complete its cool down cycle. Do not immediately unplug the projector.

2. To turn off power to the projector, turn off the projector breaker switch and wait 10 seconds for the electrical charge to dissipate.
3. Disconnect the power supply cord.

Aligning the image

Only perform image alignment after the projector is fully assembled and powered up in its final location.

Basic image alignment ensures the image reflected from the DMDs is parallel and well-centered with the lens and screen. This initial optical alignment is the foundation for optimizing images on the screen and must be completed before final boresight adjustments. Before beginning, make sure the projector is properly positioned in relation to the screen.

1. Make sure the projector is positioned in the throw distance range for the particular lens.
2. Display a test pattern.
3. Do a quick preliminary focus and (if available) zoom adjustment with the primary lens.

   Do not worry about consistency across the image at this point, just center focus. It is good practice to have zoom adjustment and focus adjustment in the center of its range.
4. Holding a piece of paper at the lens surface, adjust offsets as necessary until the image is centered within the lens perimeter. A full black field works best for this.
5. If the projector is mounted off center to the screen axis, offset the lens as much as required. Aim the projector over slightly towards the center of the screen, but use caution when doing so, as too much tilt causes excessive keystone distortion.
6. With a framing pattern on screen, double-check projector leveling so the top edge of the image is parallel to the top edge of the screen.

Adjusting offset

Adjust the offset to align the image on the screen. Always adjust offset before adjusting boresight.

For the best optical performance and minimal keystone, use offsets instead of aiming at the center of the image, in off-axis installations. Avoid extreme tilts or offsets. Corner vignettes on a white test pattern indicate extreme offset that should be avoided using mechanical alignment.

1. Project an image with the primary lens.
2. Select a framing test pattern.
3. Select **LENS OFFSET**.

   You can also select **MENU** > **Configuration** > **Lens Settings** > **Lens Offset**.
4. Use the arrows to adjust the offset to display a square image on the screen, with minimal projector aiming error.
5. To exit to the home page, select **Back**.

Resetting the lens to home position

Realign the lens to the home position after the lens has been offset and out of alignment.

1. Select **LENS OFFSET**.
   You can also select **MENU** > **Configuration** > **Lens Settings** > **Lens Offset**.
2. To reset the lens to the default home position, select **Enter**.
3. To confirm the reset, select **OK**.

Selecting a test pattern

Many test patterns are available to assist with the configuration of the projector and to diagnose any issues that may occur.

1. From the display panel, use the arrows to select **Test Pattern**.
   You can also select the test patterns from **MENU** > **Test Pattern** or selecting **Test Pattern** on the IR remote.
2. Scroll through the list of test patterns.
3. Select the required test pattern.
4. To confirm your selection, select **Enter**.

Running a Hawkeye calibration

When Christie Sapphire® 4K40-RGBH is turned on for the first time, the factory LiteLOC calibration is used. Christie recommends calibrating the projector using the Hawkeye software tool for the environment and application in which the projector is to be operated. For the color comb 3D application, LiteLOC calibration using Hawkeye must be performed with the appropriate filter installed in the projector

Christie Sapphire® 4K40-RGBH can fully operate in both 100-120 VAC limited power mode (with limited brightness) and 200-240 VAC full power mode. A Hawkeye calibration must be performed if using 100-120 VAC operation or an intelligent filter holder (IFH) module in either 100-120 VAC or 200-240 VAC operation for the first time.

1. If required, contact your Christie representative for the Hawkeye software.
2. Open the Hawkeye software.
   A laptop or PC is required to run the Hawkeye software.
3. Make sure the projector subnet and computer subnet match.
4. Connect the spectroradiometer with the Hawkeye software.
5. Aim the spectroradiometer toward the center of the image.
6. Run Hawkeye calibration.
   Make sure the process is done in low light and is not interrupted. The process lasts approximately 50 minutes.

Adjusting boresight

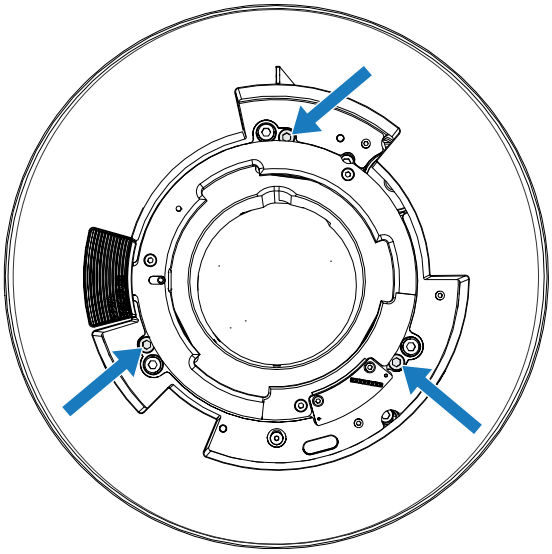
The boresight adjustment balances the tilt of the lens mount to compensate for screen-to-projector tilt.

Caution! If not avoided, the following could result in minor or moderate injury.

- Do not look directly into the lens when the light source is on. The extreme high brightness can cause permanent eye damage.

If doing excessive boresight adjustment, it may make the lens keep-out zones smaller.

1. Close the shutter on the projector.
2. Unlock the three lens mount stabilization screws.



3. Open the shutter.
4. From the Test Pattern menu, select the **Boresight** test pattern.

   The Boresight test pattern assists with adjusting the boresight for the three focus points.
5. To focus the top boresight guide, adjust the blue boresight screw.

   Adjust the screw 1/4 turn. If you get to the end, further unlock the corresponding stabilization screw.
6. To focus the right boresight guide, adjust the green boresight screw.
7. To focus the left boresight guide, adjust the yellow boresight screw.
8. To continue to refine the focus, repeat steps 5 to 7.
9. Once the focus is refined, close the shutter.
10. To maintain the adjustments, lock the stabilization screws.

    When locking the screws, start with the top stabilization screw and turn it so it just touches the base. Repeat for the other two stabilization screws. Continue to adjust the locking screws until they are tight.
11. Open the shutter.

Optimizing the integrator zoom and focus

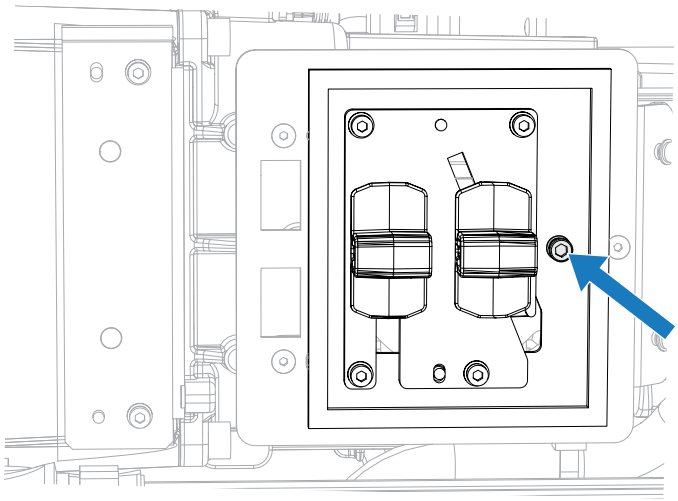
Learn how to optimize the integrator zoom and focus.

These instructions must be performed after replacing a light engine, fold mirror, relay optics, and zoom/focus assembly or when doing preventative maintenance.

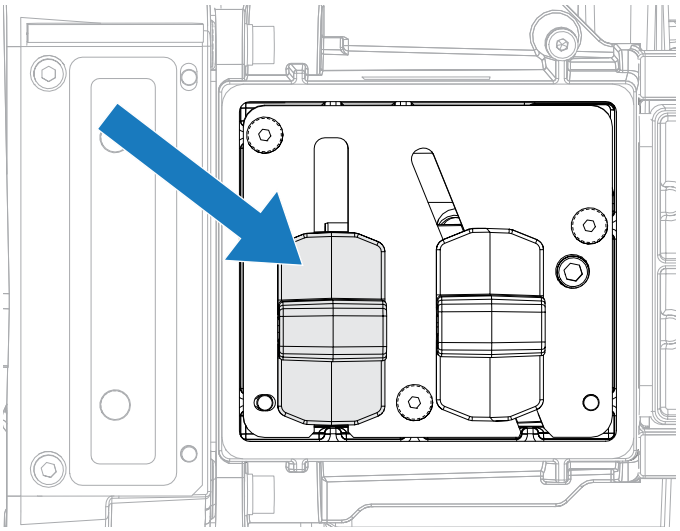
Notice. If not avoided, the following could result in property damage.

- Optimizing the integrator zoom is a critical adjustment because if the zoom is not set properly, it results in lower brightness on screen and the DMD and other components may be damaged.

1. Turn off the projector and disconnect it from AC power.
2. Remove the four screws securing the electronics-side cover and remove the cover.
3. Open the Service door on the side of the projector.
4. Remove the zoom and focus cover and rotate it out of the way.
5. Unlock the Zoom and Focus paddles.

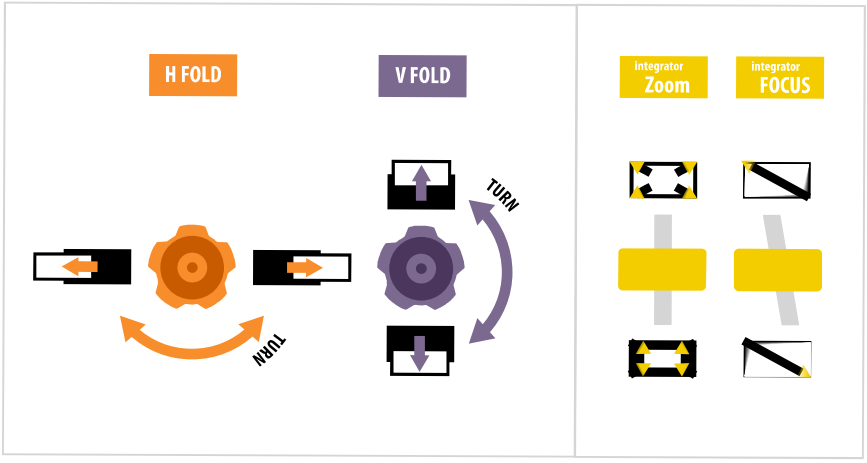


6. Adjust the Zoom paddle to minimum zoom (paddle all the way down).

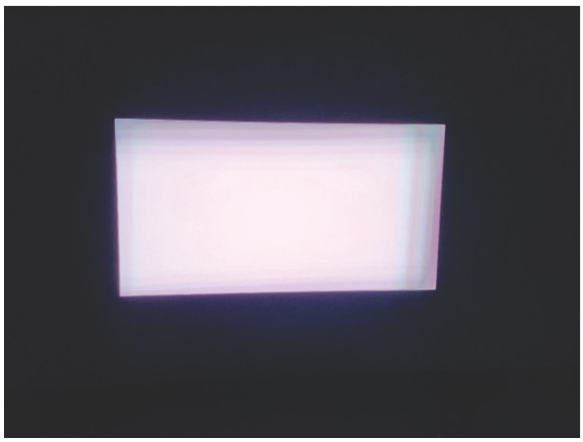


7. Power on the projector to Standby mode.

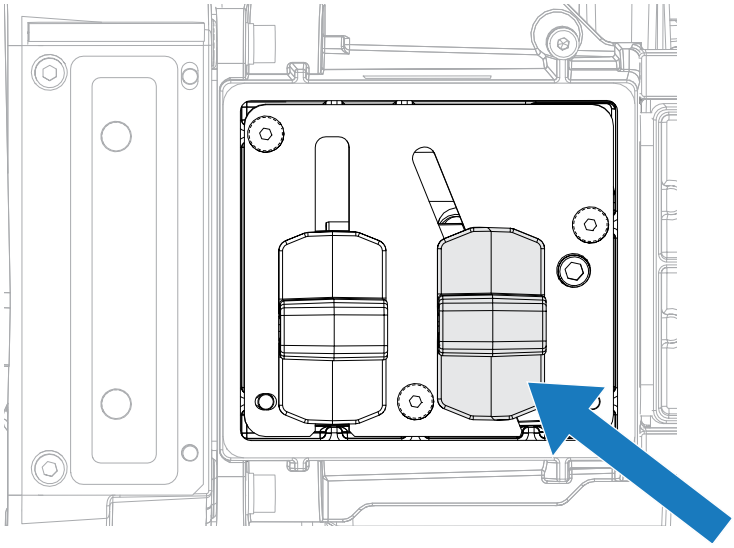
8. Set the brightness to 30% or less before powering on the projector into full power mode.
   If the Brightness slider is greyed out, enable LiteLOC™.
9. Power on the lasers.
10. From the Test Pattern menu, select the **Integrator Rod** test pattern.

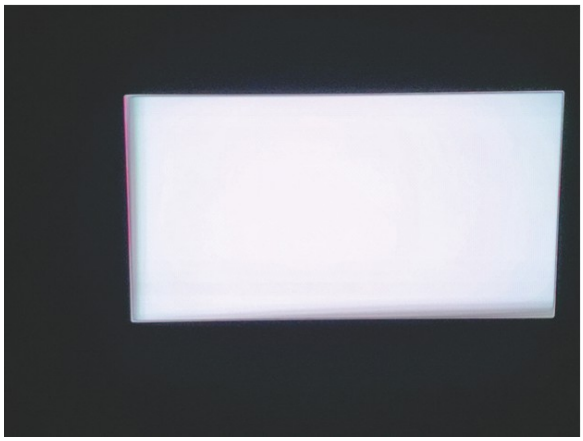


11. *Adjust the fold mirror* (on page 26) to see the edges of the integrator rod on the DMD (both horizontally and vertically).
    Your image should look like the following:



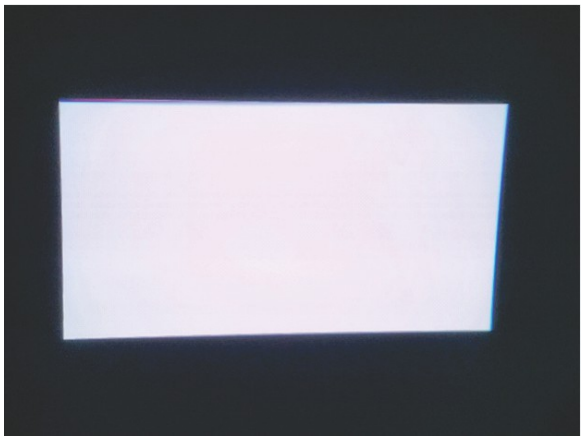
12. Adjust the Integrator Rod Focus paddle until the edges of the image look sharp as shown in the second image below.





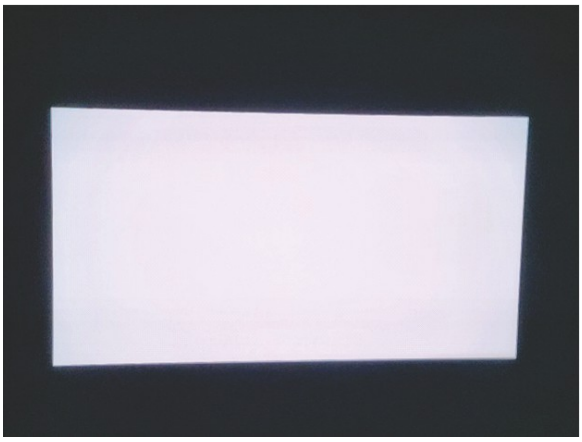
13. Adjust the fold mirror to align the integrator rod image to the DMD.

    If you see shadows around edge of the screen, adjust the fold mirror until the shadow is split evenly (top/bottom and left/right).



14. Increase the Integrator Zoom paddle slowly and with caution until the shadow disappears.

    As the zoom is adjusted, the focus may require additional adjustment.



15. When complete, lock the Zoom and Focus paddles and re-install the zoom and focus cover.

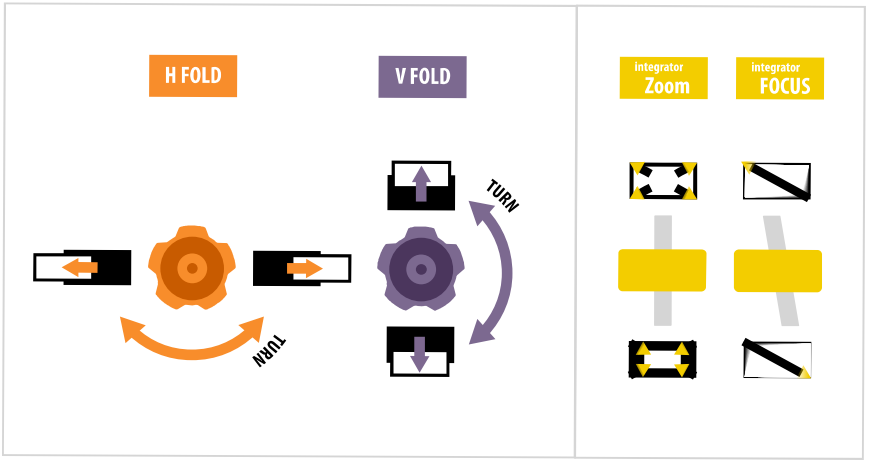
Adjusting the fold mirror

Fold mirror adjustment must be completed by trained personnel.

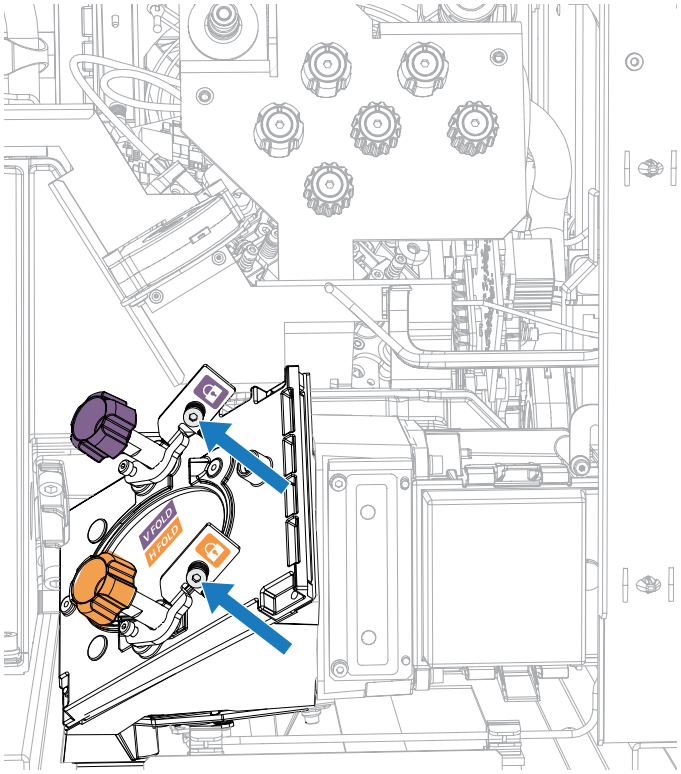
Notice. If not avoided, the following could result in property damage.

- Misalignment of the fold mirror may cause permanent damage to the product.

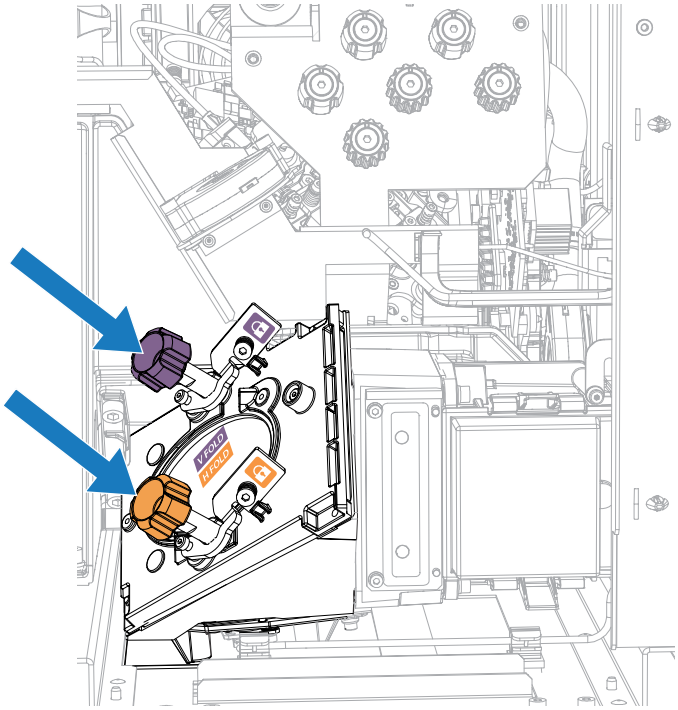
1. Set the brightness to 30% or less before powering on the projector.
   If the Brightness slider is greyed out, enable LiteLOC™.
2. From the Test Pattern menu, select the **Integrator Rod** test pattern.



3. Open the Service door on the side of the projector.
4. Unlock the fold mirror screws to unlock the adjustment knobs.



5. To make horizontal adjustments, use the orange knob labeled Horizontal.
6. To make vertical adjustments, use the purple knob labeled Vertical.



7. To continue to refine the fold mirror adjustment, repeat the horizontal and vertical adjustments.
8. Lock the fold mirror screw to lock the adjustment knobs.
9. Once satisfied with the alignment, increase the projector power.

Adjusting the LOS coupling mirror

Perform a coupling mirror adjustment when the illumination optical system (IOS) and laser optical subsystem (LOS) are replaced. The LOS coupling mirror adjustment must be completed by trained personnel.

Warning! If not avoided, the following could result in death or serious injury.

- HIGH VOLTAGE HAZARD! When adjusting the laser optical subsystem (LOS) coupling mirror, use care to avoid the adjustment tool making contact with the 54V power supply.

1. Disable LiteLOC™ and set the blue and green laser setpoints to 0% and the red laser setpoint to 30% or less before powering on the projector.
2. Adjust the LOS coupling mirror to make sure the mirror position is nominal.

   Only small adjustments are necessary. Use a 2.5 mm flathead screwdriver.

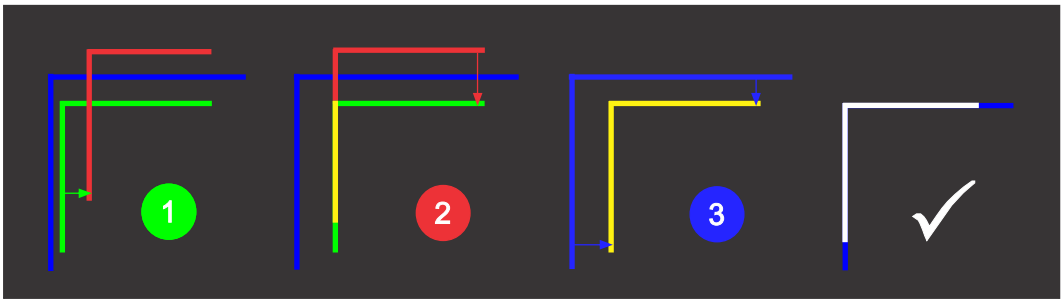
   The mirror position must be optimized to ensure maximum brightness. A poor adjustment can result in reduced brightness or cause damage to the projector.
3. Attach a tamper-proof sticker to both the horizontal and vertical adjustment screws.
4. Re-enable LiteLOC.

Adjusting digital micromirror device (DMD) convergence

A convergence problem occurs when one or more projected colors (red, green, and blue) appears misaligned when examined with a convergence test pattern.

Two features can be used independently or in conjunction to adjust convergence: electronic (with the remote or through the menu) and/or mechanical.

When adjusting the convergence, you are adjusting red and green to blue for mechanical convergence. For electronic convergence all three colors can be adjusted. Always align the color components of the sprite to the inner most line color (for each axis). The three colors should overlap to form pure white lines throughout the image and one or more poorly converged individual colors may appear adjacent to some or all of the lines.



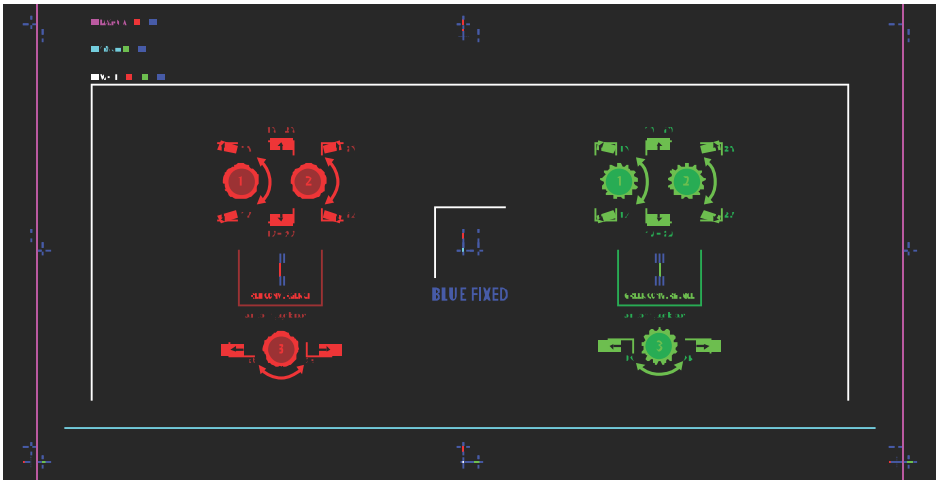
For best convergence results, Christie recommends disabling all geometry and color (set the color correction mode to **Max Drive**) correction before adjusting convergence.

If you wear glasses with corrective lenses when performing this adjustment, make sure you are viewing the test pattern on a straight angle through the optical axis of your glasses, and not from a tilted or angled perspective. This avoids a prismatic effect that can appear to shift convergence when viewing at an angle.

Mechanically adjusting convergence

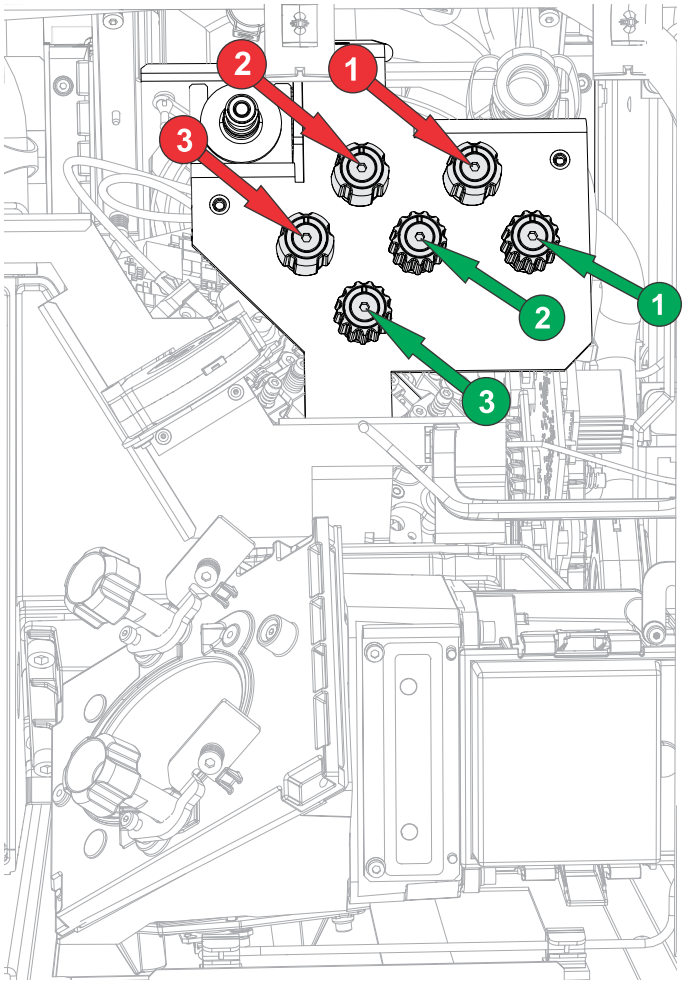
Use the convergence knobs behind the Service door to mechanically adjust convergence.

1. Before adjusting digital micromirror device (DMD) convergence, make sure the projector has reached a steady operational state. If switching from a white or bright test pattern to a dark convergence test pattern, or if warming up the projector after a shutdown, allow 15 minutes for stabilization so the optics can reach a steady state.
2. Make sure electronic convergence has been reset to zero prior to conducting mechanical convergence.
3. From the Test Pattern menu, select the **Convergence** test pattern and display it full screen.



4. Open the Service door on the side of the projector.
5. To adjust the convergence knobs, use the 3 mm driver included with the projector.

   If adjusting by hand without using the tool, pull out the convergence adjustment knobs to engage them.



6. Use the Convergence test pattern to assist with adjusting the horizontal and vertical lines.

   Horizontal adjustments are controlled by adjusting knob 3.

   Vertical convergence and rotation are controlled by adjusting knobs 1 and 2. Christie recommends rotating a single knob a maximum of a quarter rotation before adjusting the second knob a quarter rotation. For example, if using one hand, turn the left knob a quarter rotation and then the right knob a quarter rotation, and so on. Adjusting a single knob for vertical or rotational adjustment to an extreme before adjusting the second knob may result in the convergence mechanism binding.

   For the best stability, Christie recommends setting convergence while rotating the knobs in a clockwise direction. This may require first adjusting convergence by turning the knobs counter-clockwise, and finalizing the convergence with a clockwise approach. This applies to all knobs.

7. When complete, push in all the convergence adjustment knobs to disengage them.

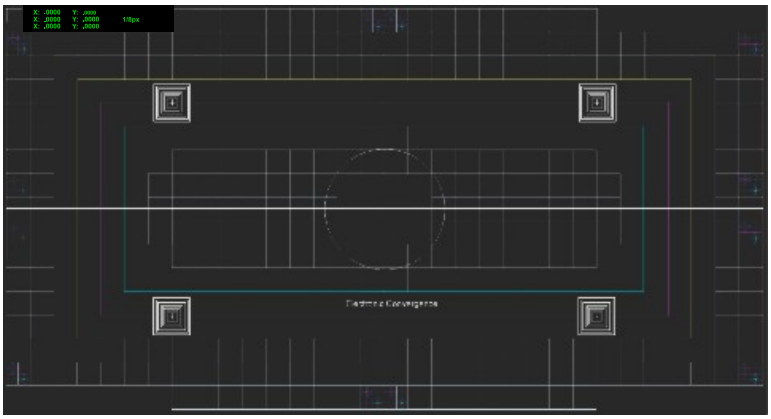
Electronically adjusting convergence through the menu

Use the electronic convergence feature in the menu to adjust convergence. It can be used in addition to or instead of mechanical digital micromirror device (DMD) convergence. When used in addition

to mechanical DMD convergence, Christie recommends completing mechanical convergence prior to making electronic adjustments.

- This feature is only available on the local interface (display panel).
- If warping with Christie Twist™ or Mystique™, adjust the convergence mechanically. Do not use the electronic convergence feature.

1. Before adjusting DMD convergence, make sure the projector has reached a steady operational state. If switching from a white or bright test pattern to a dark convergence test pattern, or if warming up the projector after a shutdown, allow 15 minutes for stabilization so the optics can reach a steady state.
2. Make sure the **Convergence Enable** option is selected:
   a) From the display panel, select **MENU** > **Admin** > **Service**.
   b) Enter the service password.
   c) Select **Convergence Enable**.
3. From the Test Pattern menu, select the **E-Convergence** test pattern and display it full screen.
   Until electronic convergence is completed, the displayed image may appear to be blurred and difficult to read, especially for white text, due to the mis-convergence of the red, green, and blue pixels.



4. To access the electronic convergence menu, select **MENU** > **Admin** > **Service** > **Convergence**.
5. To show the adjustment locations, select **Show Convergence Sprite**.
   Only one adjustment position can be selected at a time.
6. From the Corner list, select the corner you want to adjust first.
   By default the top-left position is selected.
7. To select the color for adjustment, select **Color** and select the appropriate color from the list.
   By default, all three color components (red, green, and blue) are displayed.
   It may be helpful to obtain a better view of the position of a particular color component if one or two of the other colors are deselected.
8. Modify the red, green, and/or blue convergence for the selected sprite both vertically and horizontally by adjusting the sliders so all three color components are overlapped (sprite is displayed in white).
   You cannot move the selected sprite outside the resolution range.

9. To adjust remaining locations, repeat steps 5 to 8.
10. To apply and store the new settings, select **Convergence Enable**.
    If already selected, clear and reselect **Convergence Enable**.
11. To reset the electronic convergence, select **Reset**.
12. At the confirmation prompt, select **Reset** and then apply and store the new settings using step 10.

Aligning the image with lens zoom and focus

The lens zoom and focus adjustment allows the projected image to be focused and shifted to align with the screen.

1. Display an image or test pattern that can be used to analyze image focus and geometry.
2. Select **ZOOM**.
3. Use the up and down arrows to zoom in or out of the image.
4. To exit, select **Back**.
5. Select **FOCUS**.
6. Use the up and down arrows to adjust the focus of the image.
7. To exit, select **Back**.
8. To refine your adjusts, repeat steps 2 to 7.

Running Auto Setup to optimize display settings

Auto Setup initiates an automated process in which the projector optimizes video settings for the active signal. Auto Setup helps to save time in perfecting a display and you can modify the adjustments as required.

1. Make sure of the following before running Auto Setup:
   - *Test patterns are turned off* (on page 21).
   - The active signal is valid.
2. From the remote, select **Auto Signal** or from the web UI, select **Auto Setup**.
3. Select **Run Auto Setup**.
   The system optimizes the active signal and displays a progress message on screen.

Managing the light source for Sapphire® 4K40-RGBH

Learn how to configure brightness and color using the projector's Hawkeye and LiteLOC™ features.

Use Hawkeye to perform the sensor-to-screen calibration by measuring the screen colour and brightness at different levels for each light component, and set color accuracy and brightness for your setup.

During the calibration, the system takes nine sets of on-screen measurements and Csense X, Y, and Z and then automatically sets the red, green, and blue laser drive currents to achieve the required setting. These measurements are used by the software to calculate the sensor-to-screen calibration parameters. The measurements gathered during calibration are used by the software to calculate the sensor-to-screen calibration parameters, which are then applied to the projector's specifics accordingly.

For Sapphire® 4K40-RGBH in addition to the nine sets, nine more sets of data are taken with only the phosphorous portion. This calibration is performed using Hawkeye-ProvenueOL.

LiteLOC's ability to hold required color and brightness depends on your environmental conditions. When the environmental conditions exceed the projector's ability to maintain the required brightness, it automatically dims as necessary to maintain your required color point on the screen. In this case, the projector also issues a warning. If the environmental conditions become better, the projector recovers your original required brightness.

Automatically calibrating the LiteLOC™ feature

Follow this procedure to automatically generate the calibrated data.

Use Hawkeye-ProvenueOL to calibrate LiteLOC® for Sapphire® 4K40-RGBH.

Manually configuring LiteLOC™

To make sure color and brightness are held at the required levels for your installation, Christie recommends enabling LiteLOC with your required settings for each laser configuration you create.

1. To configure LiteLOC, select **MENU** > **Admin** > **Service**.
2. Enter the service password.
3. Select **Light & Output Settings**.
4. Verify LiteLOC is enabled.
5. Use the **Brightness** slider to increase and decrease the brightness and select **Enter**.

   If the required brightness cannot be achieved, the slider indicates the actual brightness.
6. To set the white point you want to achieve from the laser, enter the required **White x** and **White y** values.

Manually disabling LiteLOC™

Disable LiteLOC if you want to manually control the red, green and blue lasers independently. When LiteLOC is disabled, the set color and brightness may drift over time as the ambient conditions change.

Christie recommends only disabling LiteLOC during the calibration process.

1. From the display panel, select **MENU** > **Admin** > **Service**.
2. Enter the service password.
3. Select **Light & Output Settings**.
4. To disable LiteLOC, select **LiteLOC** > **Disabled**.
5. Check the room temperature.

   A lower room temperature generally results in increased brightness and better efficiency. A higher room temperature reduces the maximum power setting available for the lasers. The maximum expected room temperature setting must reflect the anticipated operating conditions.
6. To set the approximate red power level, select **Red Laser Setpoint** and use the slider to increase and decrease the value required for the projector brightness.

   System stability may be affected if you set a power level below the minimum power level recommended.
7. To set the green (**Green Laser Setpoint**), blue (**Blue Laser Setpoint**), and phosphor (**Phosphor Setpoint**) power levels, repeat step 4.

Managing the light source for Sapphire® 4K40-RGBH

Learn how to configure brightness and color using the projector's Hawkeye and LiteLOC™ features.

Use Hawkeye to perform the sensor-to-screen calibration by measuring the screen colour and brightness at different levels for each light component, and set color accuracy and brightness for your setup.

During the calibration, the system takes nine sets of on-screen measurements and Csense X, Y, and Z and then automatically sets the red, green, and blue laser drive currents to achieve the required setting. These measurements are used by the software to calculate the sensor-to-screen calibration parameters. The measurements gathered during calibration are used by the software to calculate the sensor-to-screen calibration parameters, which are then applied to the projector's specifics accordingly.

For Sapphire® 4K40-RGBH in addition to the nine sets, nine more sets of data are taken with only the phosphorous portion. This calibration is performed using Hawkeye-ProvenueOL.

LiteLOC's ability to hold required color and brightness depends on your environmental conditions. When the environmental conditions exceed the projector's ability to maintain the required brightness, it automatically dims as necessary to maintain your required color point on the screen. In this case, the projector also issues a warning. If the environmental conditions become better, the projector recovers your original required brightness.

Automatically calibrating the LiteLOC™ feature

Follow this procedure to automatically generate the calibrated data.

Use Hawkeye-ProvenueOL to calibrate LiteLOC® for Sapphire® 4K40-RGBH.

Manually configuring LiteLOC™

To make sure color and brightness are held at the required levels for your installation, Christie recommends enabling LiteLOC with your required settings for each laser configuration you create.

1. To configure LiteLOC, select **MENU** > **Admin** > **Service**.
2. Enter the service password.
3. Select **Light & Output Settings**.
4. Verify LiteLOC is enabled.
5. Use the **Brightness** slider to increase and decrease the brightness and select **Enter**.
   If the required brightness cannot be achieved, the slider indicates the actual brightness.
6. To set the white point you want to achieve from the laser, enter the required **White x** and **White y** values.

Manually disabling LiteLOC™

Disable LiteLOC if you want to manually control the red, green and blue lasers independently. When LiteLOC is disabled, the set color and brightness may drift over time as the ambient conditions change.

Christie recommends only disabling LiteLOC during the calibration process.

1. From the display panel, select **MENU** > **Admin** > **Service**.
2. Enter the service password.

3. Select **Light & Output Settings**.
4. To disable LiteLOC, select **LiteLOC** > **Disabled**.
5. Check the room temperature.

   A lower room temperature generally results in increased brightness and better efficiency. A higher room temperature reduces the maximum power setting available for the lasers. The maximum expected room temperature setting must reflect the anticipated operating conditions.
6. To set the approximate red power level, select **Red Laser Setpoint** and use the slider to increase and decrease the value required for the projector brightness.

   System stability may be affected if you set a power level below the minimum power level recommended.
7. To set the green (**Green Laser Setpoint**), blue (**Blue Laser Setpoint**), and phosphor (**Phosphor Setpoint**) power levels, repeat step 4.

Maintenance and cleaning

Maintain the cleanliness of all internal components during any service procedure. All of the projector optics must remain free of contaminants to perform at the level specified. Even a small amount of dust or a fingerprint may degrade the image or cause a noticeable reduction of brightness.

In environments where dust, smog, dirt, and other contaminants are prevalent, Christie strongly recommends performing more frequent maintenance than your maintenance schedule indicates.

Always power down and disconnect/disengage all power sources to the projector before servicing or cleaning the lens or before any of the projection covers or doors (if applicable) are loosened and removed. If the seal is broken while the intake fans are still operating, internal components are immediately vulnerable to contamination from inbound particles.

Warning! If not avoided, the following could result in death or serious injury.

- SHOCK HAZARD! Disconnect the product from AC before installing, moving, servicing, cleaning, removing components, or opening any enclosure.

Caution! If not avoided, the following could result in minor or moderate injury.

- Observe all electrostatic precautions. Use a grounded wrist strap and insulated tools when handling, servicing, or cleaning electronic assemblies.
- Only Christie qualified technicians are permitted to open product enclosures.

Notice. If not avoided, the following could result in property damage.

- Avoid touching optical elements.
- Always wear clean, lint-free gloves when handling the product.
- Only use cleaning solutions recommended by Christie. All other cleaning solutions may cause product damage and will void the warranty.

Best practices to maintain a projector

Christie recommends the following best practices to maintain Christie Sapphire® 4K40-RGBH projectors.

- Update software when new software updates are available.
  For details, see the *Christie TruLife+ User Guide (P/N: 020-103315-XX)*.
- Perform maintenance as required and according to the *preventative maintenance schedule* (on page 15).
- If edge blending is enabled, exercise the DMDs.
- If the projector has filters, replace or clean the filters according to the *preventative maintenance schedule* (on page 15).
- When replacing filters, adhere to the marked airflow direction.
- Top up coolant according to the *preventative maintenance schedule* (on page 15).

Guidelines for cleaning

Use the following guidelines when cleaning components.

If you have questions about cleaning any components, contact Christie Technical Support.

Component	Preventative measures	How to clean
Illumination optical system (IOS)	In a contaminated environment, never touch exposed components with bare hands or blow air on exposed components with the mouth.	Use ionized pneumatic guns only. Keep imaging components and yourself grounded at all times. Wear powder-free latex gloves.
Integrator	Never disassemble the integrator module.	Blow off particles with clean, dry de-ionized air.
Illumination system, internal lenses/ prisms	Never touch interior components with bare hands or blow air on interior components with the mouth.  Normally the internal parts should not be accessed.	Blow off particles with clean, dry de-ionized air using an air blowing device. If necessary, wipe in a single direction with a clean high quality optical cloth. Wear powder-free latex gloves.
Light engine components	Never touch components with bare hands or blow air on components with the mouth.	Blow off particles with clean, dry de-ionized air using an air blowing device. If necessary, use a Q-tip with acetone on the glass surface. Never touch the imaging panels. If acetone is not available, use pure isopropyl alcohol. Wear powder-free latex gloves.
Light engine, digital micromirror device (DMD) panels	Never touch the panels or blow on the panels.  Normally the internal parts should not be accessed.	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 necessary. A small amount of dust on the lenses has 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 and gently rub in a circular motion.	Use filtered compressed air to blow out dust and a clean lint-free cloth.

Ventilation

Use the following guidelines when maintaining ventilation.

- Do not place the projector near a heat source or in an enclosure, unless proper ventilation is provided.
- Do not insert objects into the ventilation openings of the projector.
- Do not spill liquids of any kind into the projector. Should an accidental spill occur, immediately unplug the projector and have it serviced by a qualified service technician.

Cleaning the projector optics

Learn about cleaning the optical components in the projectors.

Caution! If not avoided, the following could result in minor or moderate injury.

- Only qualified service technicians are authorized to maintain optical components.
- Always wear clean, powder-free latex gloves when handling optical components.

Typically, optical components do not need to be cleaned frequently if they are installed and operated in a location meeting or exceeding the environmental standard recommended by Christie. Unnecessary cleaning of optics increases the risk of degrading delicate coatings and surfaces. Only clean optics when dust, dirt, oil, fingerprints or other marks are obvious and are causing performance problems. Inspect exposed optical surfaces periodically in a clean, dust-free environment using a bright, portable illumination device such as an LED flashlight.

Use the following products when cleaning the optical surfaces:

- Powder-free N-DEX (nitrile) or latex gloves
- 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), Kimwipes™ or equivalent
- Acetone—if acetone is not available, use pure isopropyl alcohol
- Cotton swabs with wooden stems only
- Lens cleaning cloth/microfibre, such as Melles Griot (18LAB024) or equivalent

If the recommended cleaning supplies provided above are unavailable in your area, contact Christie Technical Support.

Cleaning the lens

To avoid the risk of scratching the lens, clean the lens only if absolutely required.

Removing dust from the projection lens

Remove dust from the projection lens to ensure optimum image display.

1. Brush most of the dust off with a camel-hair brush or use a dust-free blower.

2. Fold a microfiber cloth and wipe the remaining dust particles off the lens with the smooth portion of the cloth with no folds or creases.

   Do not apply finger pressure. Instead, use the tension in the folded cloth to remove the dust.

3. If significant dust remains on the lens surface, dampen a clean microfiber cloth with lens cleaning solution and wipe gently until clean.

Removing fingerprints, smudge, or oil from the projection lens

Remove fingerprints, smudges, or oil from the projection lens to ensure optimum image display.

Clean the lens only if absolutely required.

1. Brush most of the dust off with a camelhair brush or use a dust-free blower.
2. Wrap a lens tissue around a swab and soak it in lens cleaning solution.

   The tissue should be damp but not dripping. Do not use a cleaning solvent containing ammonia. Avoid lens contact with Xylene and Ether.

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

Refilling the coolant

Christie Sapphire® 4K40-RGBH projectors rely on liquid coolant to maintain the laser optical subsystem at the required operating temperatures. This section provides service instructions and safety precautions for filling the light engine and laser optical subsystem (LOS) reservoir units and handling coolant.

Caution! If not avoided, the following could result in minor or moderate injury.

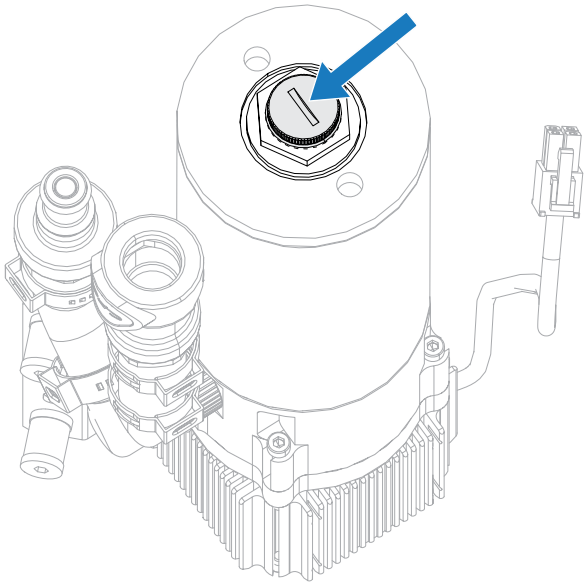
- Use protective eye wear and gloves. Follow workplace guidelines for using personal protective equipment when installing, cleaning, and servicing the product.
- HAZARDOUS SUBSTANCE! Use caution when handling the product as it contains propylene glycol. Do not ingest coolant. For information on safe handling, refer to the Safety Data Sheet (SDS) for the coolant.
- This procedure must be performed by Christie qualified technicians.

Notice. If not avoided, the following could result in property damage.

- Fill the coolant to the recommended level only. Do not fill above the maximum level line shown on the reservoir unit.

1. Remove the affected liquid coolant reservoir from the projector.
   - *Front liquid cooling pump module* (on page 80)
   - *Rear liquid cooling pump module* (on page 81)

   The liquid coolant reservoir must be removed from the projector before filling.
2. Remove the fill port cap from the reservoir.



3. Pour the required coolant (Koolance LIQ-740PR P/N: 003-005179-XX) into the fill port. Fill only to the recommended level.
4. Replace the top cap on the reservoir fill port.
5. Using the flathead screwdriver, tighten the top cap to seal it with a torque of 14kgf.cm.
6. Use a soft cloth to wipe away any coolant that drips outside the reservoir.
7. Re-install the liquid coolant reservoir.

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

Service prerequisites

Before servicing the projector, perform the following tasks.

- Always power down and disengage all power sources to the projector prior to servicing.
- Follow all service safety precautions.

Disposing of replaced components and packaging

To help conserve the environment, determine which replaced product components can be recycled, reused, or sent back to Christie. Dispose appropriately and according to your local regulations.

In addition, for replacement parts not being returned to Christie, reuse or recycle the replacement part packaging according to your local regulations.

Tools required for service

Before servicing the projector, make sure the following tools and components are available:

- 2 mm, 2.5 mm, 3 mm, 4 mm, and 5 mm ball drivers (provided in the projector packaging)
- 5 mm and 7 mm socket or nut driver
- 19 mm wrench
- Flathead screwdriver
- Torque driver
- Needle nose pliers
- Magnetiser
- Side cutters and cable ties

- Electrostatic protective strap and pad
- Disposable lint-free gloves (included with optical components)
- Cloth wipes

Index of parts and modules

The following tables list the parts and modules for Christie Sapphire® 4K40-RGBH.

Projector covers and feet

Part/module	Part number
Top cover (on page 52)	003-007018-XX
Rear cover (on page 53)	003-007017-XX
Front cover (on page 54)	003-200135-XX
Electronics-side (left) cover (on page 54)	003-203015-XX
Side-intake (right) (on page 55)	003-200830-XX
Bottom cover (on page 55)	003-007016-XX
Feet—4 pack (on page 56)	003-006113-XX

Lens mount components

Part/module	Part number
Lens boot (on page 61)	003-005150-XX
Lens mount offset motor (on page 62)	003-005247-XX
Focus motor	003-007029-XX
Lens mount (on page 65)	003-104569-XX

Ventilation and cooling components

Part/module	Part number
Blue light engine fan FPGA (on page 67)	003-112556-XX
Green light engine fan FPGA (on page 68) *Red light engine fan FPGA* (on page 69)	003-112555-XX
Laser driver card cage (12 V 0.50 A 4 wire 120x25) fan	003-121494-XX
Light engine intake (12 V 1.2 A 4 wire 150x50) fan (on page 74)	003-007028-XX
Radiator intake (12 V 1.2 A 4 wire 150x50) fan (on page 70)	
Cave fan (on page 75)	003-114437-XX
Laser optical subsystem (LOS) rear radiator (on page 76)	003-201476-XX

Part/module	Part number
Light engine radiator (on page 78)	003-201474-XX
Front liquid cooling pump module (on page 80)	003-200838-XX
Rear pump module (on page 81)	003-200837-XX

Electronics components

Part/module	Part number
User interface module	003-201541-XX
Card cage (on page 84)	003-202884-XX
AC power input assembly (on page 86)	003-202537-XX
Line filter (on page 86)	003-007632-XX
AC breaker (on page 87)	003-007633-XX
2000 W 54 V power supply low voltage (on page 88)	003-122275-XX
1500 W 12 V power supply (on page 89)	003-007273-XX

Printed circuit boards and sensors

Part/module	Part number
Housekeeping board (HKBH) (on page 92)	003-115112-XX
Lens connect board (LCBP) (on page 92)	003-112399-XX
Laser driver board (on page 93)	003-114517-XX
Motor driver board (on page 95)	003-007642-XX
Front IR sensor board (front IRB) (on page 96)	003-112635-XX
Rear IR sensor board 1.2 (rear IRB) (on page 97)	
Convenience light board and holder (CLB) (on page 98)	003-005261-XX
Status LED board (SLB) (on page 98)	003-006587-XX
Temperature sensor #1 (on page 99)	003-115156-XX
Temperature sensor #2 (on page 100)	003-115156-XX 003-122336-XX
Laser optical subsystem (LOS) IR board 1 (on page 100) *Laser optical subsystem (LOS) IR board 2* (on page 101)	003-007643-XX
Light engine temperature sensor (on page 102)	003-100618-XX
Diffuser interface board 1.0 (DIB) (on page 102)	003-113605-XX
Color sensor board 1.0 (CSB) (on page 104)	003-114408-XX

Optical components

Part/module	Part number
Shutter (on page 107)	003-104955-XX
Fold mirror adjustment assembly (on page 108)	003-107316-XX
Coupling fold mirror	003-109779-XX
Rotating diffuser assembly (on page 108)	003-202599-XX
Left-eye 3D 66 mm filter (on page 109)	177-101103-XX
Right-eye 3D 66 mm filter (on page 109)	177-102104-XX
2D aperture 66 mm filter (on page 109)	177-104106-XX
Zoom focus assembly	003-202606-XX
*Light engine** (on page 112)	003-202026-XX 003-202921-XX
Blue laser module (on page 114)	003-202516-XX
RGB module (on page 116)	003-202520-XX
Phosphor module (on page 118)	003-202515-XX

* Contact Christie Technical Support for the appropriate light engine for your projector.

Harnesses

Part/module	Part number
Blower flex harness (on page 122)	003-007634-XX
MiniSAS 750 mm Harness kit	003-006741-XX
Auto optical switch harness	003-111558-02

Accessories

Learn about the accessories (sold separately) available for the projector.

Lenses

If using a shorter throw lens and switching between dark and light content, focus drift can occur.

Projection lens	Part number	Notes
Fixed high brightness		
0.38:1 fixed	144-136101-XX	Brightness is reduced up to 30% when using the 0.38:1 lens. Focus drift occurs with this lens when

Projection lens	Part number	Notes
		switching between prolonged periods of light and dark content.
0.72:1 fixed	144-110103-XX	—
0.9:1 fixed	144-111014-XX	—
Zoom high brightness		
1.13-1.31:1 zoom (Discontinued)	144-103105-XX	—
1.13-1.66:1 zoom	144-129103-XX	—
1.31-1.63:1 zoom (Discontinued)	144-104106-XX	—
1.45-2.17:1 zoom	144-130105-XX	—
1.63-2.17:1 zoom (Discontinued)	144-105107-XX	—
1.95-3.26:1 zoom	144-131106-XX	—
1.99-2.71:1 zoom (Discontinued)	144-106108-XX	—
2.71-3.89:1 zoom	144-107109-XX	—
3.89-5.43:1 zoom	144-108100-XX	—
4.98-7.69:1 zoom	144-109101-XX	Requires a 185 mm lens hood extension (P/N: 163-168106-XX) to use with this product*.
Fixed ultra high contrast		
0.72:1 fixed	163-116109-XX	—
0.9:1 fixed	163-117100-XX	—
Zoom ultra high contrast		
1.13-1.66:1 zoom	163-118101-XX	—
1.45-2.17:1 zoom	163-119102-XX	—
1.95-3.26:1 zoom	163-120103-XX	—
2.71-3.89:1 zoom	163-121105-XX	—
3.89-5.43:1 zoom	163-122106-XX	—

* Only required when the projector is operated with 2D YNF at 200-240 VAC.

Filters and coolant

Description	Part number
Light engine air filter (single)	003-007693-XX
Light engine air filter (2-pack)	003-007274-XX
Coolant Propylene Glycol 740 (Koolance LIQ-740PR)	003-005179-XX

Line cords

Description	Part number
250 V/32 A IEC309 3.0 m cord—Australia	108-434102-XX
250 V/30 A IEC309 3.0 m cord—China	108-396109-XX
250 V/32 A IEC309 3.0 m cord—Europe	108-429106-XX
250 V/30 A IEC309 3.0 m cord—Japan	108-398101-XX
250 V/30 A IEC309 3.0 m cord—Korean	108-397100-XX
250 V/30 A IEC309 3.0 m cord—North America	108-395108-XX
120 V/15 A IEC309 2.5 m cord—North America	108-601108-XX

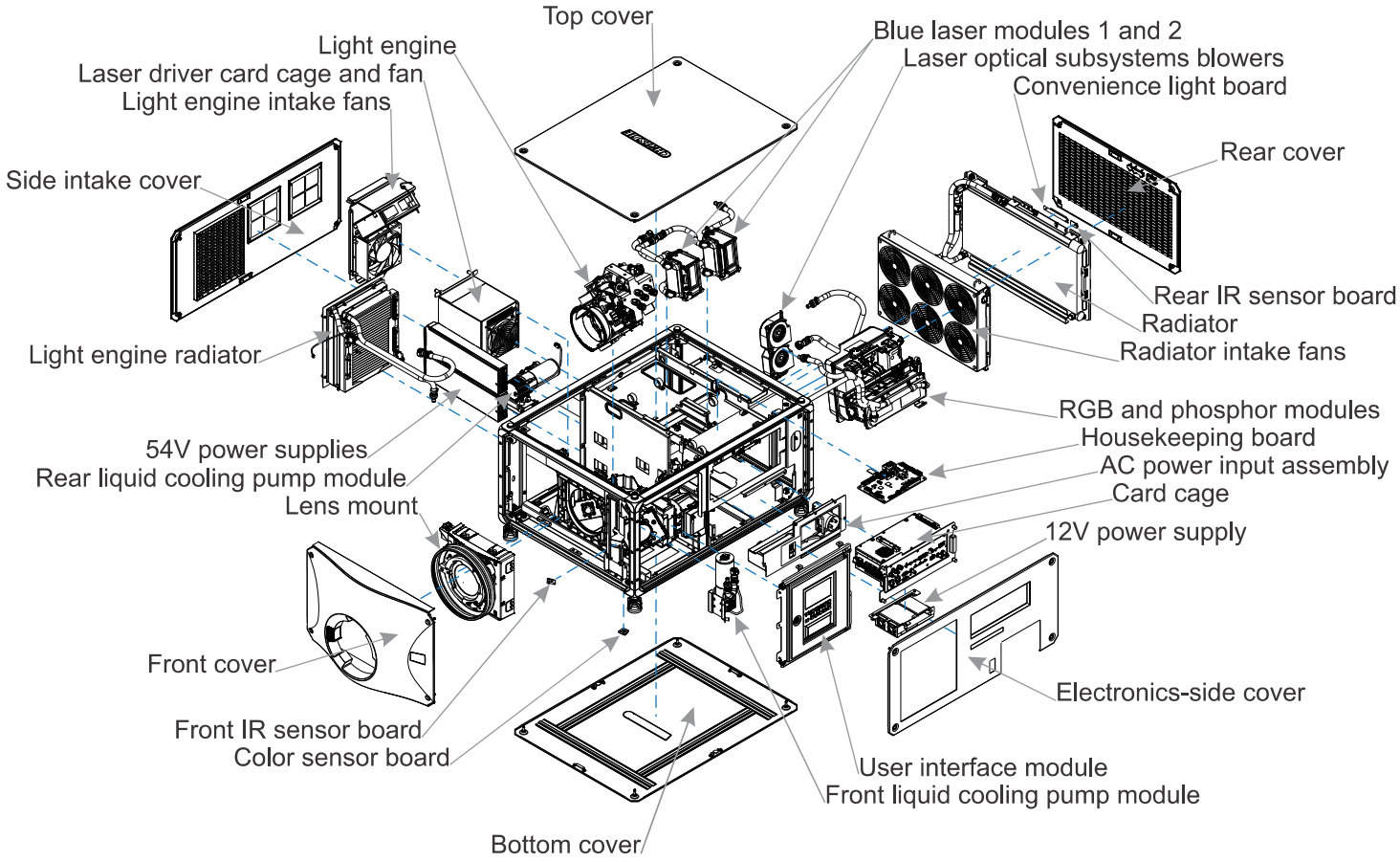
Other accessories

Description	Part number	Notes
Software accessories		
Christie Mystique™	900-100285-XX 900-100286-XX 900-100274-XX 900-100275-XX	Mystique version 2.6.0 or higher is required for the electronic convergence feature.
Christie Twist™ Premium	156-002103-XX 156-102104-XX	Twist version 2.9 or higher is required for the electronic convergence feature.
Christie Twist™ Pro	156-001102-XX 156-101103-XX	
Christie Guardian	156-134109-XX 156-135100-XX	—
Hardware accessories		
IR remote	003-120918-XX	—
Driver set	003-007010-XX	—
576 mm rigging handles	163-162100-XX	—
774 mm rigging handles	163-125109-XX	—
Rigging Couplers kit	163-128102-XX	—
Zoom Lens Conversion kit	003-005538-XX	—
Fixed Lens Conversion kit	003-005537-XX	—
Left-eye 3D 66 mm filter	177-101103-XX	—
Right-eye 3D 66 mm filter	177-102104-XX	—
Mono 3D 66 mm filter	177-104106-XX	—
Side Filter kit	163-195106-XX	—

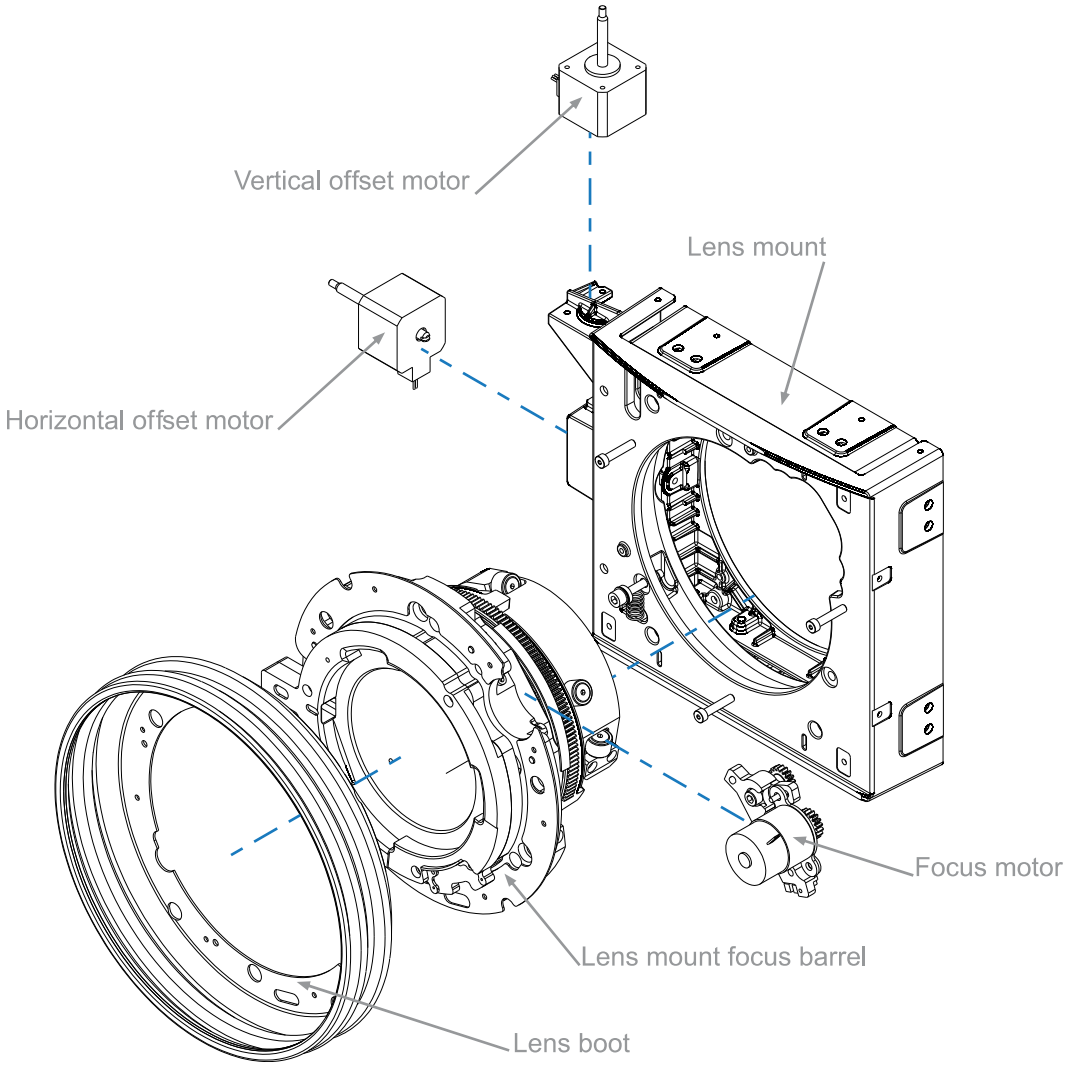
Christie Sapphire® 4K40-RGBH exploded views

The following shows the exploded views for the Christie Sapphire® 4K40-RGBH projectors.

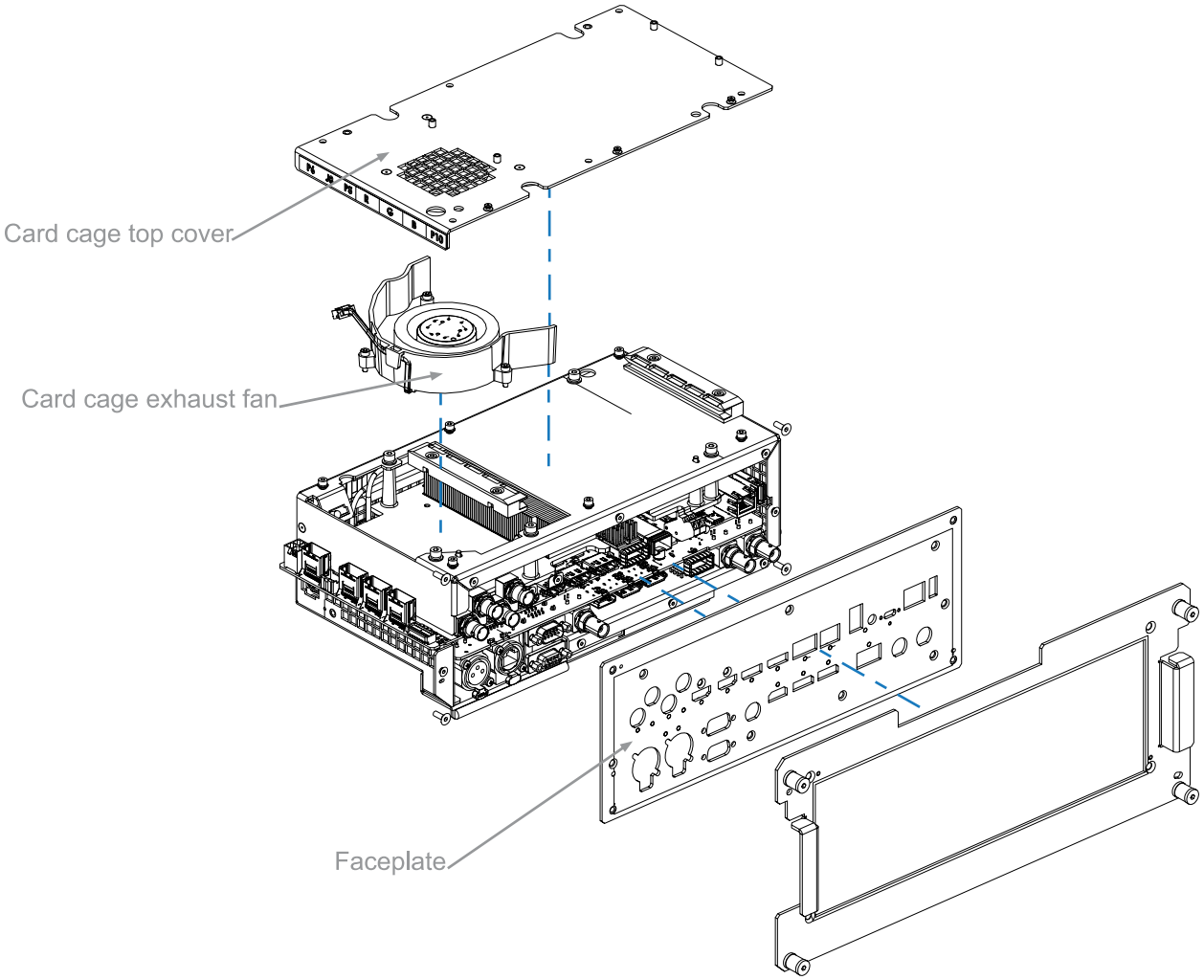
Christie Sapphire® 4K40-RGBH high-level exploded view



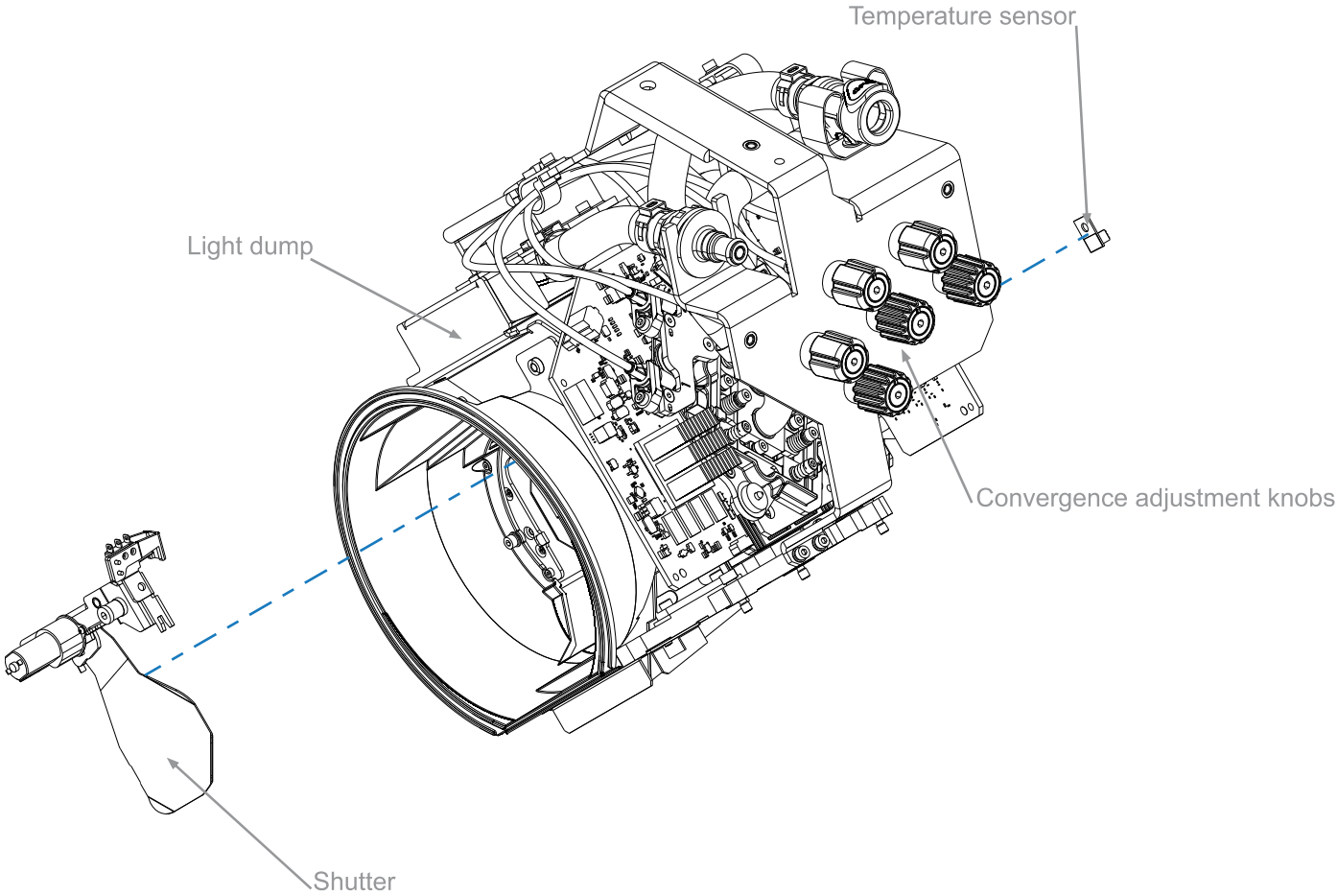
Christie Sapphire® 4K40-RGBH lens mount exploded view



Christie Sapphire® 4K40-RGBH card cage exploded view



Christie Sapphire® 4K40-RGBH light engine exploded view



Projector covers and feet

Warning! If not avoided, the following could result in death or serious injury.

- Prior to rigging the projector, inspect the quarter-turn fasteners on the covers to make sure they are safely secured.
- Prior to rigging the projector, always tighten the lock nut on the projector feet against the bottom of the projector to lock the feet. Otherwise, the feet must be removed.

Projector covers and feet index of parts and modules

The following table lists the parts and modules for the Christie Sapphire® 4K40-RGBH covers and feet.

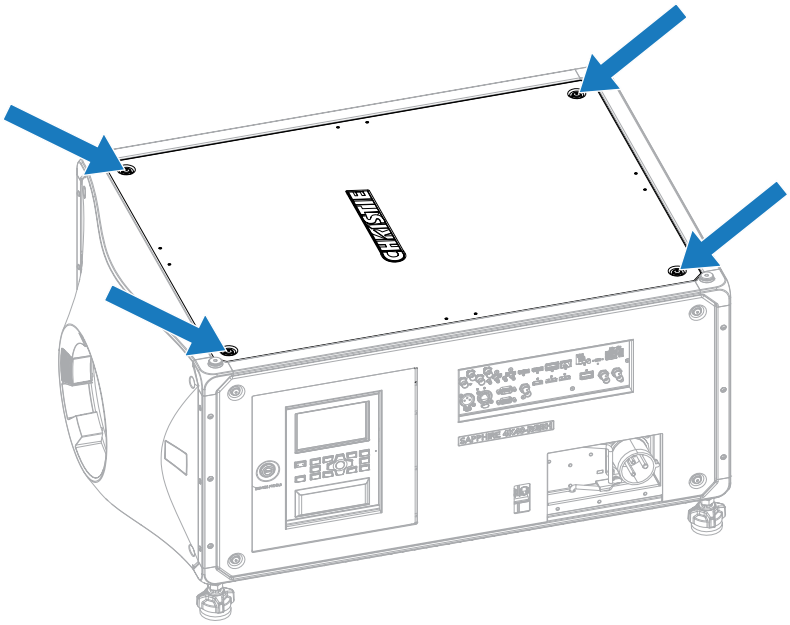
Part/module	Part number
Top cover (on page 52)	003-007018-XX
Rear cover (on page 53)	003-007017-XX
Front cover (on page 54)	003-200135-XX
Electronics-side (left) cover (on page 54)	003-203015-XX
Side-intake (right) (on page 55)	003-200830-XX
Bottom cover (on page 55)	003-007016-XX
Feet—4 pack (on page 56)	003-006113-XX

Top cover

The top cover provides access to the light engine, electronics, and various other internal components.

Part number: 003-007018-XX

1. Loosen the four screws securing the top cover.



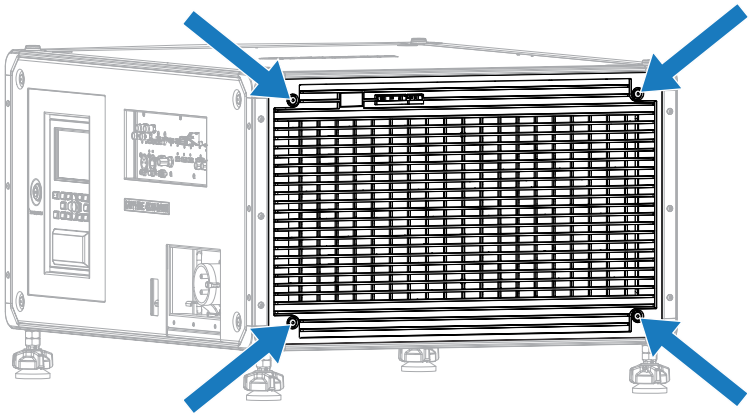
2. Remove the top cover.
3. Replace top cover, if required.
4. To re-install, follow these steps in reverse order.

Rear cover

The rear cover provides access to the rear exhaust fans.

Part number: 003-007017-XX

1. Loosen the four screws securing the rear cover.



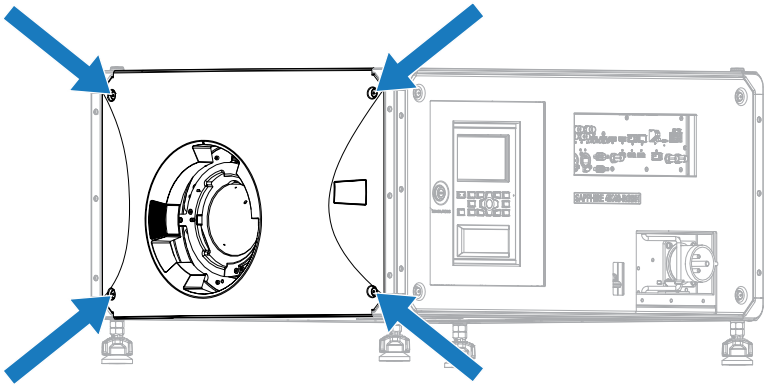
2. Remove the rear cover.
3. Replace the rear cover, if required.
4. Regularly clean the steel mesh shield when servicing the rear cover.
5. To re-install, follow these steps in reverse order.

Front cover

The front cover provides access to the lens assembly, front sensors, and liquid coolant reservoir.

Part number: 003-200135-XX

1. Loosen the four screws securing the front cover.



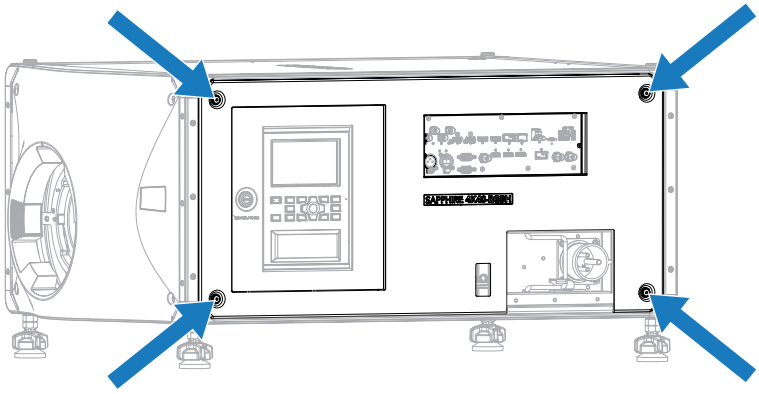
2. Unlatch the safety strap securing the front cover.
3. Remove the front cover.
4. Replace the front cover, if required.
5. To re-install, follow these steps in reverse order.

Electronics-side cover

The electronics-side cover provides access to side panel display and card cage.

Part number: 003-203015-XX

1. Loosen the four screws securing the electronics-side cover.



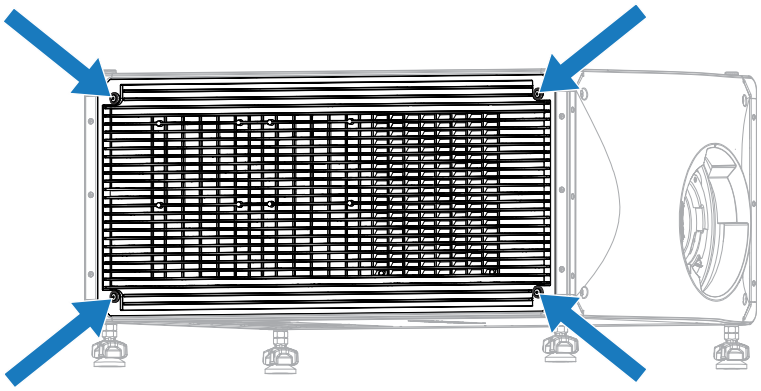
2. Remove the electronics-side cover.
3. Replace the electronics-side cover, if required.
4. To re-install, follow these steps in reverse order.

Side-intake cover

The side-intake cover provides access to the radiator, fans, and light engine.

Part number: 003-200830-XX

1. Loosen the four screws securing the side-intake cover.



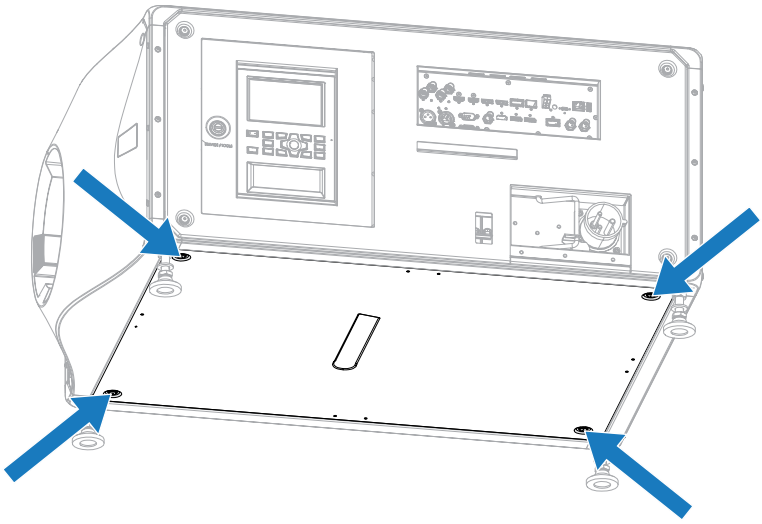
2. Remove the side-intake cover.
3. Replace the side-intake cover, if required.
4. To re-install, follow these steps in reverse order.

Bottom cover

The bottom cover provides access to the color sensor board. (CSB)

Part number: 003-007016-XX

1. Flip the projector onto its side.
2. Loosen the four screws securing the bottom cover.



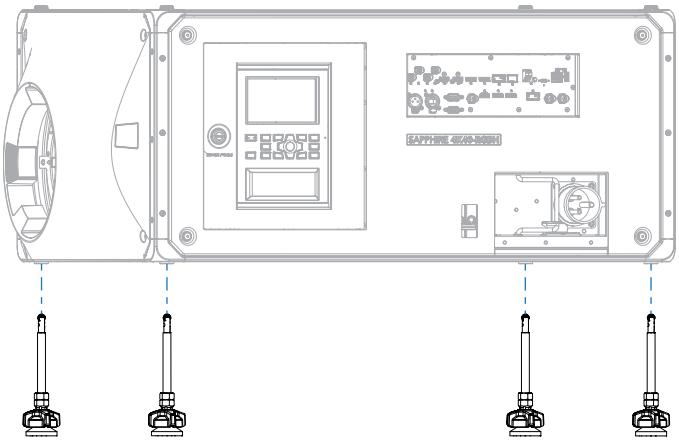
3. Remove the bottom cover.

4. Replace the bottom cover, if required.
5. To re-install, follow these steps in reverse order.

Projector foot

The adjustable feet can be raised or lowered when positioning the projector to make sure it is level on all sides so the displayed image appears rectangular without any keystone.

Part number: 003-006113-XX



1. Make sure the projector is in a secure position.

   Christie does not recommend having the projector overhang when replacing the feet, unless the projector is securely positioned.
2. Loosen the lock nut on the affected foot.
3. Uninstall the foot.
4. Replace the foot, if required.
5. To re-install, follow these steps in reverse order.

Lens mount components

The lens mount provides a means of securing a projection lens to the projector. Components include the lens boot, lens mount barrel, and the lens mount offset.

Lens mount components index of parts and modules

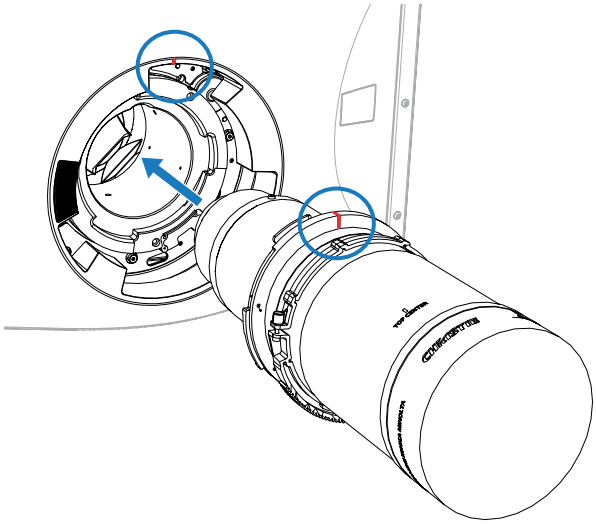
The following table lists the parts and modules for the Christie Sapphire® 4K40-RGBH lens mount components.

Part/module	Part number
Lens boot (on page 61)	003-005150-XX
Lens mount offset motor (on page 62)	003-005247-XX
Focus motor	003-007029-XX
Lens mount (on page 65)	003-104569-XX

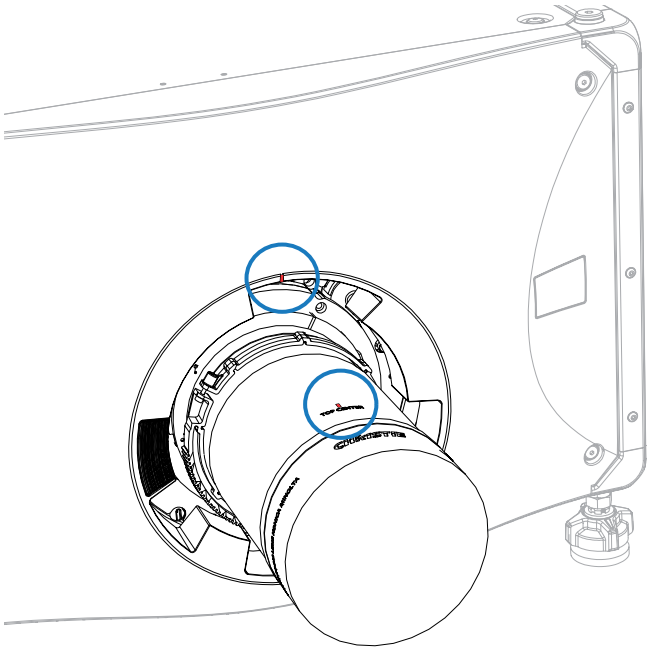
Installing the projector lens

Only use lenses designed for Christie Sapphire® 4K40-RGBH projectors. Installing a lens not designed for Christie Sapphire® 4K40-RGBH, results in a warning that the lens is not present.

1. Turn off the lasers.
2. Remove the lens caps from the lens.
3. Align the guides on the front cover and the lens marked by a red line.



4. Insert the lens into the projector and turn it clockwise until two clicks sound.
   The first click indicates the safety lock mechanism has been engaged.
5. Continue to turn the lens clockwise until a second click sounds.
   The second click indicates the lens is fully locked in position. The top center label should face up and be aligned to the lens guide on the front cover.



6. After installing a new lens in the projector:
   - *Adjust boresight* (on page 22).
   - *Perform electronic convergence* (on page 30).

Calibrating the lens motor

Make sure the lens motor is calibrated before using the projector.

If the lens motors are not calibrated properly, implications may include:

- Incorrect reporting of the lens motor position.
- Inability to use the full range of the lens motors.
- Lens motors traveling outside of the pre-defined keep-out area.
- Damage to the projector.

Calibrate the lens motors when any of the following conditions are met:

- After a lens change.
- After the projector is moved and/or jostled.
- After any manual adjustment is made to the zoom or focus.

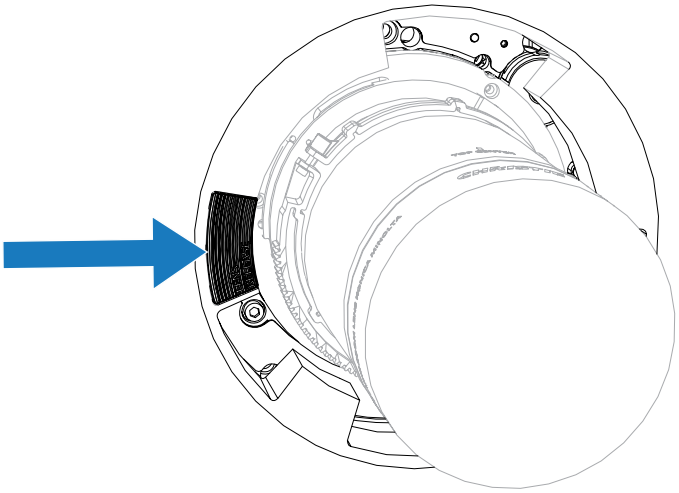
To calibrate the lens:

1. Select **MENU** > **Configuration** > **Lens Settings** > **Lens Calibration**.
2. Select **Enter**.

Removing the projection lens

Use the correct method of removing the lens.

1. Turn off the lasers.
2. Push in and hold the lens release button.



3. Turn the lens counterclockwise until the lens guides are aligned.
4. Slide the lens straight out of the projector.
   If the lens does not slide out easily, reset the lens offset before removing the lens.
5. Attach the lens cap to avoid damage.

Warning! If not avoided, the following could result in death or serious injury.

- Once lens removal has begun, the safety retention features of the lens are defeated. To re-engage the safety lock mechanism, remove and re-insert the lens, or fully rotate the lens clockwise until a click sounds.
- Use packaging tape to ensure the safe shipment of the projection lens to restrain the zoom ring from rotating during shipping.

Installing the ultra short throw projector lens

Learn how to install the ultra short throw projection lens.

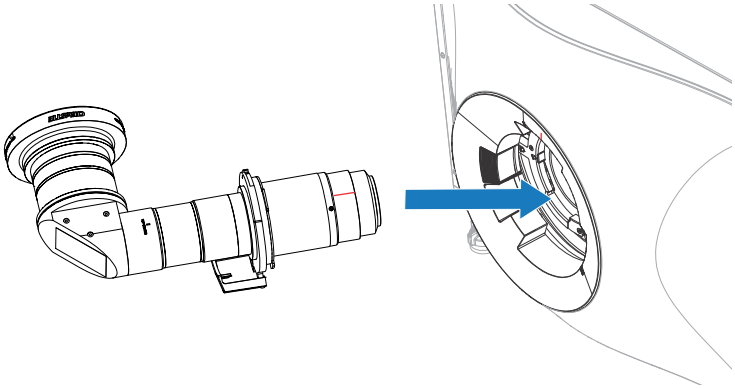
When using the ultra short throw lens and switching between dark and bright content, focus drift can occur. To help to mitigate this issue, Christie recommends reducing brightness and focusing the content on what you primarily want the projector to focus on, or creating different profiles for the dark and light content.

The illustrations in this document are for representation only and may not depict your model exactly.

1. Switch to the ultra short throw lens keep-out area.
   a) Select **MENU** > **Configuration** > **Lens Settings**.
   b) Select **Enable UST Lens (0.38:1)**.
   c) To enable the ultra short throw lens keep-out area, select **Enter**.

   Not switching to this keep-out area risks damaging the projector when the ultra short throw lens is installed.
2. Turn off the lasers.
3. Remove the lens caps from the lens.
4. Align both the guide on the front cover and the lens marked by a red line, and the insert plates on the lens.
5. Insert the lens into the projector and turn it clockwise until it is locked in place.

   Make sure the lens is supported near the front element.

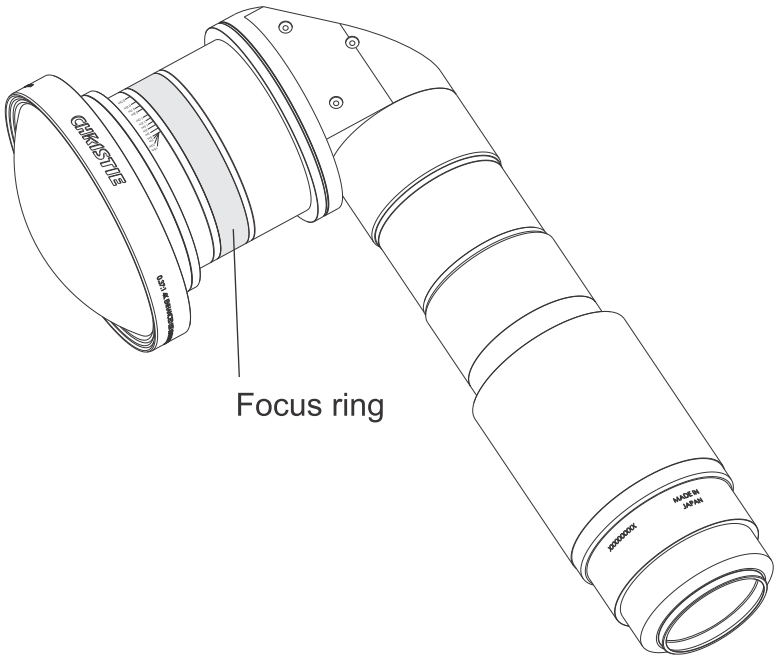


Aligning and focusing the image

After installing the lens, align and focus the image.

The method for performing the steps below may vary depending on projector model. For detailed information, refer to the user documentation for your product.

1. If required, power on the projector.
2. Perform a lens calibration.
3. To align the image, position the projector and adjust offsets.
4. Adjust boresight.
5. Adjust the center focus of the image by using the Focus feature on the projector.
6. Manually adjust the corner focus of the image using the focus ring on the lens.



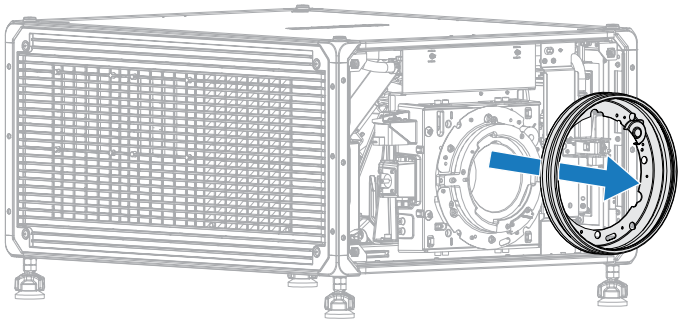
7. To fine tune the focus, repeat steps 5 and 6 until optimum focus is achieved.

Lens boot

The lens boot is a critical part of the projector's electromagnetic interference (EMI) enclosure and is required to meet FCC standards for radiated emissions. It also helps to keep out dust and foreign materials.

Part number: 003-005150-XX

1. *Remove the front cover* (on page 54).
2. Remove the front cover.
3. Disconnect the harness.
4. To release the lens boot, remove eight screws securing the two boresight indicator brackets.
5. Carefully pull the lens boot off of its locating pins and around the bayonet locking plates.



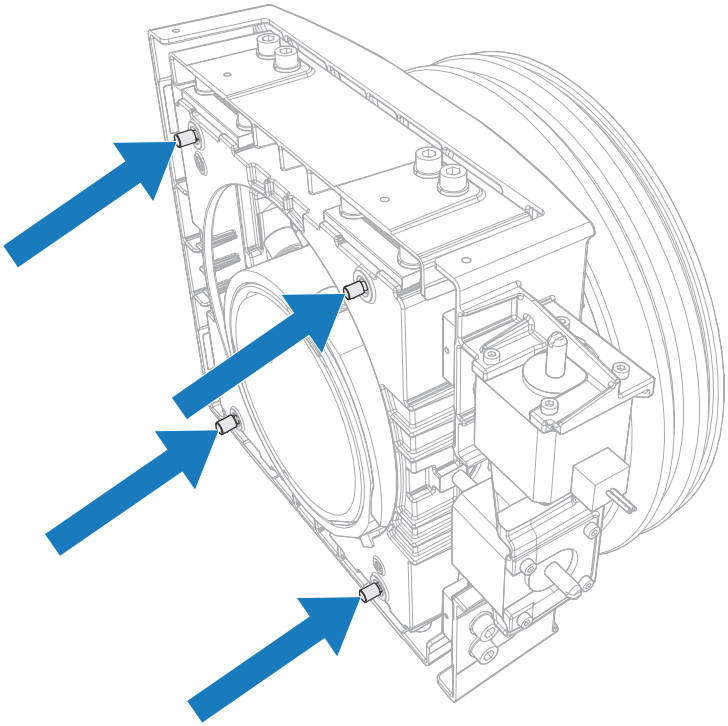
6. Replace the lens boot and/or the boresight indicator brackets.
7. To re-install, follow these steps in reverse order.

Offset motors

The offset motor provides a means of adjusting the position of the projection lens using motorized controls. It contains both the horizontal and vertical offset motors.

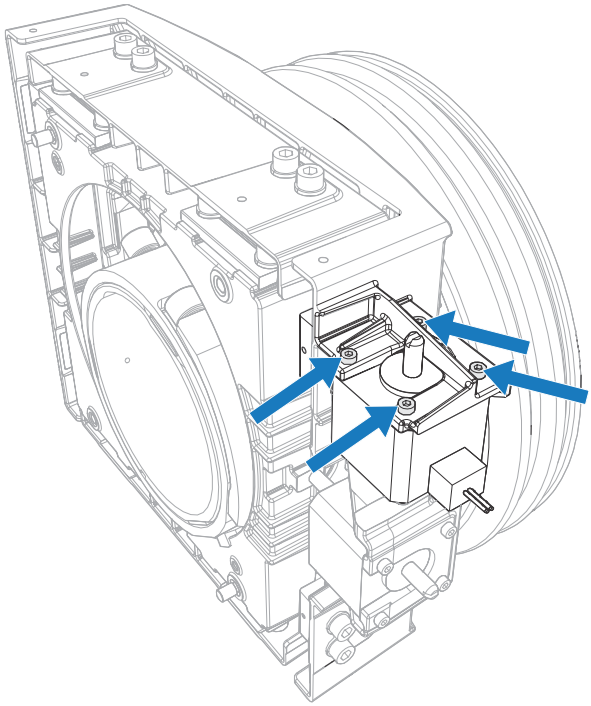
Part number: 003-005247-XX

1. *Remove the top cover* (on page 52).
2. *Remove the front cover* (on page 54).
3. Disconnect the lens mount harness at the bottom left of the lens mount.
4. Remove the four screws securing the lens mount to the projector.

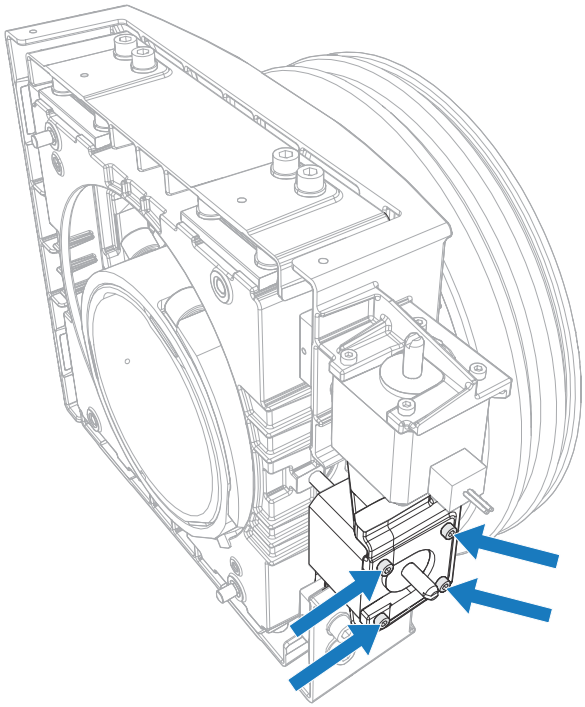


5. Remove the entire lens mount.
6. Remove the four screws securing the affected offset motor (horizontal (H) or vertical (V)).

Vertical offset motor screws



Horizontal offset motor screws



7. With a flathead screwdriver, unthread the drive shaft until the motor assembly is free.
8. Disconnect the harness to the affected motor.
9. Replace the affected motor.

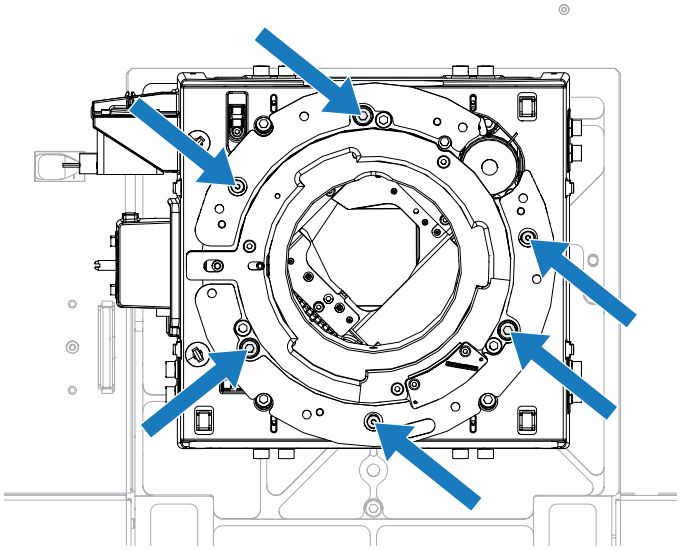
10. To re-install, follow these steps in reverse order.

Focus motor

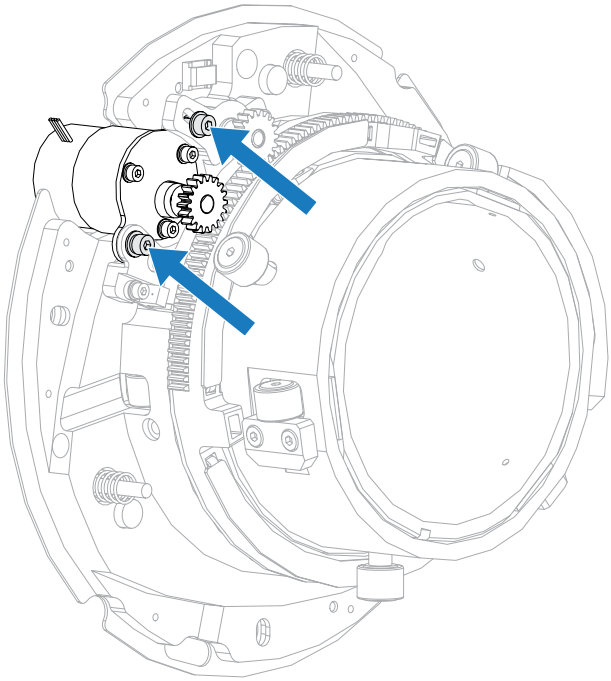
The focus motor is locate do on the boresight assembly.

Part number: 003-007029-XX

1. *Remove the lens from the projector* (on page 59) and place it on a secure surface.
2. *Remove the lens boot* (on page 61).
3. Remove the six screws securing the boresight assembly and remove the assembly from the projector.



4. Remove the two screws securing the focus motor to the boresight assembly.



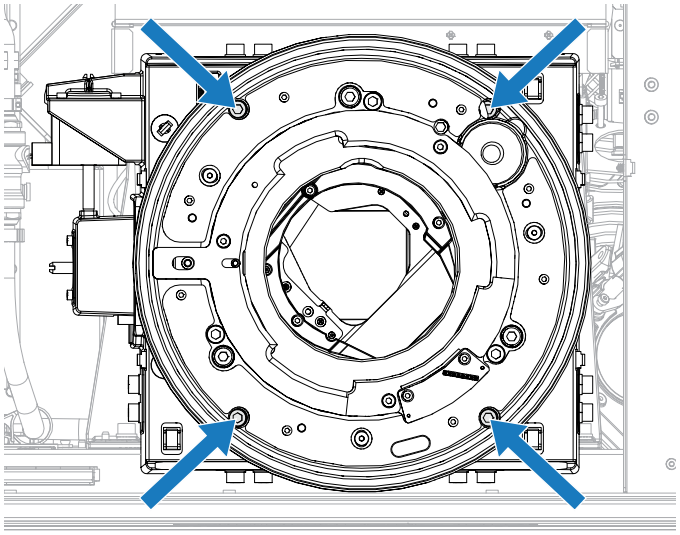
5. Remove the focus motor and replace it.
6. To re-install, follow these steps in reverse order.

Lens mount

The lens mount, located at the front of the projector is an assembly of mechanical and electrical components that securely holds and positions the projection lens.

Part number: 003-104569-XX

1. *Remove the top cover* (on page 52).
2. *Remove the front cover* (on page 54).
3. Disconnect the five harnesses (sensors, ILS, motors).
4. Remove the four screws securing the lens mount to the projector.



5. Remove the lens mount assembly.
6. Replace the lens mount assembly, if required.
7. To re-install, follow these steps in reverse order.

Ventilation and cooling

Vents and louvers provide ventilation, both for intake and exhaust, keeping the projector components within their operating temperature specifications.

When replacing fans, make sure you confirm the fan direction for airflow. The correct orientation of the fan also makes sure the fan harness reaches the connector.

Ventilation and cooling index of parts and modules

The following table lists the parts and modules for Christie Sapphire® 4K40-RGBH.

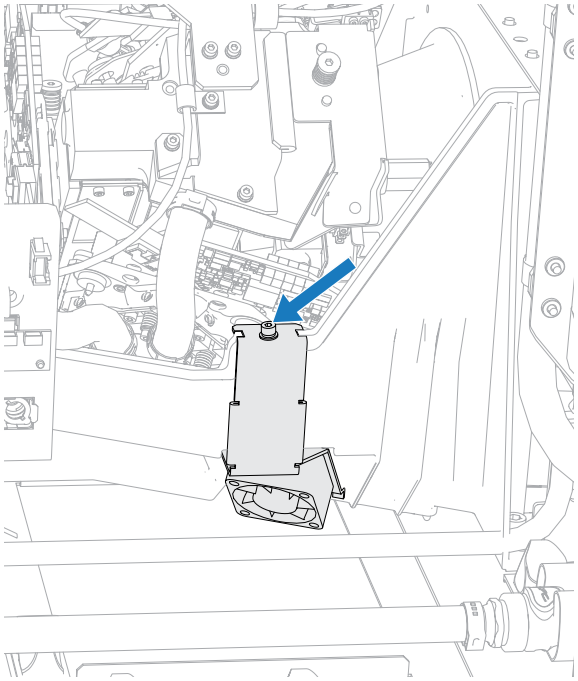
Part/module	Part number
Blue light engine fan FPGA (on page 67)	003-112556-XX
Green light engine fan FPGA (on page 68) *Red light engine fan FPGA* (on page 69)	003-112555-XX
Laser driver card cage (12 V 0.50 A 4 wire 120x25) fan	003-121494-XX
Light engine intake (12 V 1.2 A 4 wire 150x50) fan (on page 74)	003-007028-XX
Radiator intake (12 V 1.2 A 4 wire 150x50) fan (on page 70)	
Cave fan (on page 75)	003-114437-XX
Laser optical subsystem (LOS) rear radiator (on page 76)	003-201476-XX
Light engine radiator (on page 78)	003-201474-XX
Front liquid cooling pump module (on page 80)	003-200838-XX
Rear pump module (on page 81)	003-200837-XX

Blue formatter fan (#3)

The blue formatter fan provides cooling for the blue light engine formatter board.

Part number: 003-112556-XX

1. *Remove the top cover* (on page 52).
2. Remove the light engine intake fan module.
3. Disconnect the fan #3 harness inline connector.
4. Loosen the screw securing the fan and bracket.



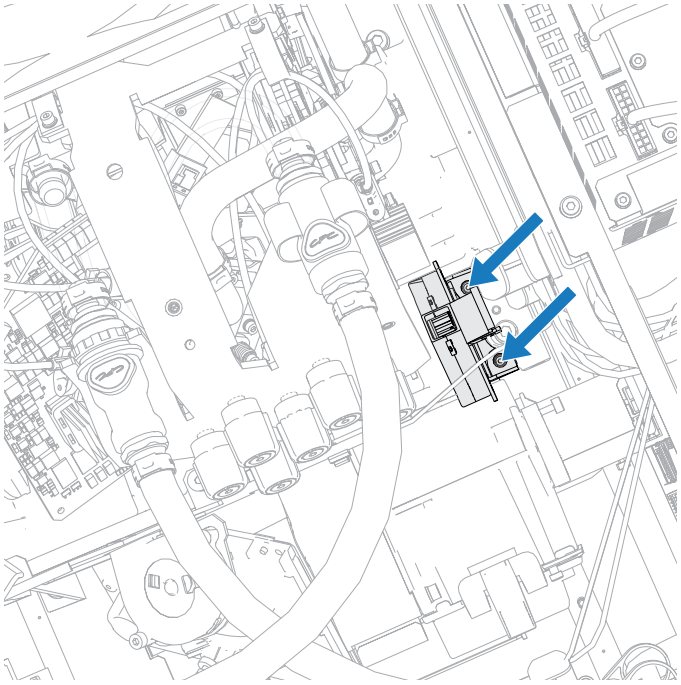
5. Remove the four screws securing the fan to the bracket.
6. Replace the fan, if required.
7. To re-install, follow these steps in reverse order.

Green formatter fan (#4)

The green formatter fan provides cooling for the green light engine formatter board.

Part number: 003-112555-XX

1. *Remove the top cover* (on page 52).
   If you do not have top access, you can access the fan through the service door.
2. Disconnect the fan #4 harness inline connector.
3. Loosen the two screws securing the fan bracket.



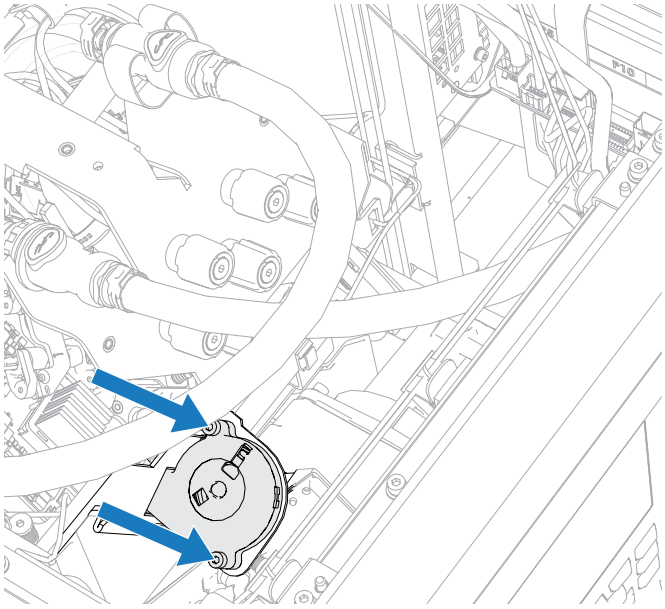
4. Remove the fan bracket.
5. Remove the two screws securing the fan to the bracket.
6. Move the bracket back and make sure it does not come in contact with the light engine.
7. Replace the fan, if required.
8. To re-install, follow these steps in reverse order.

Red formatter fan (#5)

The red formatter fan provides cooling for the red light engine formatter board.

Part number: 003-112555-XX

1. *Remove the top cover* (on page 52).
   If you do not have top access, you can access the fan through the service door.
2. Disconnect the fan #5 harness inline connector.
3. Loosen the three screws securing the bracket holding the assembly and remove it.
4. Remove the two screws securing the fan to the bracket.



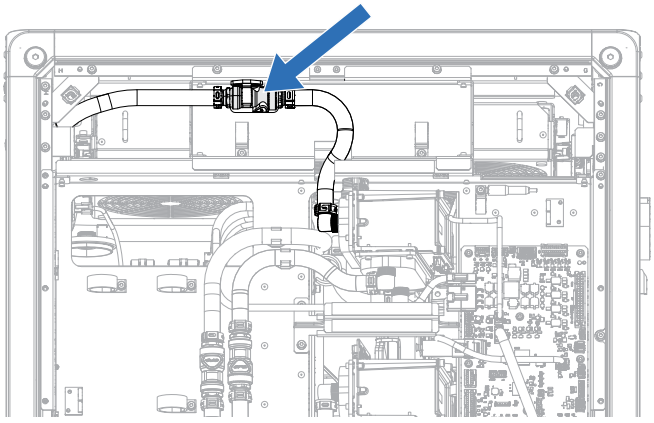
5. Replace the fan, if required.
6. To re-install, follow these steps in reverse order.

Radiator intake fans (#6-11)

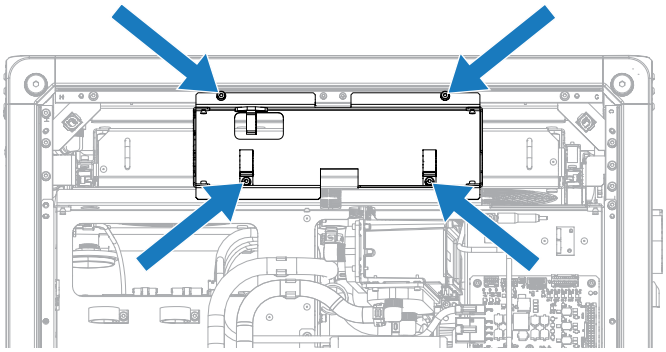
The radiator intake fans draw cool air in to assist in cooling the projector.

Part number: 003-007028-XX

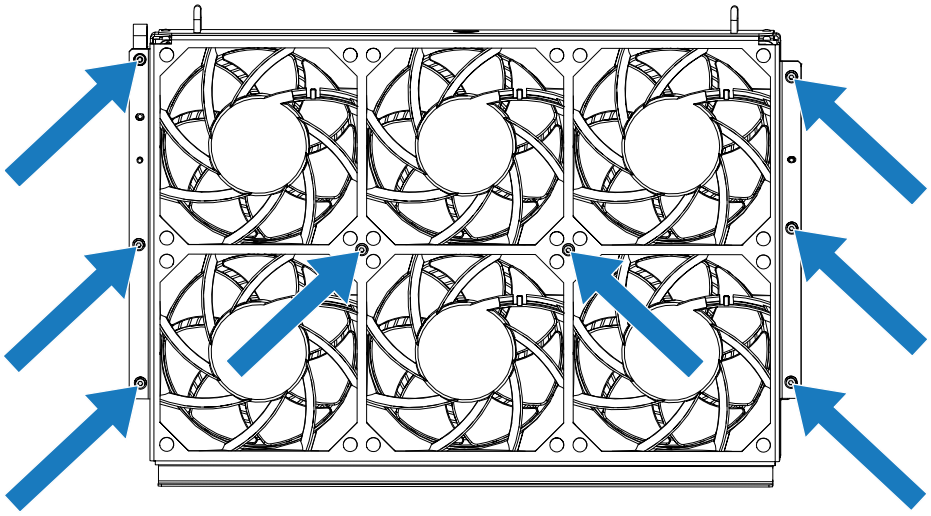
1. *Remove top cover* (on page 52).
2. Disconnect the radiator quick disconnect (top inline coolant hose).



3. Loosen the four screws securing the top radiator bracket and remove it.



4. Disconnect the HKBG to Fans 6-11 (P/N: 001-114742-XX) and IRB/SLB (P/N: 001-115338-XX) harnesses from the housekeeping board.
5. Pull up the radiator fan assembly and remove it from the projector.
6. Remove the eight screws securing the bracket.



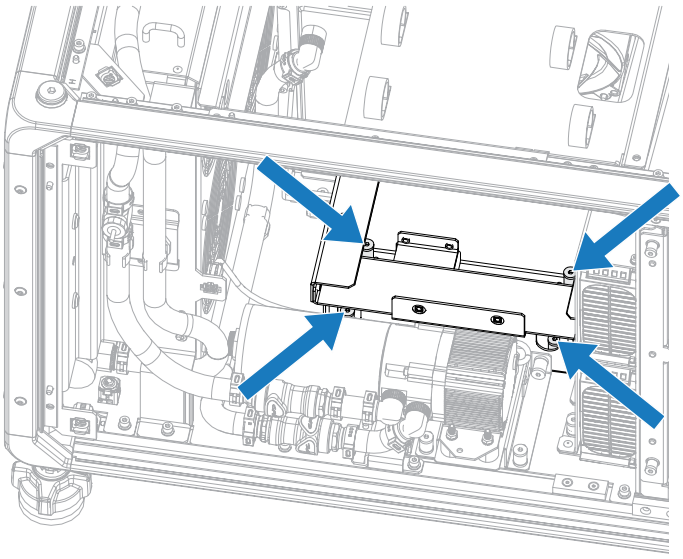
7. Disconnect the affected fan inline fan harness connector.
8. For each fan, remove and replace the affected fan.
9. To re-install, follow these steps in reverse order.
   When replacing, make sure to line up the vibration isolators.

Laser optical subsystem blowers (#14 and 15)

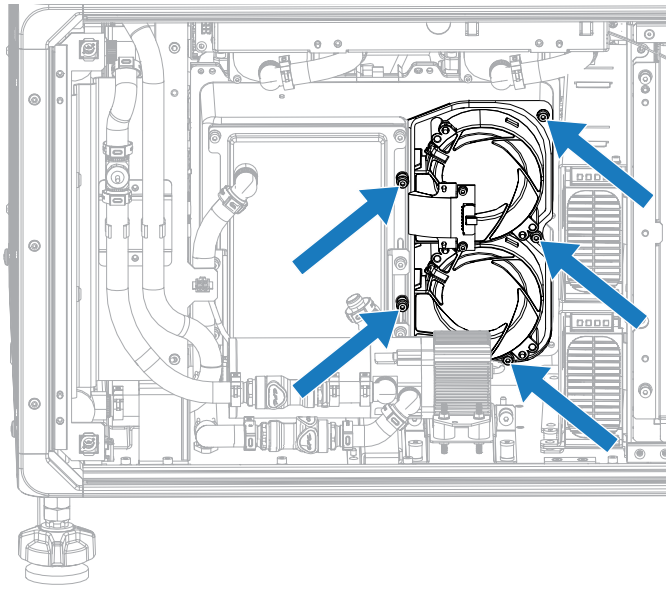
The laser optical subsytsem (LOS) blowers (#14 and 15) draw hot hair from the LOS.

Part number: 003-007500-XX

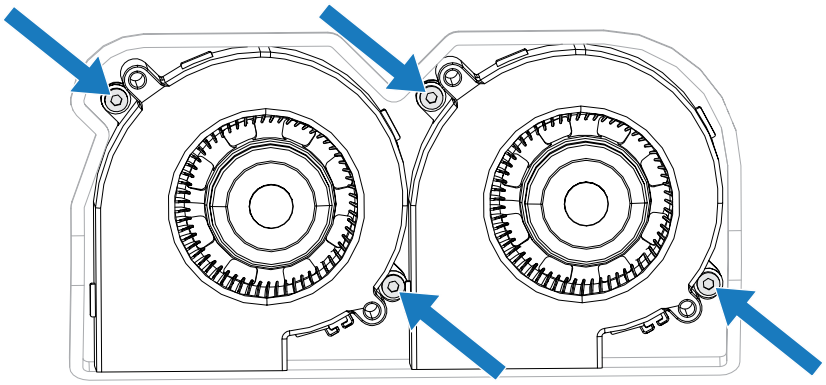
1. Remove the laser driver module.
2. Remove the four screws securing the laser driver mounting bracket



3. Disconnect the LOS blower connector.
4. Loosen the five screws securing the LOS blower module.



5. Rremove the two screws securing the affected blower.



6. Lift out the affected blower and then disconnect the harness under it.
7. Replace the blower, if required.
8. To replace the other blower, repeat steps 5 to 7.
9. To re-install, follow these steps in reverse order.

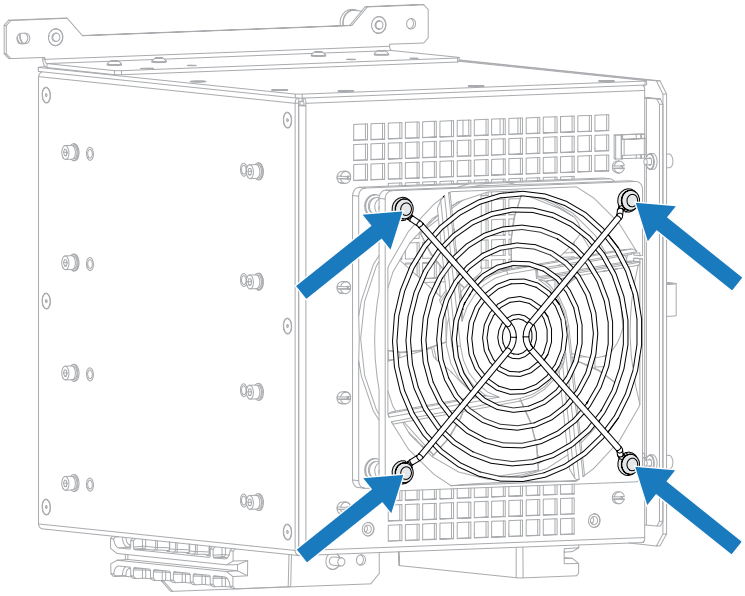
   When replacing the blower, make sure the harness is routed underneath and not pinched by the blower.

Laser driver card cage exhaust fan (#16)

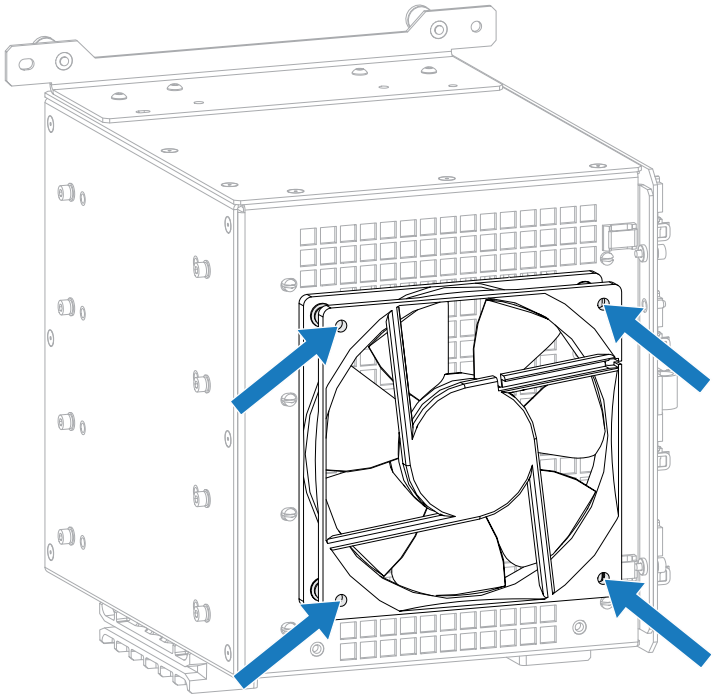
The laser driver card cage exhaust fan (#16) provides cooling for the laser driver card cage.

Part number: 003-121494-XX

1. *Remove the laser driver card cage* (on page 93).
2. Disconnect the fan harness.
3. Remove the grill from the fan to access the screws securing the fan to the laser driver card cage.



4. Loosen the four screws securing the fan to the laser driver card cage and remove the fan.



5. Replace the fan, if required.
6. To re-install, follow these steps in reverse order.

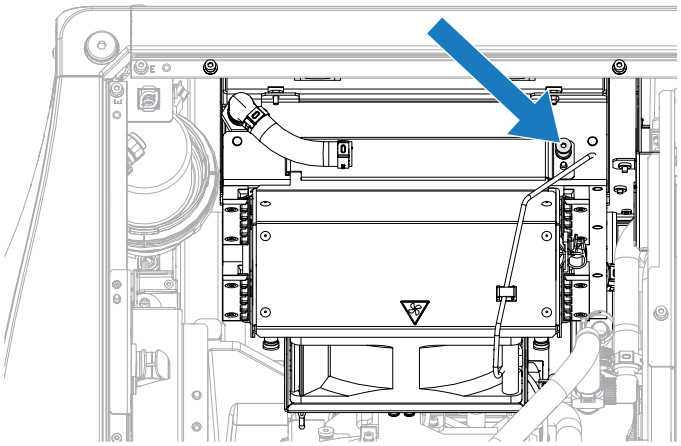
Light engine intake fans (#17 and 18)

The light engine intake fans draw air into the projector to cool the light engine.

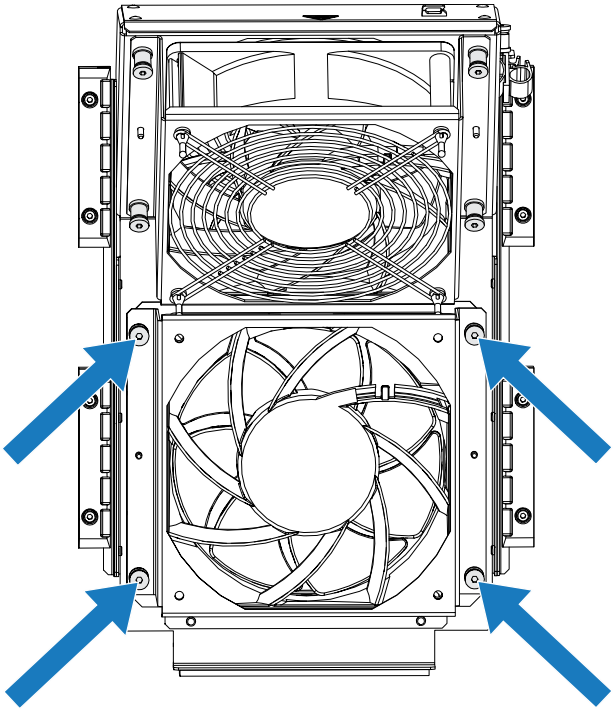
Part number: 003-007028-XX

Christie recommends removing the bottom fan (#18) prior to removing the top fan (#17).

1. *Remove top cover* (on page 52).
2. Disconnect the harness for fans 17 and 18.
3. Loosen the screw securing the light engine fan module bracket and remove the fan module.



4. Remove the four screws securing the lower fan and remove it from the assembly.

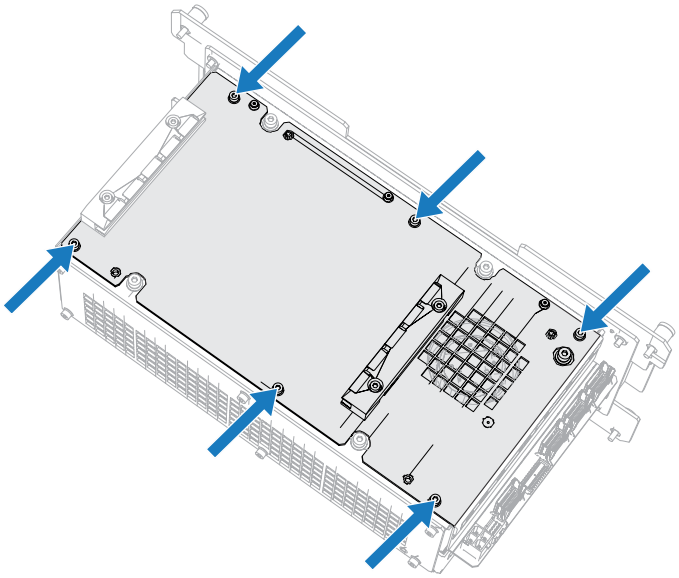


5. Replace the fan.
6. Repeat steps 4 and 5 to replace the upper fan, if required.
7. To re-install, follow these steps in reverse order.
   Make sure the rubber inserts are properly installed when replacing fan #17.

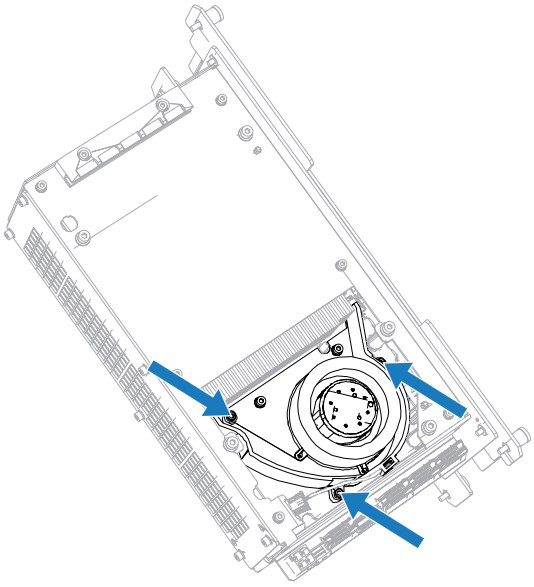
Card cage fan (#102)

The card cage fan (#102) draws the hot air out of the card cage.

1. Remove the six screws securing the fan cover plate.



2. Disconnect the inline connector (J11) for the fan.
3. Loosen the three screws securing the fan and remove it.



4. Replace the fan.
5. To re-install, follow these steps in reverse order.

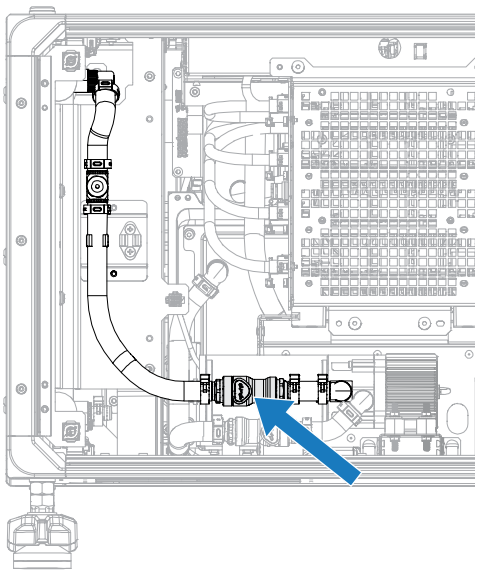
Laser optical subsystem (LOS) radiator

The laser optical subsystem (LOS) radiator exchanges heat from the coolant in the liquid cooling system to the air.

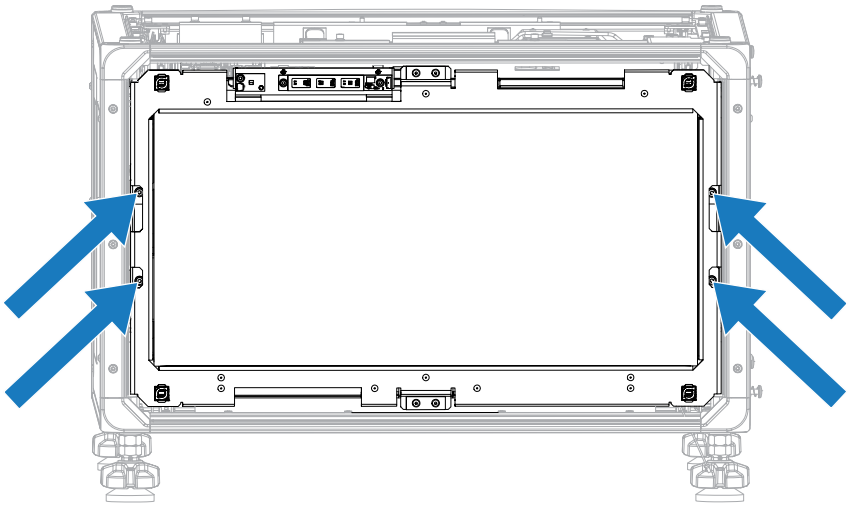
Part number: 003-201476-XX

1. *Remove top cover* (on page 52).

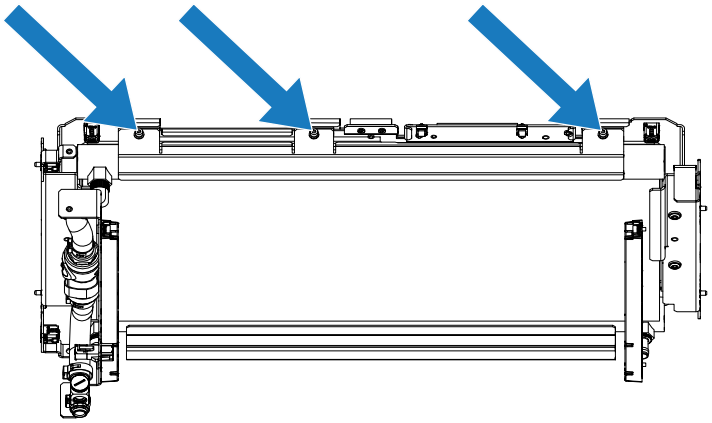
2. *Remove the rear cover* (on page 53).
3. *Remove the side-intake cover* (on page 55).
4. *Remove the radiator fans* (on page 70).
5. Disconnect the rear intake temperature sensor harness.
6. Disconnect the quick disconnect.
   Christie recommends putting a Kimwipe™ below the disconnect.



7. Remove the four screws securing the radiator.



8. Remove the radiator from the projector.
9. Remove the three screws securing the radiator to the clamp bracket.



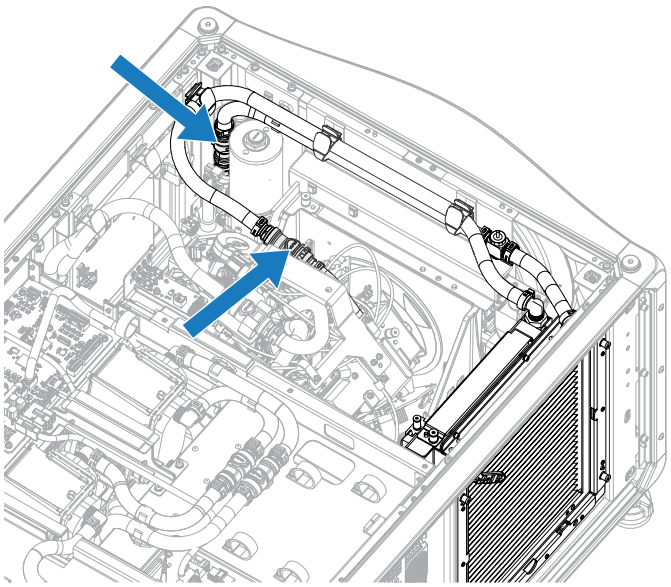
10. Replace the radiator, if required.
11. To re-install, follow these steps in reverse order.

Light engine radiator

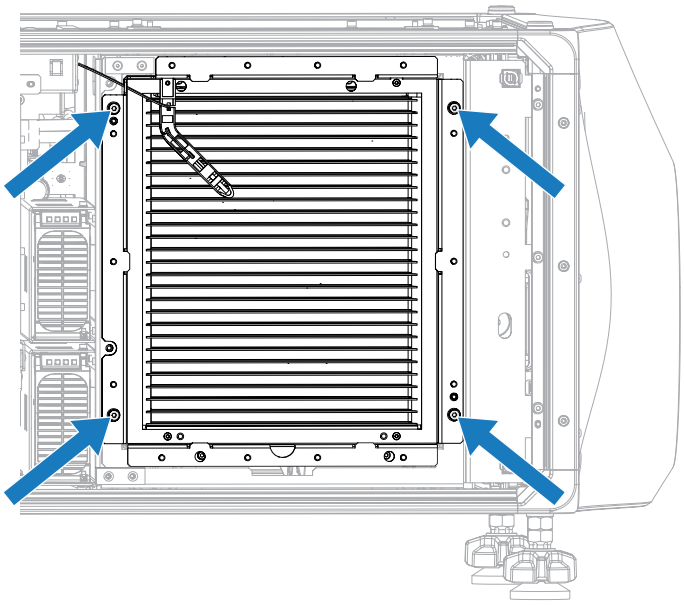
The radiator exchanges heat from the coolant in the liquid cooling system to the air.

Part number: 003-201474-XX

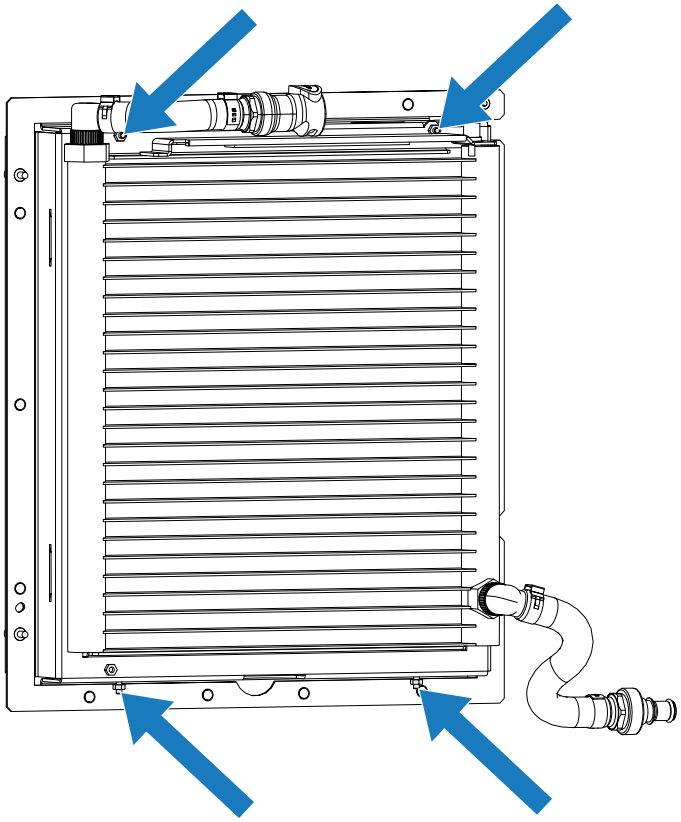
1. Remove the light engine fans.
2. *Remove the side-intake cover* (on page 55).
3. Disconnect the front coolant temperature (P/N: 002-122248-XX) and the air intake temperature (P/N: 002-122336-XX) harnesses.
4. Disconnect the radiator inlet and outlet hoses.
   Christie recommends putting a Kimwipe™ below the disconnects.



5. Remove the four screws securing the radiator.



6. Remove the radiator from the projector.
7. Remove the four nuts securing the radiator cover and remove it.



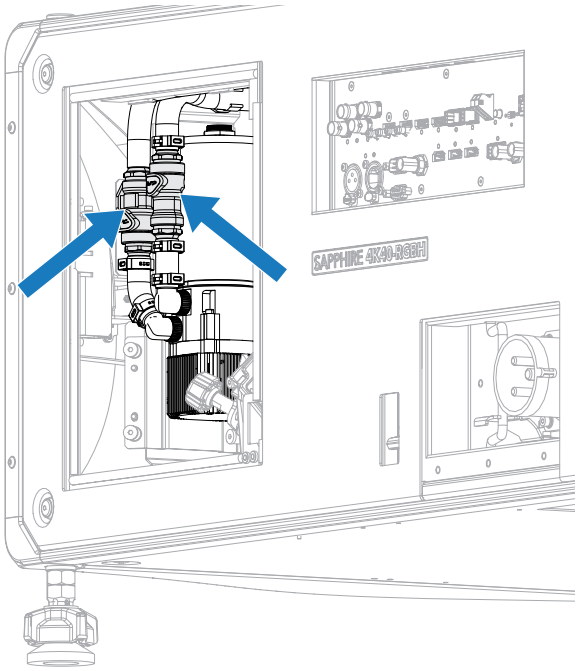
8. Remove and replace the radiator, if required.
9. To re-install, follow these steps in reverse order.

Front liquid cooling pump module

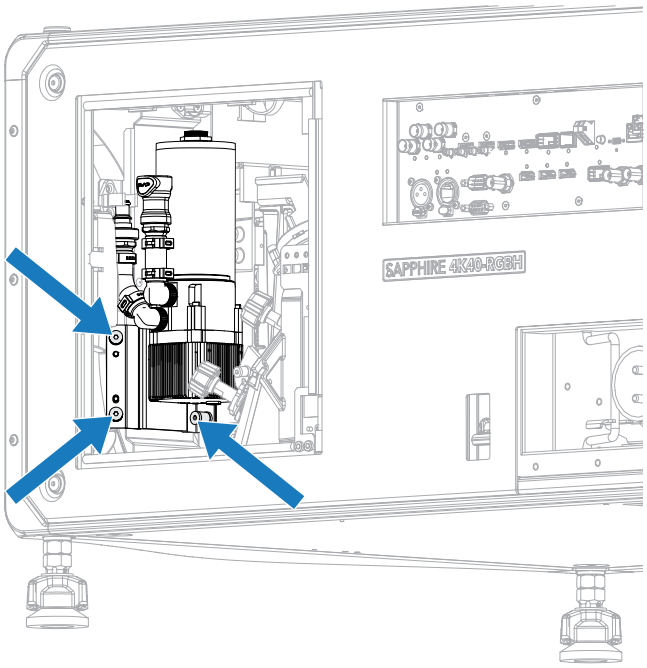
Learn how to remove the front liquid cooling pump module.

Part number: 003-202966-XX

1. *Remove the top cover* (on page 52).
2. Open the Service door.
3. Disconnect the pump harness.
4. Disconnect two quick disconnects and release them from the retaining brackets.



5. Loosen the three screws securing the pump bracket.



6. Remove and replace the pump module.
7. To re-install, follow these steps in reverse order.

   Christie recommends fully securing the pump module before starting to reroute and connect the hoses.

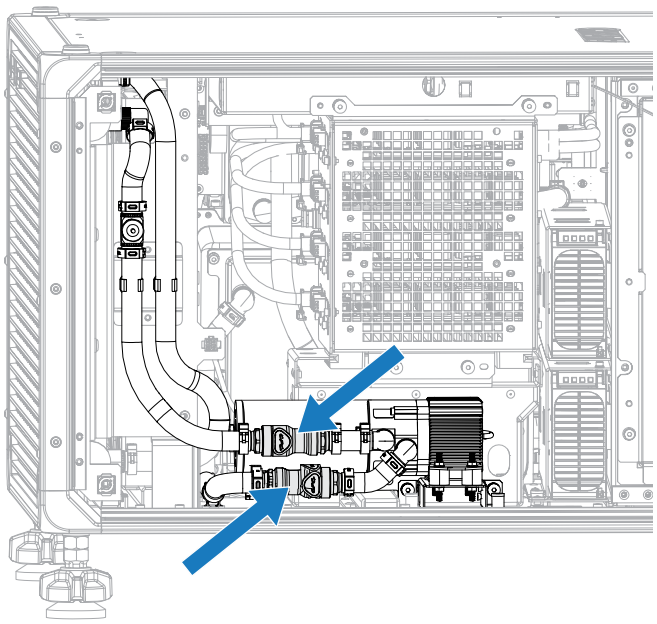
   To avoid damage when re-routing the hoses, make sure care is taken to not kink the hoses.

Rear liquid cooling pump module

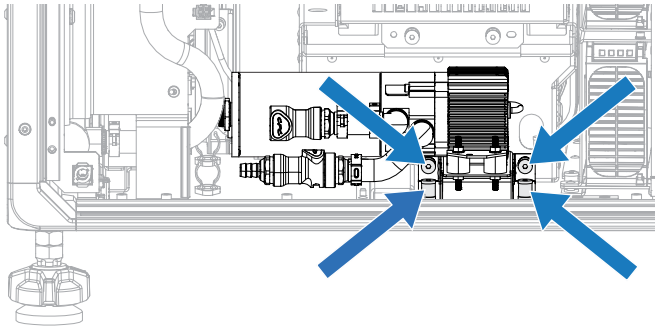
Learn how to remove the rear liquid cooling pump module for the laser optical subsystem (LOS).

Part number: 003-202966-XX

1. *Remove the side-intake cover* (on page 55).
2. Disconnect the two quick disconnects.



3. Disconnect the pump harness.
4. Loosen the four screws securing the liquid cooling pump module.



5. Remove and replace the pump module.
6. To re-install, follow these steps in reverse order.

   Christie recommends fully securing the pump module before starting to reroute and connect the hoses.

To avoid damage when re-routing the hoses, make sure care is taken to not kink the hoses.

Electronics

Electronics index of parts and modules

The following table lists the parts and modules for the Christie Sapphire® 4K40-RGBH electronics components.

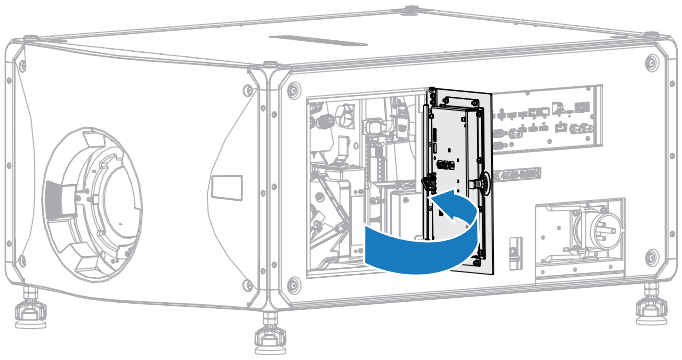
Part/module	Part number
User interface module	003-201541-XX
Card cage (on page 84)	003-202884-XX
AC power input assembly (on page 86)	003-202537-XX
Line filter (on page 86)	003-007632-XX
AC breaker (on page 87)	003-007633-XX
2000 W 54 V power supply low voltage (on page 88)	003-122275-XX
1500 W 12 V power supply (on page 89)	003-007273-XX

User interface module

Complete the following steps to install the user interface module on Sapphire® 4K40-RGBH.

Part number: 003-201541-XX

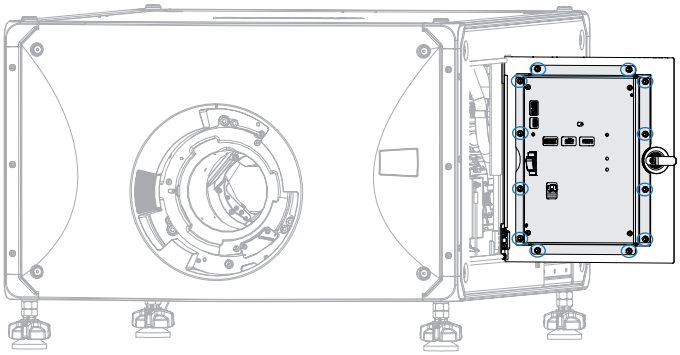
1. Open the service door.



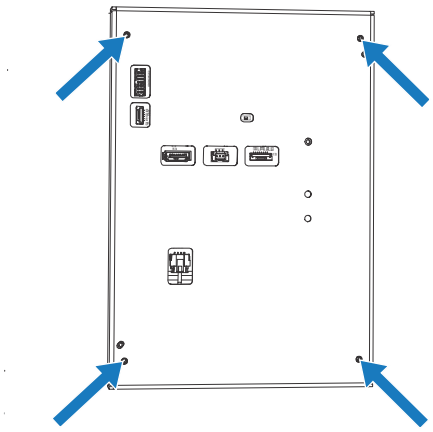
2. Disconnect the J30 (input panel), P32 (CLB interface), and SATA harnesses from the back of the user interface module.
3. Remove the ground harness.
4. Remove the harnesses from the clip.

5. Remove the 12 nuts (highlighted by the red circles in the image below) and remove the user interface from the door.

   Make sure to retain the nuts.



6. Remove the four screws from the back plate of the user interface module and remove the rear cover.



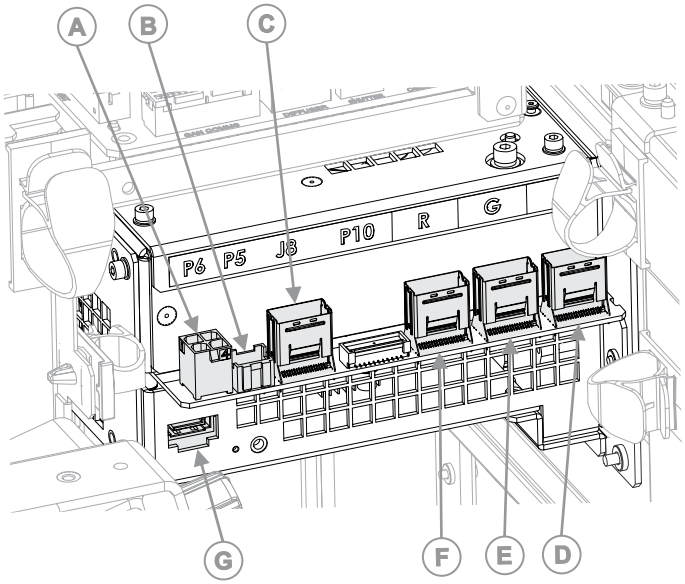
7. Transfer the back plate to the new user interface module.
8. To re-install, follow these steps in reverse order.

Card cage

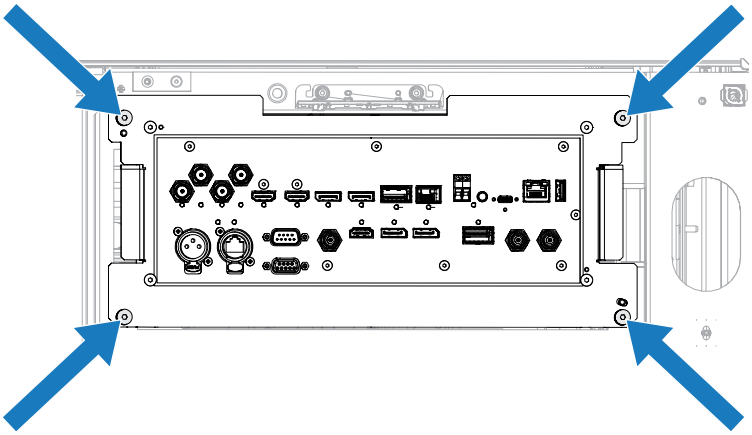
The card cage contains the connections for any input sources.

Part number: 003-202884-XX

1. *Remove top cover* (on page 52).
2. *Remove the electronics-side cover* (on page 54).
3. Disconnect all external card cage connections and any input sources.
4. Disconnect P110 and P112 from the housekeeping board.
5. Remove the three miniSAS connections (D to F in the image below).



6. Disconnect the P5, P6, and P8 (A to C in the image in step 5) connectors from the side of the card cage.
7. Disconnect the IKB SATA harness (G in the image in step 5).
8. Loosen the four screws securing the card cage.



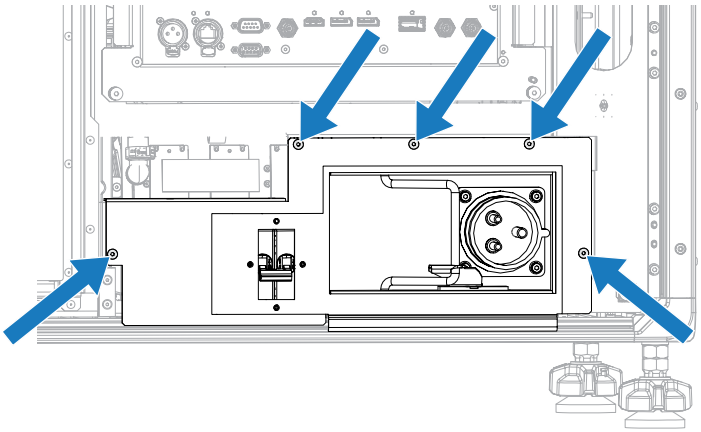
9. Partially slide the card cage out along the guides.
10. Disconnect the AC inline harness.
11. Fully slide the card cage out of the projector.
    To avoid possible damage, carefully place the card cage on a clean, flat surface.
12. Replace the card cage, if required.
13. Move the bracket to the new card cage.
14. To re-install, follow these steps in reverse order.
15. After you have replaced the card cage, make sure to do the following:
    - If a Mirage license was installed on the projector, re-apply the license.
    - Redo the sensor-to-screen calibration as the projector is reset to the factory defaults.

AC power input assembly

The AC power input is located at the electronics-side of the projector.

Part number: 003-202537-XX

1. *Remove the electronics-side cover* (on page 54).
2. Remove the five screws securing the AC input plate.



3. Disconnect the three AC inline harnesses.
4. Replace the AC power input.
5. To re-install, follow these steps in reverse order.

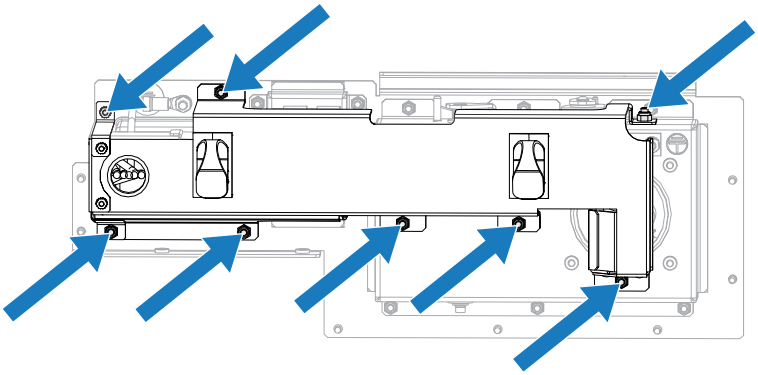
Hi-Pot testing must be performed after removing and replacing the AC power input.

Line filter

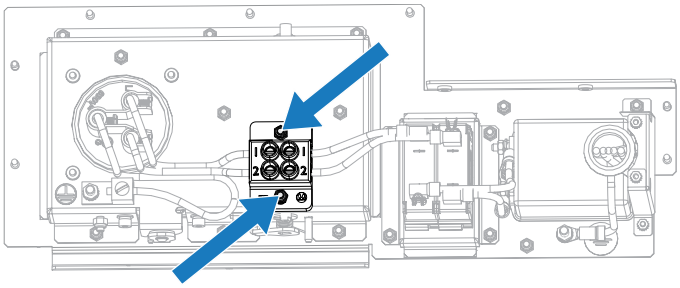
The line filter is located at the electronics-side of the projector.

Part number: 003-007632-XX

1. Remove the AC power input module.
2. Remove harnesses from clip.
3. Remove the seven nuts securing the metal shield.



4. Remove the two nuts securing the line filter assembly.



5. Disconnect the line and neutral harnesses (four in toal; two on each side).
6. Remove the line filter.
7. Replace the line filter.
8. To re-install, follow these steps in reverse order.
   When re-installing, check for any issues with the harnesses, making sure the routing is correct.

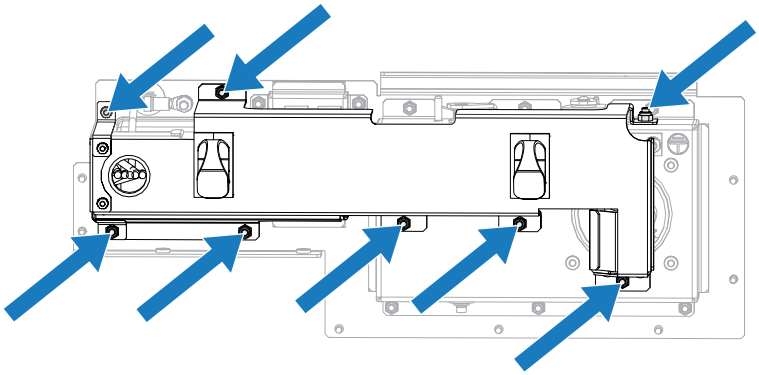
Hi-Pot testing must be performed after removing and replacing the line filter.

AC breaker

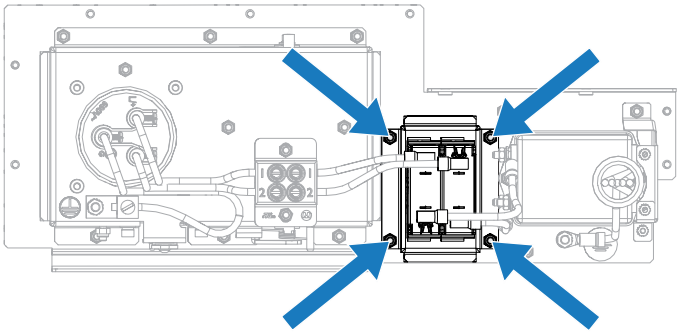
The line filter is located at the electronics-side of the projector.

Part number: 003-007633-XX

1. Remove the AC power input module.
2. Remove the harnesses from clip.
3. Remove the seven nuts securing the metal shield and remove the shield.



4. Disconnect the four terminals from the breaker.
5. Remove the four nuts securing the module.



6. Press the snap fits and slide the breaker module out.
7. Replace the line filter.
8. To re-install, follow these steps in reverse order.
   When re-installing, check for any issues with the harnesses, making sure the routing is correct.

Hi-Pot testing must be performed after removing and replacing the line filter.

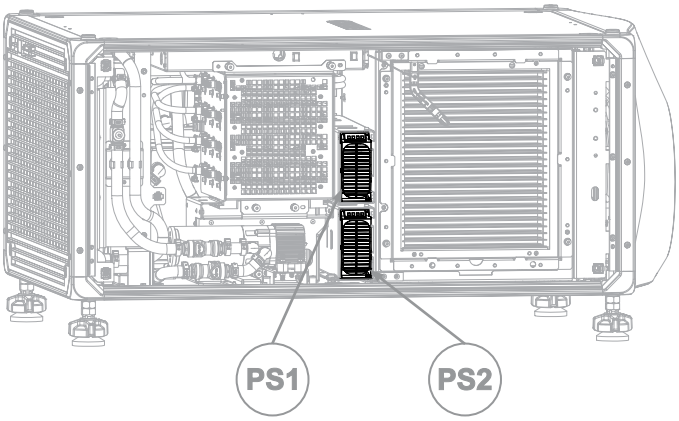
54V power supplies

Christie Sapphire® 4K40-RGBH has two 54V power supplies located behind the side-intake cover. The 54V power supply module provides the required voltages for the lasers and pump.

Part number: 003-122275-XX

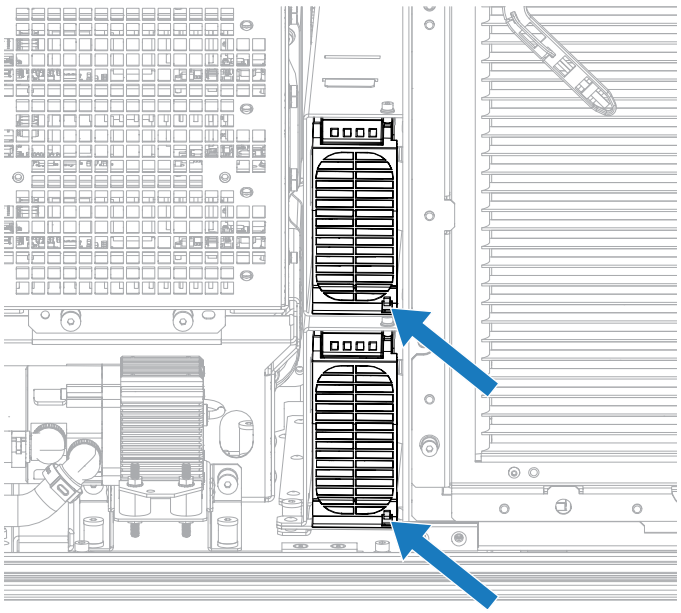
Before servicing, always carefully observe the original lead dress. Take extra precautions to secure all harnessing properly, especially in the high voltage circuitry areas. Replace any wire that appears to have damaged insulation.

Power supply 1 (PS1) is located above power supply 2 (PS2).



Do not hot swap the power supply.

1. Shut down the projector and make sure it is disconnected from AC.
2. *Remove the side-intake cover* (on page 55).
3. Press down on the locking tab for the applicable power supply to open the door.



4. Lift the door up.
5. Pull out the power supply by the door.
6. Replace it with the new power supply module.
7. To re-install, follow these steps in reverse order.

   When re-installing, open the door to slide the power supply in or it will not be fully engaged. To know it is fully engaged, pull on the power supply to make sure it does not come out.

12V power supply

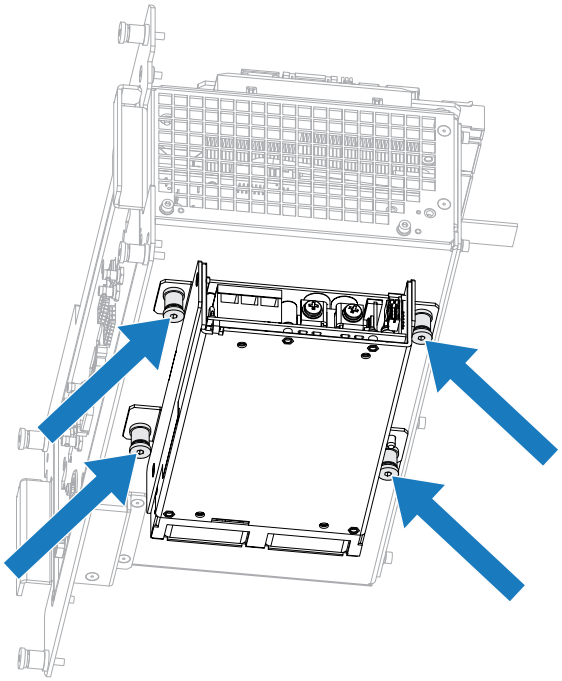
The 12V power supply module provides the required voltages for operating the electronics in the projector.

Part number: 003-007273-XX

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

Do not hot swap the power supply.

1. Shut down the projector and make sure it is disconnected from AC.
2. *Remove the card cage* (on page 84).
3. Loose the four screws securing the 12V power supply to the card cage.



4. Disconnect the 12V terminals from the old power supply and transfer to the new power supply.
5. To re-install, follow these steps in reverse order.

When reconnecting the DC outputs, make sure all positive and negative terminal connections are torqued to 30 in-lb.

Printed circuit boards and sensors

Printed circuit boards (PCB) mechanically support and electrically connect the projector components. Sensors convert information such as temperature, light, and communication into electrical signals.

Always wear an electrostatic discharge (ESD) strap and use insulated tools when replacing circuit boards.

Printed circuit boards and sensors index of parts and modules

The following table lists the parts and modules for the Christie Sapphire® 4K40-RGBH printed circuit boards and sensors.

Part/module	Part number
Housekeeping board (HKBH) (on page 92)	003-115112-XX
Lens connect board (LCBP) (on page 92)	003-112399-XX
Laser driver board (on page 93)	003-114517-XX
Motor driver board (on page 95)	003-007642-XX
Front IR sensor board (front IRB) (on page 96)	003-112635-XX
Rear IR sensor board 1.2 (rear IRB) (on page 97)	
Convenience light board and holder (CLB) (on page 98)	003-005261-XX
Status LED board (SLB) (on page 98)	003-006587-XX
Temperature sensor #1 (on page 99)	003-115156-XX
Temperature sensor #2 (on page 100)	003-115156-XX 003-122336-XX
Laser optical subsystem (LOS) IR board 1 (on page 100) *Laser optical subsystem (LOS) IR board 2* (on page 101)	003-007643-XX
Light engine temperature sensor (on page 102)	003-100618-XX
Diffuser interface board 1.0 (DIB) (on page 102)	003-113605-XX
Color sensor board 1.0 (CSB) (on page 104)	003-114408-XX

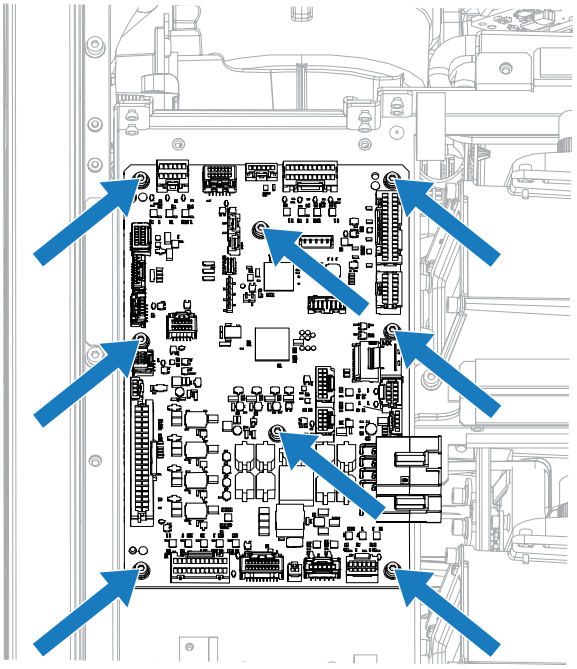
Housekeeping board (HKBH)

The housekeeping board (HKBH) acts as an interface board with the majority of the control devices feeding into it, including fans, power supply input, shutter, IR receivers, and so on.

Part number: 003-115112-XX

1. *Remove the top cover* (on page 52).
2. Disconnect the 21 harnesses from the housekeeping board.

   The harnesses to disconnect: J8, J76, J77, J81, J84, J86, J87, J89, J97, J100, J101, J102, J103, J104, J106, J110, J111, J112, J114, J129, J130
3. Remove the eight screws securing the housekeeping board.



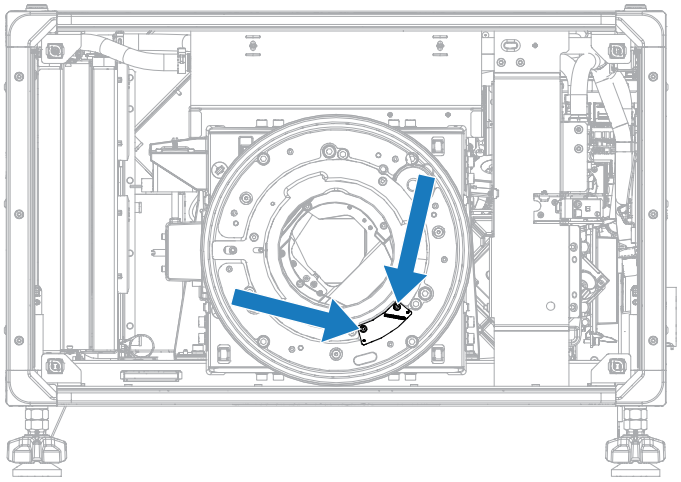
4. Pull back the harnesses and remove the board.
5. To re-install, follow these steps in reverse order.

Lens connect board (LCBP)

The lens connect board (LCBP) communicates with the lens.

Part number: 003-112399-XX

1. *Remove the front cover* (on page 54).
2. Remove the two screws securing the LCBP.



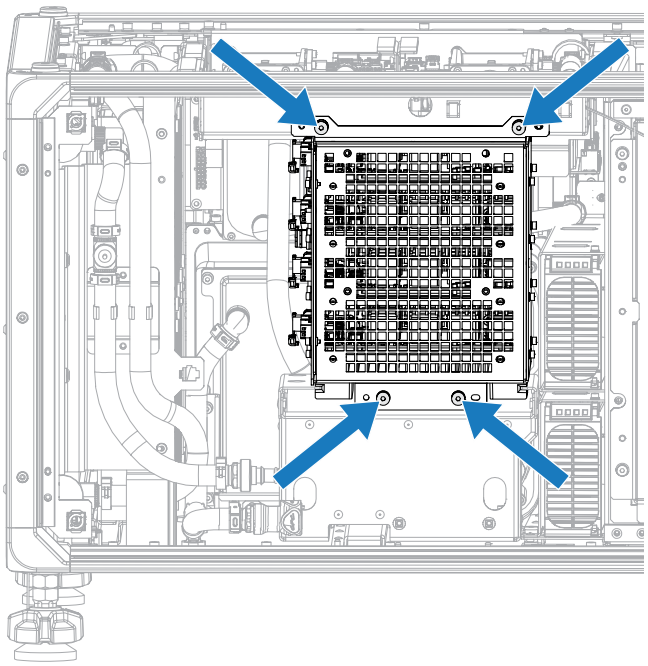
3. Replace the LCBP.
4. To re-install, follow these steps in reverse order.

Laser driver boards (CS12_1, CS12_2, CS12_3, and CS12_4)

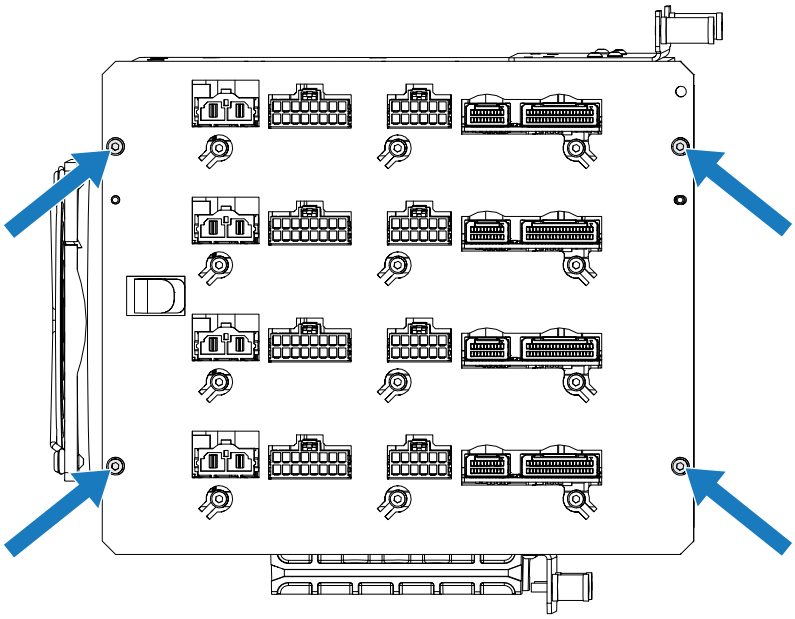
The laser driver boards control the lasers in the project..

Part number: 003-114517-XX

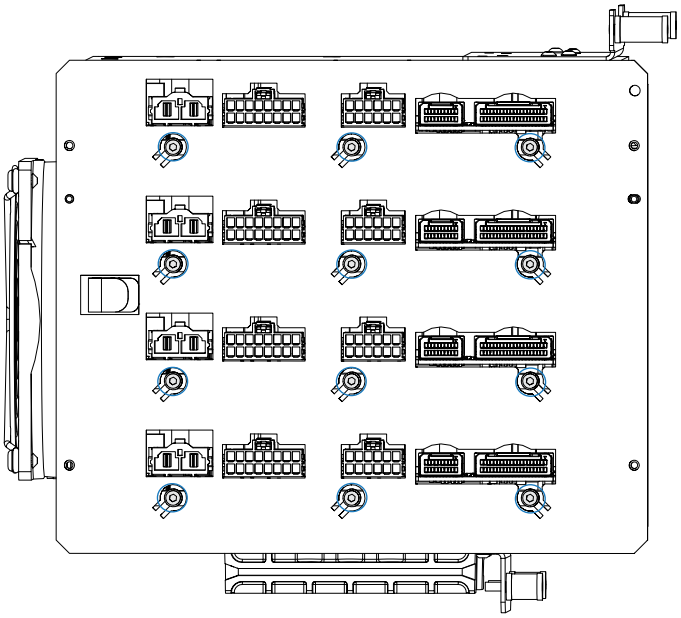
1. *Remove the top cover* (on page 52).
2. *Remove the side-intake cover* (on page 55).
3. Disconnect the four harnesses from all four boards (J140, J141, J142 J143) and J144 from boards CS12G0 #1 and CS12G0 #2.
4. *Remove the rear liquid cooling pump module* (on page 81).
5. Disconnect the laser driver fan # 16 harness (J104) from the housekeeping board and unroute from the clips.
6. Loosen the four screws securing the laser driver boards module and remove from projector.



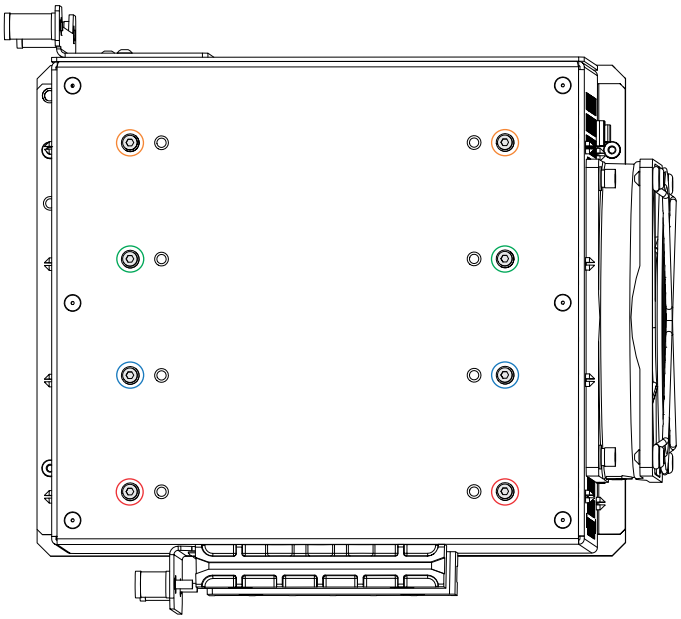
7. Remove the four cage screws.



8. Remove the connector-side plate of the laser driver cage by first removing the twelve screws (highlighted by red circles in the image below).



9. On the other side of the laser driver cage, remove the two screws securing the board to be removed (the paired screws are highlighted by different colored circles in the image below).



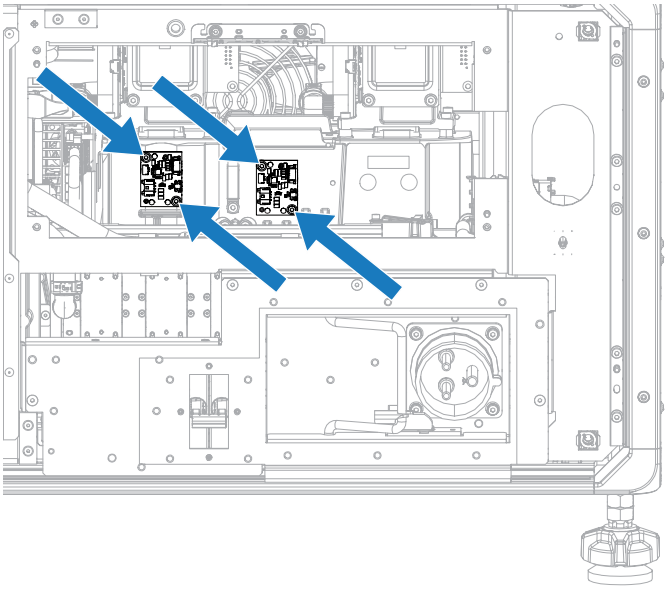
10. Wearing an anti-static wrist strap, remove and replace the laser driver board.
11. To re-install, follow these steps in reverse order.

Motor driver boards

The motor driver boards control the blue laser modules.

Part number: 003-007642-XX

1. *Remove the card cage* (on page 84).
2. Disconnect two harnesess on the affected board.
3. Remove the two screws securing the affected board and remove it.



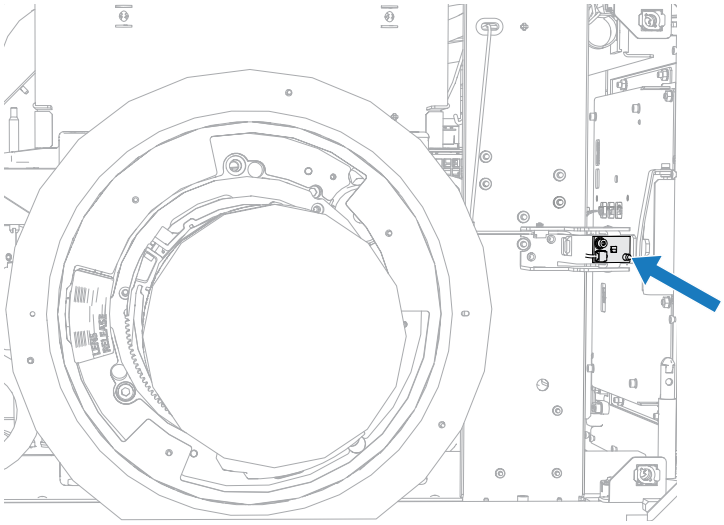
4. Replace the board, if required.
5. To replace the other board, repeat steps 2 to 4.
6. To re-install, follow these steps in reverse order.

Front IR sensor board (front IRB)

The front IR sensor board (front IRB) receives command codes from the IR remote to control the projector operation.

Part number: 003-112635-XX

1. *Remove the front cover* (on page 54).
2. Disconnect the front IR harness (J108_F).
3. Remove the screw securing the front IR sensor board to the bracket.



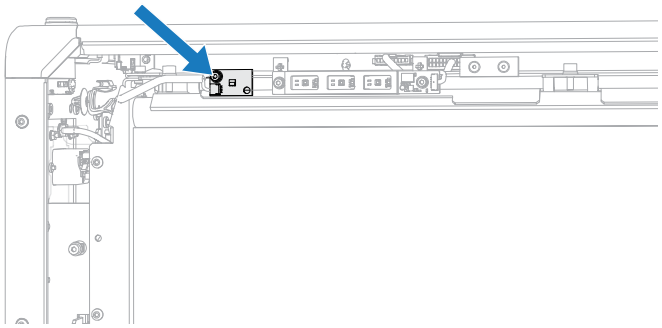
4. Pull up the board off the post.
5. Replace the board, if required.
6. To re-install, follow these steps in reverse order.

Rear IR sensor board (rear IRB)

The rear IR sensor board (rear IRB) receives command codes from the IR remote to control the projector operation.

Part number: 003-112635-XX

1. *Remove the rear cover* (on page 53).
2. Disconnect the rear IR harness (P108_R).
3. Remove the screw securing the rear IR sensor board to the bracket.



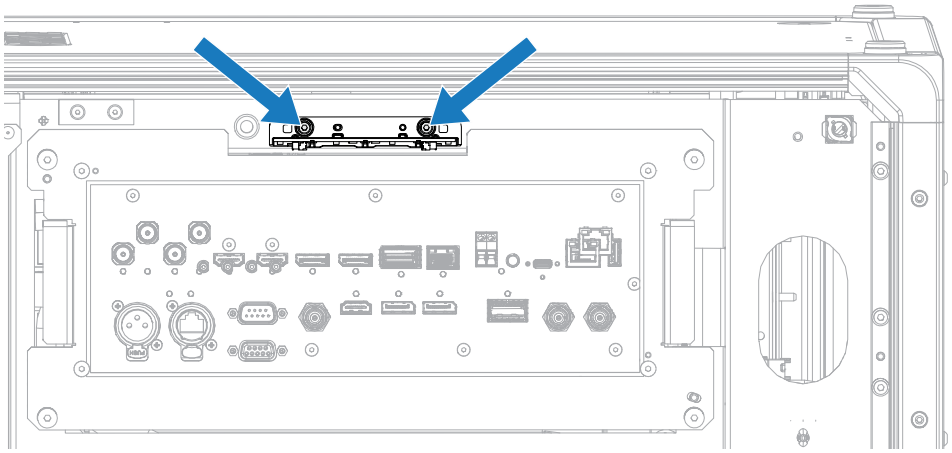
4. Pull up the board off of the pin.
5. Replace the board, if required.
6. To re-install, follow these steps in reverse order.

Convenience light board (CLB)

The convenience light board (CLB) provides extra illumination when interfacing with the card cage.

Part number: 003-005261-XX

1. *Remove the electronics-side cover* (on page 54).
2. Remove the two screws securing the CLB.



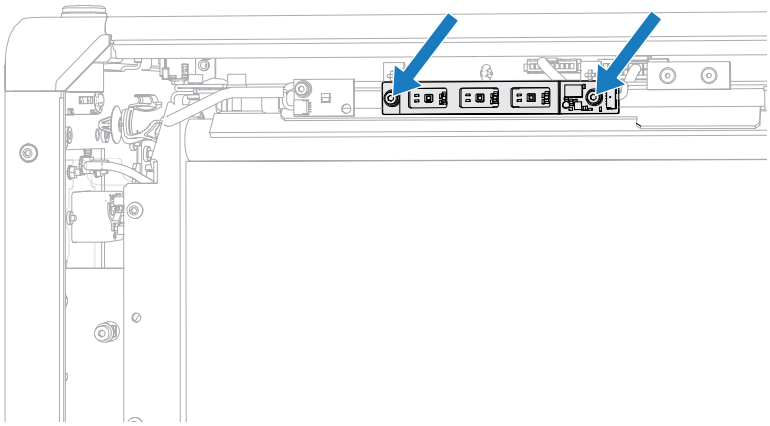
3. Disconnect the harness.
4. Remove the CLB bracket and board.
5. To re-install, follow these steps in reverse order.

Status LED board (SLB)

The status LED board (SLB) provides visual information about the operational state of the projector.

Part number: 003-006587-XX

1. *Remove the rear cover* (on page 53).
2. Disconnect the SLB harness connector J1 from the SLB.
3. Remove the two screws securing the SLB and remove the board.



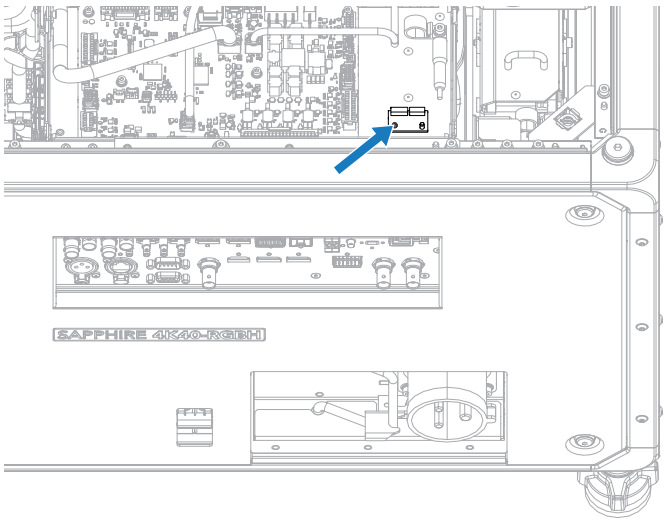
4. Replace the SLB assembly.
5. To re-install, follow these steps in reverse order.

Temperature sensor #1

Temperature sensor #1 is located at the top of the projector on the electronics side.

Part number: 003-115156-XX

1. *Remove the top cover* (on page 52).
2. Disconnect the two connectors.
3. Remove the screw securing the temperature sensor and remove it.



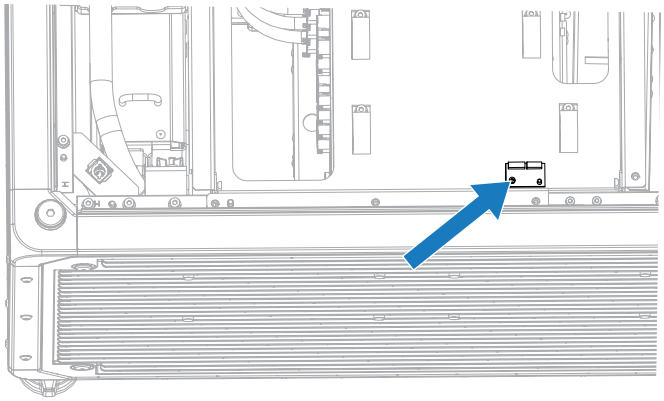
4. Replace the temperature sensor.
5. To re-install, follow these steps in reverse order.

Temperature sensor #2

Temperature sensor #1 is located at the top of the projector on the right (side-intake) side.

Part number: 003-115156-XX

1. *Remove the top cover* (on page 52).
2. Disconnect the two connectors.
3. Remove the screw securing the temperature sensor and remove it.



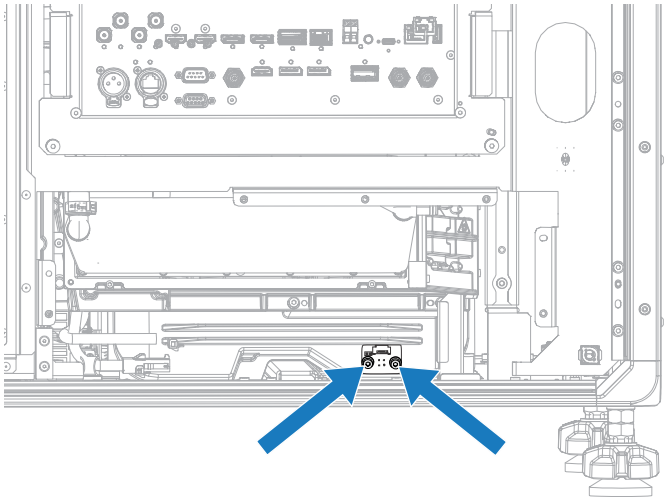
4. Replace the temperature sensor.
5. To re-install, follow these steps in reverse order.

Laser optical subsystem (LOS) IR board 1

The laser optical subsystem (LOS) IR board 1 is located on the phosphor module behind the AC module.

Part number: 003-007643-XX

1. *Remove the AC module* (on page 86).
2. Disconnect the harness.
3. Remove the two screws securing the board and remove it.



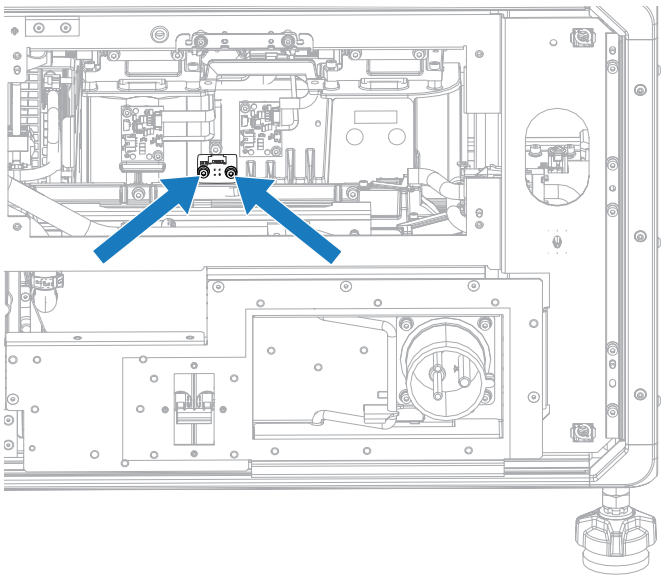
4. Replace the board, if required.
5. To re-install, follow these steps in reverse order.

Laser optical subsystem (LOS) IR board 2

The laser optical subsystem (LOS) IR board 2 is located on the phosphor module behind the card cage.

Part number: 003-007643-XX

1. *Remove the card cage* (on page 84).
2. Disconnect the harness.
3. Remove the two screws securing the board and remove it.



4. Replace the board, if required.
5. To re-install, follow these steps in reverse order.

Light engine temperature sensor

The light engine temperature sensor is located on the green waterblock of the light engine.

Part number: 003-100618-XX

1. Remove the light engine.
2. Disconnect the connector to the temperature sensor.
3. Remove the screw securing the temperature sensor and remove it.

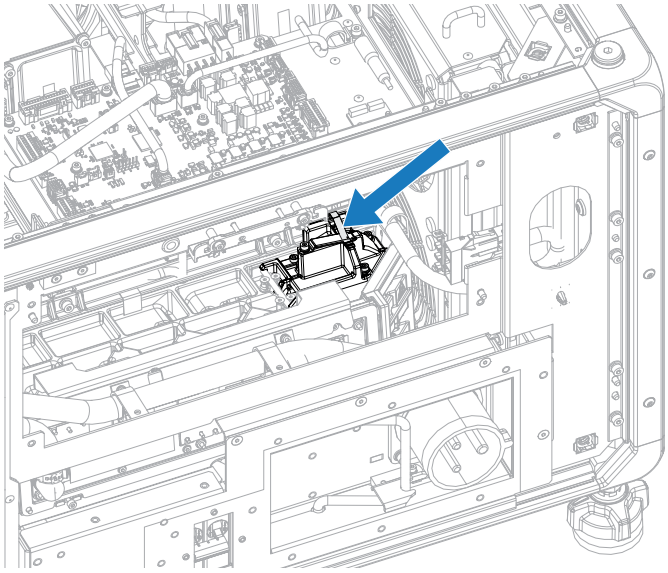
4. Replace the temperature sensor.
5. To re-install, follow these steps in reverse order.

Diffuser interface board (DIB)

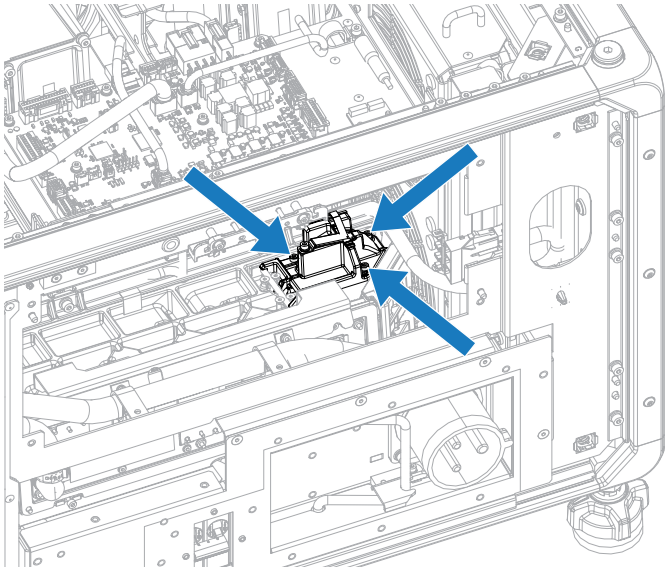
The diffuser interface board (DIB) controls the rotating diffuser.

Part number: 003-113605-XX

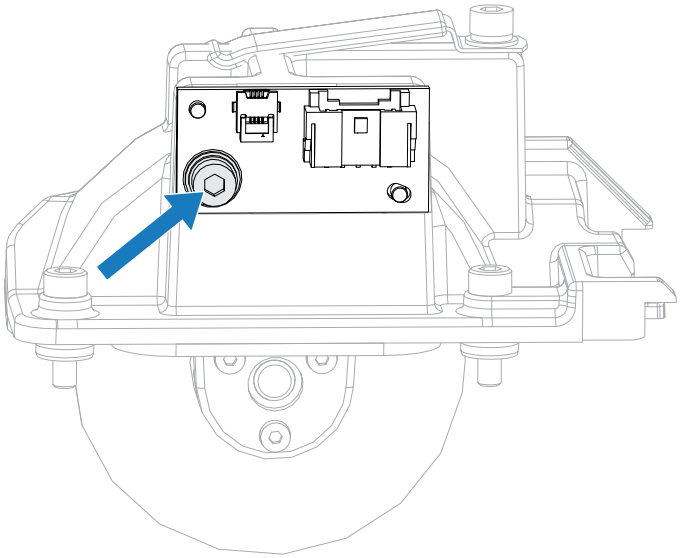
1. *Remove the card cage* (on page 84).
2. Disconnect the J135 harness connector and the harness to the diffuser.



3. Remove the three screws securing the diffuser wheel.



4. Lift the diffuser wheel up and out of the projector.
5. Remove the screw securing the DIB.



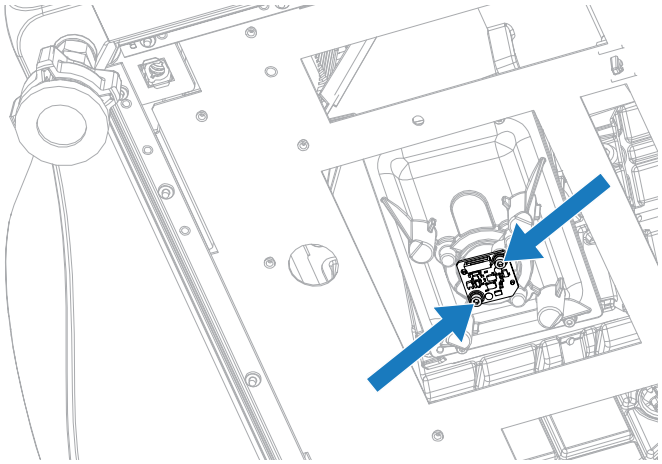
6. Replace the board.
7. To re-install, follow these steps in reverse order.

Color sensor board (CSB)

The color sensor board (CSB) measures the color of the light being generated by the optics. It is used in a feedback loop to make sure the output color of the image is stable as the lasers age.

Part number: 003-114408-03

1. To access the CSB, flip the projector on either its top or sides.
   Alternatively, you can raise the leveling feet to their maximum position.
2. *Remove the bottom cover* (on page 55).
3. Disconnect the CSB harness.
4. Remove the two screws securing the CSB and remove the board.



5. To re-install, follow these steps in reverse order.

6. After re-installing the board, perform *optical adjustments* (on page 20) and LiteLOC™ calibration.

Optics

Learn how to replace the light source, mirrors, and other optical components.
After replacing any optical component, first power on the projector at minimum brightness.

Caution! If not avoided, the following could result in minor or moderate injury.

- HOT SURFACE HAZARD! If light output is unexpectedly low, shut down and allow adequate time for potentially hot components to cool before performing any service operations.
- After replacing an optical component, complete the recommended adjustments listed in the procedure.
- Optical projector parts can be damaged if optical adjustments are not performed correctly after an optical part replacement.

- Always wear powder-free latex gloves when handling optical components.
- Wear an electrostatic discharge (ESD) strap and use insulated tools when replacing the light engine.

Optics index of parts and modules

The following table lists the parts and modules for the Christie Sapphire® 4K40-RGBH optical components.

Part/module	Part number
Shutter (on page 107)	003-104955-XX
Fold mirror adjustment assembly (on page 108)	003-107316-XX
Coupling fold mirror	003-109779-XX
Rotating diffuser assembly (on page 108)	003-202599-XX
Left-eye 3D 66 mm filter (on page 109)	177-101103-XX
Right-eye 3D 66 mm filter (on page 109)	177-102104-XX
66 mm aperture	177-104106-XX
Zoom focus assembly	003-202606-XX
*Light engine** (on page 112)	003-202026-XX 003-202921-XX
Blue laser module (on page 114)	003-202516-XX
RGB module (on page 116)	003-202520-XX
Phosphor module (on page 118)	003-202515-XX

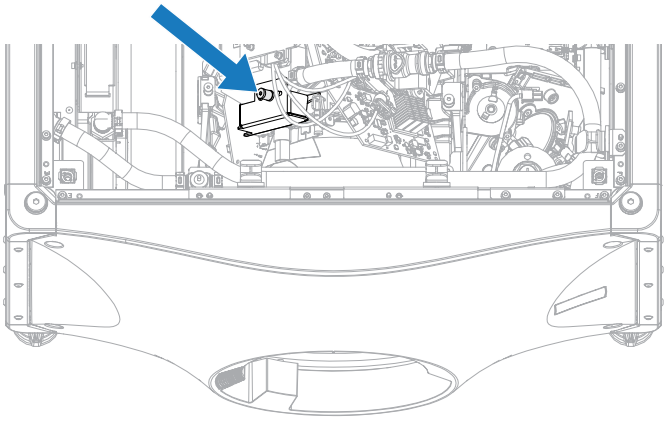
* Contact Christie Technical Support for the appropriate light engine for your projector.

Shutter

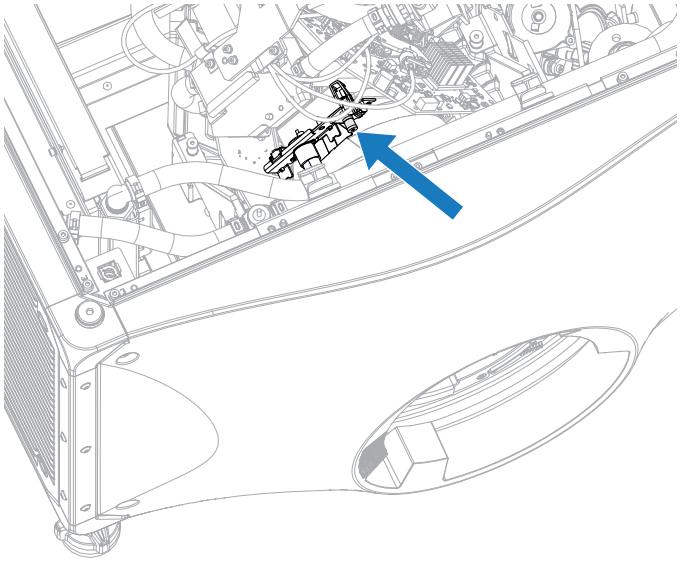
The shutter blocks the light coming into the projector lens.

Part number: 003-104955-XX

1. Power off the projector.
   The lasers and projector power must be off before removing any optical modules.
2. *Remove the light engine fan pack* (on page 74).
3. Loosen the screw securing the light dump and remove it.



4. Disconnect the two inline harnesses cables on the shutter.
5. Loosen the screw securing the shutter.
   Christie recommends using a short, right angle 3 mm allen key. If a right angle allen key is unavailable, the engine can be removed for front access using the provided straight 3 mm ball driver.



6. Pull out the shutter.
7. Replace the shutter.

8. To re-install, follow these steps in reverse order.

Warning! If not avoided, the following could result in death or serious injury.

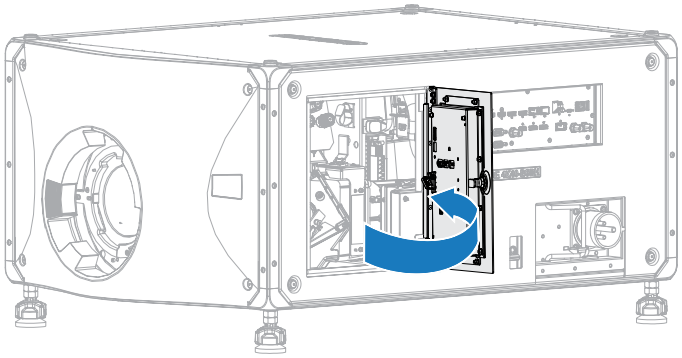
- The light dump installation is critical to containment of optical light energy. A hazard exists if operating the projector without the light dump.

Fold mirror adjustment assembly

The fold mirror adjustment assembly directs light towards the light engine.

Part number: 003-107316-XX

1. Power off the projector.
   The lasers and projector power must be off before removing any optical modules.
2. Open the service door.



3. Remove the three screws securing the fold mirror housing.
4. Remove the fold mirror and replace.
5. To re-install, follow these steps in reverse order.

Warning! If not avoided, the following could result in death or serious injury.

- The fold mirror housing installation is critical to containment of optical light energy. A hazard exists if operating without the fold mirror housing (cover).

6. After re-installing the fold mirror adjustment assembly, *optimize the integrator zoom and focus* (on page 23).

Notice. If not avoided, the following could result in property damage.

- Optimizing the integrator zoom is a critical adjustment because if the zoom is not set properly, it results in lower brightness on screen and the DMD and other components may be damaged.

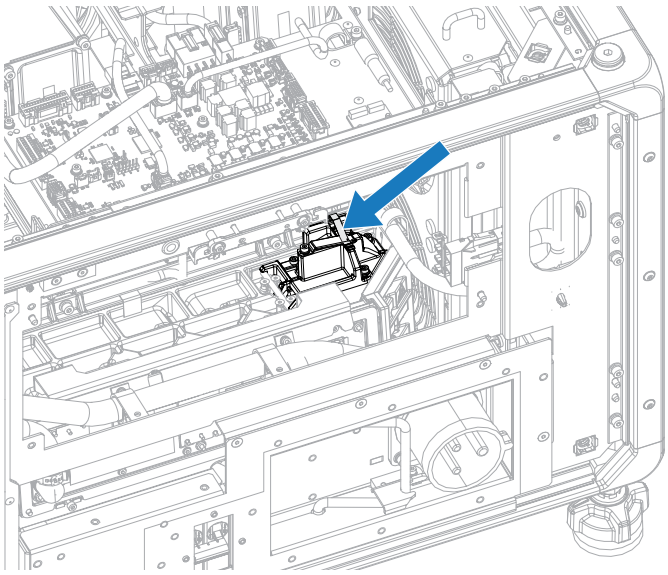
Rotating diffuser

Learn how to remove the rotating diffuser.

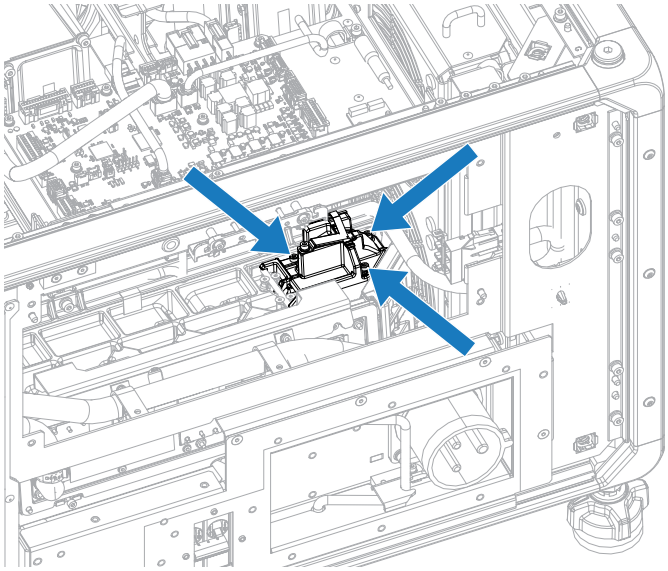
Part number: 003-202599-XX

1. Power off the projector.
   The lasers and projector power must be off before removing any optical modules.

2. *Remove the card cage* (on page 84).
3. Disconnect the J135 harness connector, and the harness to the diffuser.



4. Remove the three screws securing the diffuser wheel.



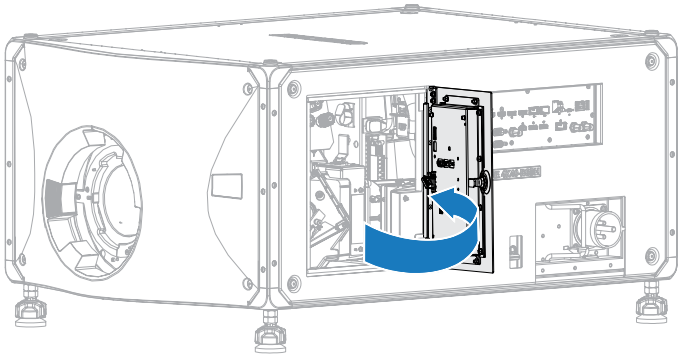
5. Replace the rotating diffuser.
6. To re-install, follow these steps in reverse order.

Intelligent filter holder (IFH)

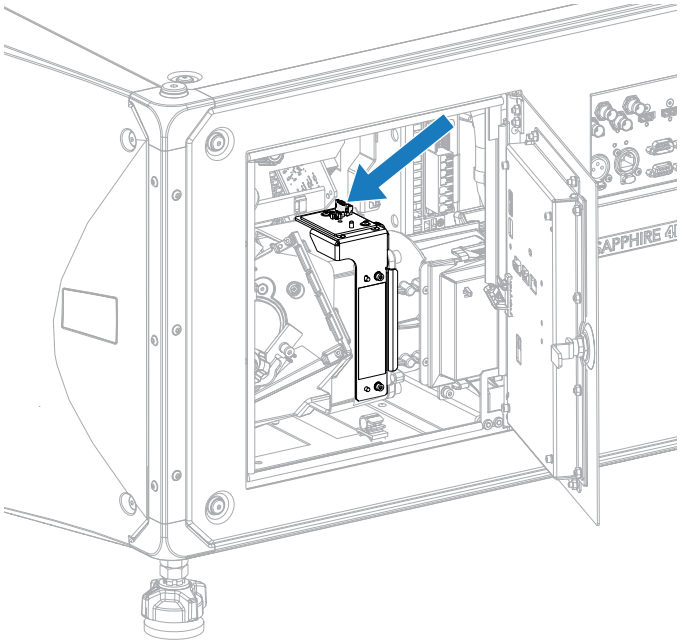
Follow these steps to replace an intelligent filter holder (IFH).

Part number: Left-eye 3D 66 mm filter (P/N: 177-101103-XX), Right-eye 3D 66 mm filter (P/N: 177-102104-XX), 2D aperture 66 mm filter (P/N: 177-104106-XX)

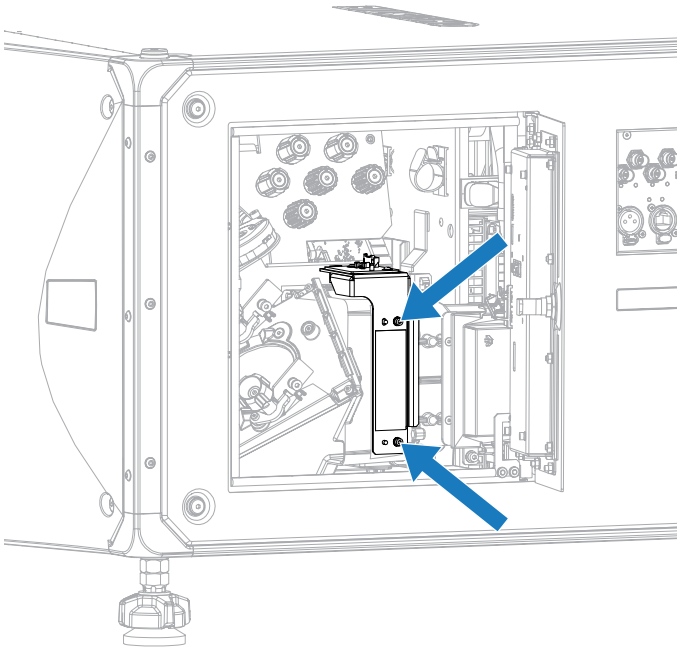
1. Open the service door.



2. Disconnect the intelligent filter holder harness on the optical filter ID (OFIB) board.



3. Remove the two screws securing the IFH and remove it.



4. Replace the IFH.
5. To re-install, follow these steps in reverse order.
6. Connect the projector to AC power and turn on the projector.
7. Christie recommends performing a Hawkeye sensor-to-screen calibration for the following scenarios:
   - If the optical filter type has never been calibrated in the system before.
   - If the the optical filter calibration was previously performed on a different inlet line voltage (110V vs 220V).

   Christie Sapphire® 4K40-RGBH automatically stores LiteLOC calibrations on a filter-by-filter type basis, and an AC voltage basis. Calibration data is not lost or discarded when changing filters.

   The matched eye glasses filter must be place over the color meter at the time of calibration.

   Christie recommends using one of the following Colorimetry Research Inc. filter holders:
   - *https://www.colorimetryresearch.com/accessories/filter-holder*
   - *https://www.colorimetryresearch.com/accessories/glasses-holder*

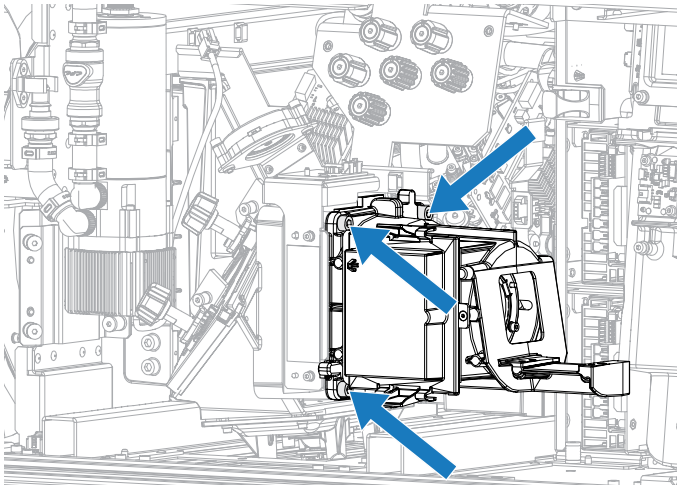
   Make sure to follow the Colorimetry Research Inc.'s procedure for using these filter holders.
8. Perform a color correction on the projector after the calibration has completed.
   For more information, see *Christie TruLife+ User Guide (P/N: 020-103315-XX)*.

Zoom focus assembly

The zoom and focus assembly allows the user to adjust the magnification and focus of the light directed onto the DMDs.

Part number: 003-202606-XX

1. Power off the projector.
   The lasers and projector power must be off before removing any optical modules.
2. *Remove the RGB module* (on page 116).
3. Remove the three screws securing the zoom and focus assembly.



4. Pull out the assembly from the projector.
5. Replace the zoom and focus assembly.
6. To re-install, follow these steps in reverse order.
7. After replacing the zoom focus assembly:
   a) *Optimize the integrator zoom and focus* (on page 23).
   b) *Perform a Hawkeye calibration* (on page 21).

Notice. If not avoided, the following could result in property damage.

- Optimizing the integrator zoom is a critical adjustment because if the zoom is not set properly, it results in lower brightness on screen and the DMD and other components may be damaged.

Light engine

The light engine modulates incoming light from the light source to create an image, which is projected to the screen.

Part number: 003-202026-XX and 003-202921-XX

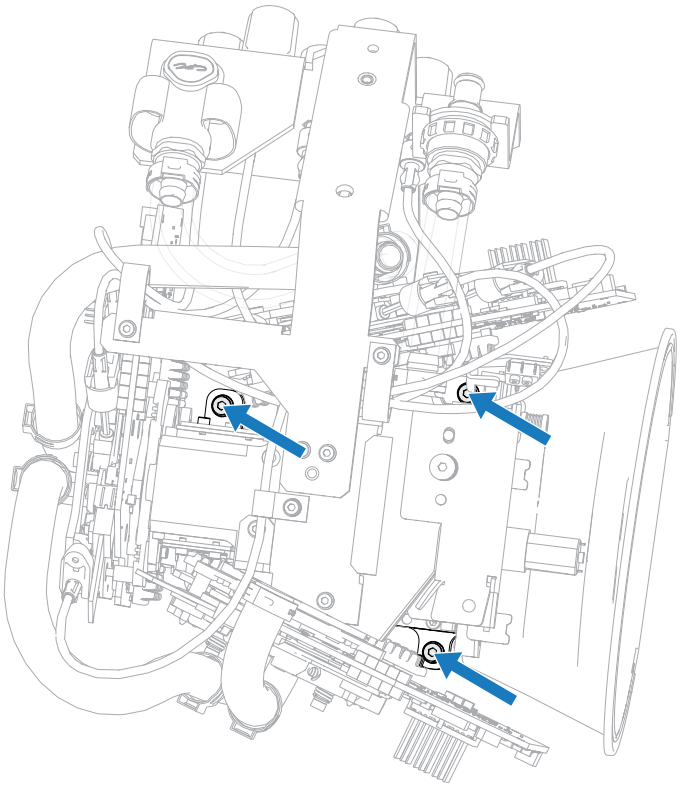
Contact Christie Technical Support for the appropriate light engine for your projector.

Caution! If not avoided, the following could result in minor or moderate injury.

- PERSONAL INJURY HAZARD! Due to weight, use caution when lifting, installing, or moving the light engine.

Always wear an electrostatic discharge (ESD) strap and use insulated tools when replacing the light engine.

1. Power off the projector.
   The lasers and projector power must be off before removing any optical modules.
2. *Remove the light engine fan pack* (on page 74).
3. Disconnect the three miniSAS cables from the card cage.
4. Disconnect the two coolant hoses to the light engine.
5. Disconnect the inline shutter harness.
6. Loosen the three screws securing the light engine to the projector base.



7. Remove the light engine from the projector.
8. Place the light engine on the light engine plate.
   If you do not have the light engine plate, place the light engine on the snood.
9. Replace the light engine.
10. To re-install, follow these steps in reverse order.
11. After re-installing the light engine:
    a) *Optimize the integrator zoom and focus* (on page 23).
    b) *Perform a Hawkeye calibration* (on page 21).

Notice. If not avoided, the following could result in property damage.

- Optimizing the integrator zoom is a critical adjustment because if the zoom is not set properly, it results in lower brightness on screen and the DMD and other components may be damaged.

12. To return the removed light engine to Christie, refer to the *Packing the Light Engine instruction sheet (P/N:020-102486-XX)* or *包装光引擎 (P/N:020-103580-XX)*.

Laser optical subsystem (LOS)

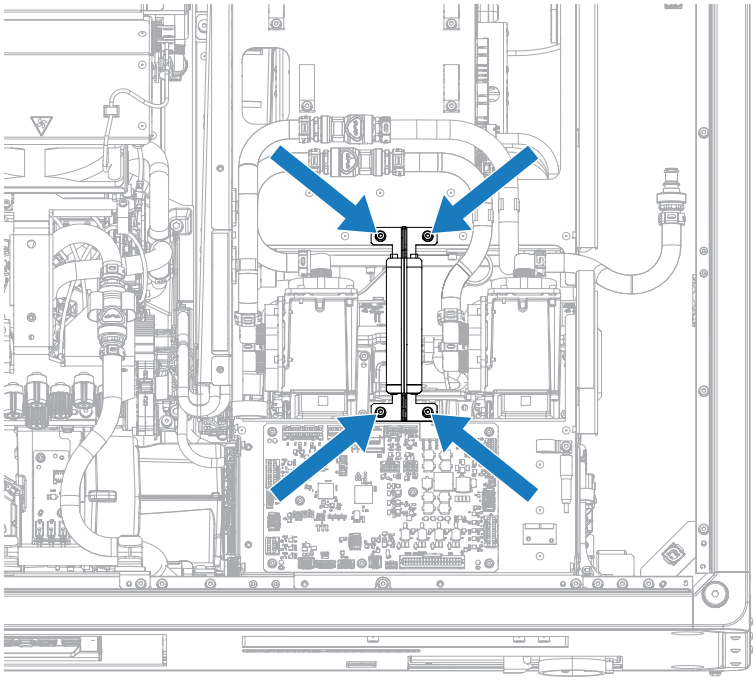
The laser optical subsystem (LOS) is comprised of four main components: blue laser modules 1 and 2, RGB module, and the phosphor module.

Blue laser modules 1 and 2

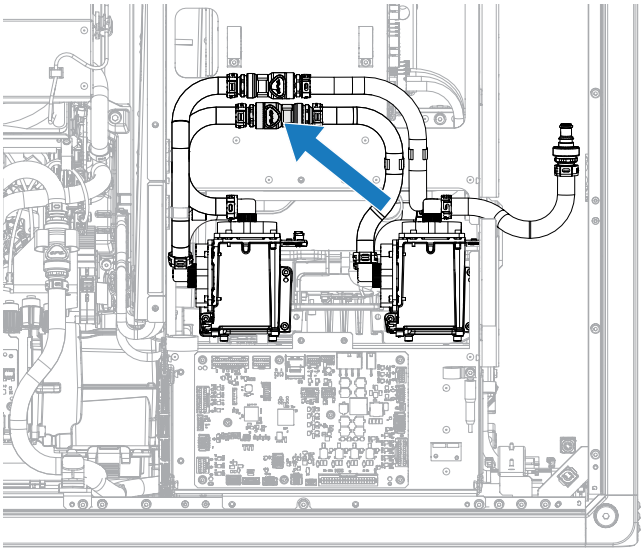
The blue laser modules 1 and 2 are accessed from the top of the projector.

Part number: 003-202516-XX

1. Power off the projector.
   The lasers and projector power must be off before removing any optical modules.
2. Allow the projector to completely cool down before unplugging the projector from power.
3. *Remove the laser optical subsystem (LOS) radiator* (on page 76).
4. Remove the four screws securing the LOS top structure bracket.

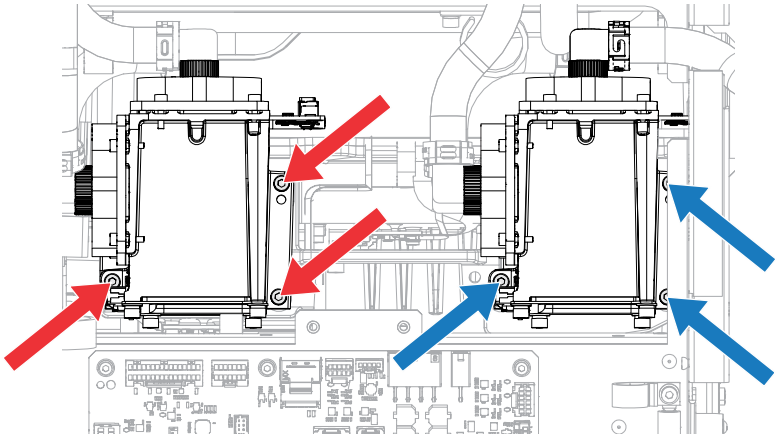


5. Disconnect the harnesses from the quad boards (each quad has two boards with two connectors on each board) of the blue laser modules.
6. Disconnect the quick disconnects between blue laser module 1 and blue laser module 2.



7. Loosen three screws securing the affected blue laser module.

   Blue laser module 1 is located closer to the rear of the projector and its screws are highlighted by the blue arrows in the image below. The blue laser module 2 screws are highlighted by the red arrows in the image below.



8. Place a cover over the phosphor module openings to keep dust and other contaniments out.
9. Replace the blue laser module.
10. Replace the other blue laser module, repeat steps 6 and 7.
11. To re-install, follow these steps in reverse order.
12. After re-installing the LOS:
    a) *Perform a LOS coupling mirror adjustment* (on page 28).
    b) *Optimize the integrator zoom and focus* (on page 23).
    c) *Perform a Hawkeye calibration* (on page 21).

Notice. If not avoided, the following could result in property damage.

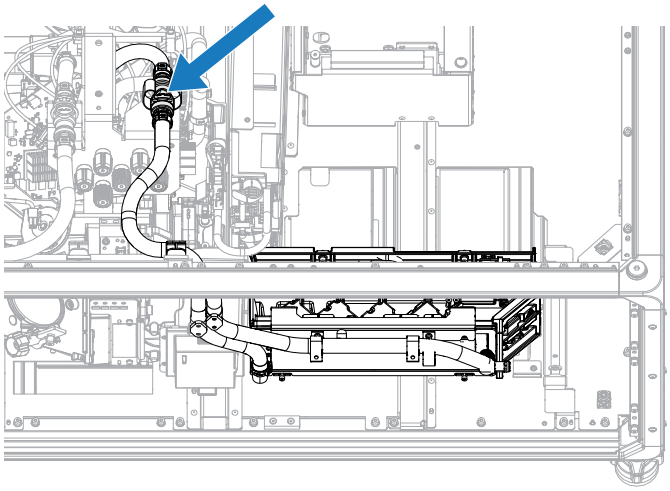
- Optimizing the integrator zoom is a critical adjustment because if the zoom is not set properly, it results in lower brightness on screen and the DMD and other components may be damaged.

RGB module

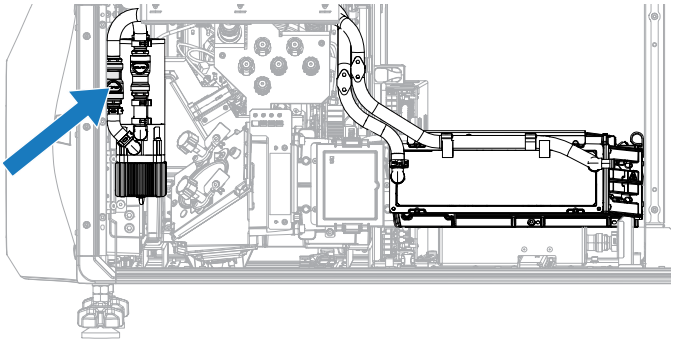
The RGB module provides RGB light for the projector.

Part number: 003-202520-XX

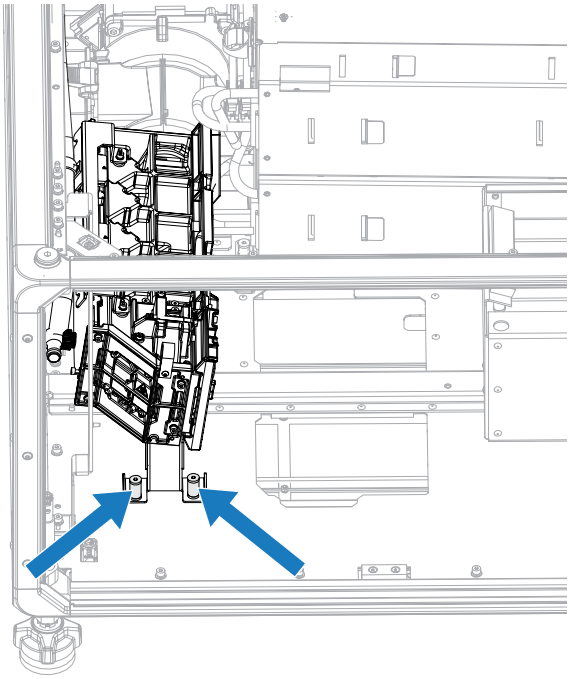
1. Power off the projector.
   The lasers and projector power must be off before removing any optical modules.
2. Allow the projector to completely cool down before unplugging the projector from power.
3. *Remove the phosphor module* (on page 118).
4. Disconnect the five harnesses from the RGB module.
5. Disconnect the RGB light engine quick disconnect and remove it from clips.



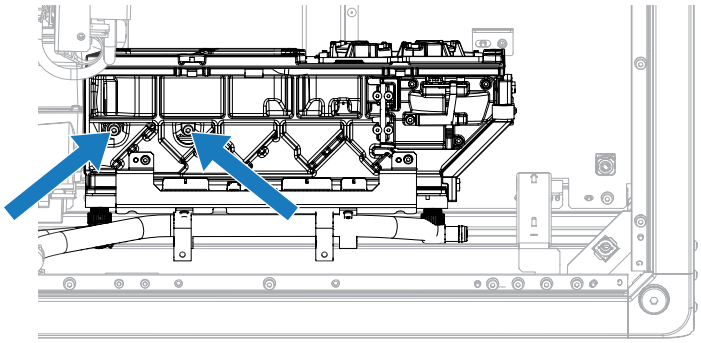
6. Disconnect the front pump quick disconnect and remove from clips.



7. Loosen the two screws from the bottom of the module.

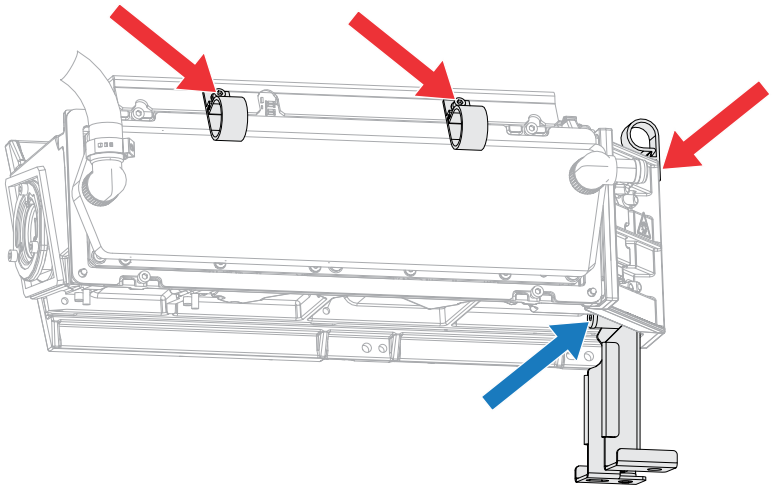


8. Remove the two screws and remove the RGB module.



9. To re-install, follow these steps in reverse order.

   Before re-installing the RGB module, transfer the bracket highlighted by the blue arrow in the image below to the new RGB module and install the three P-clips provided in the service kit (highlighted by the red arrows in the image below).



10. After re-installing the LOS:
    a) *Perform a LOS coupling mirror adjustment* (on page 28).
    If the LOS coupling mirror adjustment does not get the image completely filled, the LOS is likely not seated properly in the IOS casting.
    b) *Optimize the integrator zoom and focus* (on page 23).
    c) *Perform a Hawkeye calibration* (on page 21).

Notice. If not avoided, the following could result in property damage.

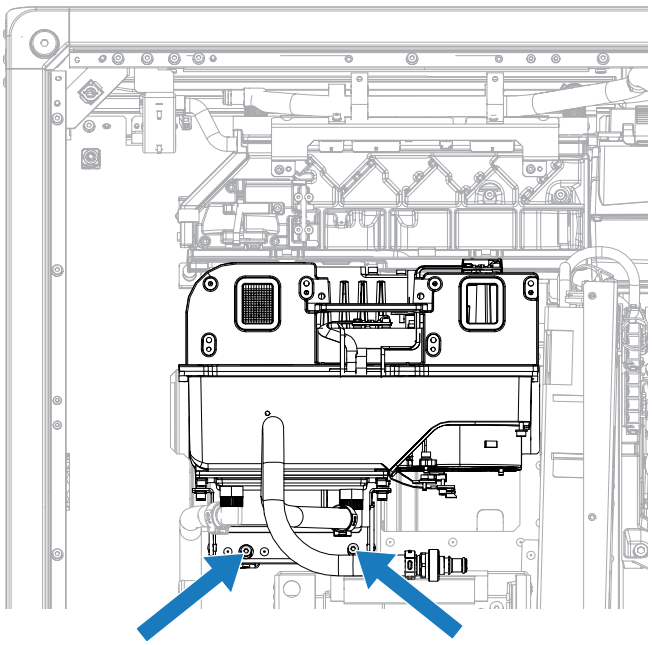
- Optimizing the integrator zoom is a critical adjustment because if the zoom is not set properly, it results in lower brightness on screen and the DMD and other components may be damaged.

Phosphor module

The phosphor module provides laser phosphor light.

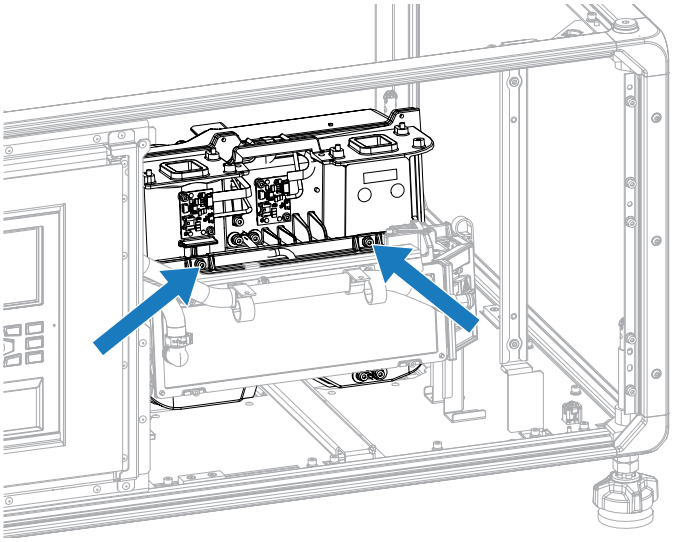
Part number: 003-202515-XX

1. Power off the projector.
   The lasers and projector power must be off before removing any optical modules.
2. Allow the projector to completely cool down before unplugging the projector from power.
3. *Remove the laser driver module* (on page 93).
4. *Remove both blue laser modules* (on page 114).
5. *Remove the card cage* (on page 84).
6. *Remove the AC power input assembly* (on page 86).
7. Disconnect the blowers flex harness.
8. Disconnect the harnesses from the laser optical subsystem motor driver boards (two boards -two harnesses per board) do not remove the flex ribbon cables. (show in graphic if possible)
9. Disconnect the harnesses for the IR sensor boards.
10. Loosen the two screws from the back of the phosphor module.

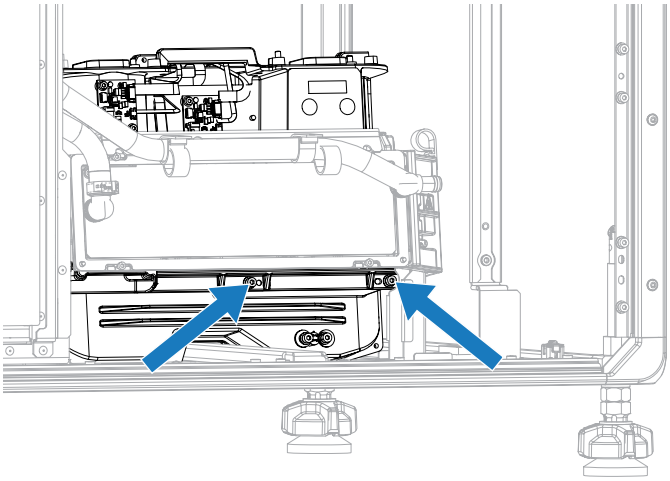


11. Loosen the four screws from the front of the module.

Two top front screws:

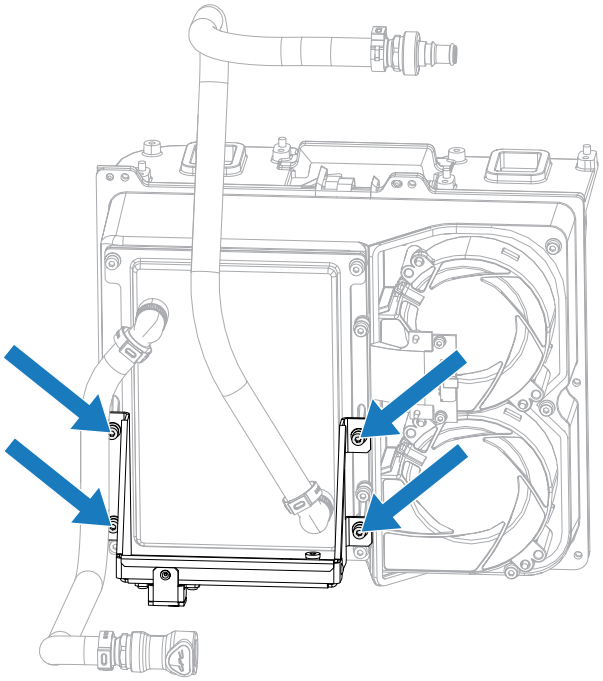


Two bottom front screws:



12. Remove the phosophor quick disconnect hose from the clip.
13. Remove the phosphor module from the projector.
14. Replace the phosphor module.
15. To re-install, follow these steps in reverse order.

    Before re-installing the phosphor module, remove the four screws securing the highlighted bracket and move it to the new phosphor modue.



16. After re-installing the phosphor module:
    a) *Perform a LOS coupling mirror adjustment* (on page 28).
    b) *Optimize the integrator zoom and focus* (on page 23).
    c) *Perform a Hawkeye calibration* (on page 21).

Notice. If not avoided, the following could result in property damage.

- Optimizing the integrator zoom is a critical adjustment because if the zoom is not set properly, it results in lower brightness on screen and the DMD and other components may be damaged.

Harnesses

Harnesses can transmit signals or electrical power.

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.

Harnessess components index of parts and modules

The following table lists the parts and modules for the Christie Sapphire® 4K40-RGBH harnesses components.

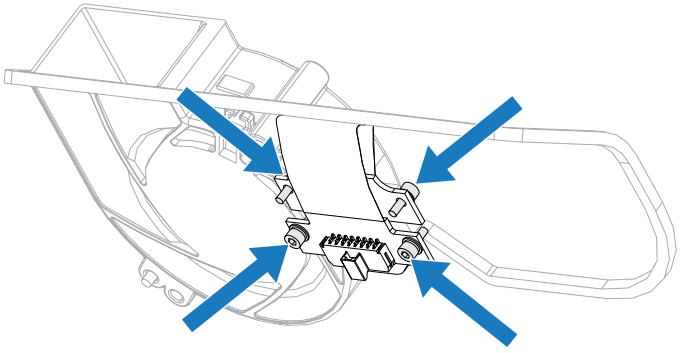
Part/module	Part number
Blower flex harness (on page 122)	003-007634-XX

Blower flex harness

The blower flex harness is located in the laser optical subsystem (LOS) blower module.

Part number: 003-007634-XX

1. *Remove the LOS blower module* (on page 71).
2. Remove LOS blower #2.
3. Disconnect both harnesses.
4. Remove the four screws securing the flex harness.
   There are two screws on each side.



5. Remove the gasket and then remove the harness.
6. Remove any adhesive residue from the housing
7. Replace the harness.

8. To re-install, follow these steps in reverse order.

- When replacing, the gasket must be replaced.
- When replacing the blower, make sure the harness is routed underneath and not pinched by the blower.