CHRISTIE®

4K-RGB Laser Optical Subsystem Replacement Instructions

These instructions explain how to replace the 4K-RGB laser optical subsystem (LOS) using the H1LOS service kit (P/N: 163-123107-XX).

Affected products

These instructions apply to the following products:

- Christie D4K40-RGB
- Christie Mirage 4K40-RGB
- Christie Roadie 4K40-RGB

- Christie CP4325-RGB
- Christie CP4330-RGB

Required tools

The following tools are required:

- 3 mm hex screwdriver
- 2.5 mm hex screwdriver

Optional tools

The following optional tools can be used to install the service kit:

- Foot adjustment tool (011-104952-XX)
- Calibrated torque driver

H1LOS Kit contents

The H1LOS service kit (P/N: 163-123107-XX) contains the following components and tools.

LOS Service Kit
163-123107-01

Table 1: Kit Content Functionality

|		
A	Bench jack (1), shown packed and extended	Use the bench jack to raise and lower the LOS. Do not use the bench jack to raise or lower the projector.
B	Riser blocks (4)	Use the riser blocks to raise a 4K40-RGB series unit to the minimum height required to pull the bench jack and LOS out from under the projector. Although not required, the riser blocks can be used for CP43XX-RGB series.
C	4mm driver (1)	Use the 4m driver for the LOS retaining screws only.
D	Foot adjustment tool (1)	Use the foot adjustment tool to rapidly spin the projector feet to the desired height. The front notch of the foot adjustment tool can also be used as a wrench.
E	LOS grip handles (1)	Attach the LOS grip handles to the projector as an alternative to the bench jack, if manually turning over the projector to access the LOS for replacement is preferable to raising it with the riser blocks and working underneath.

Setting up for LOS removal

Before LOS removal can start, the projector must be powered down, the area under and around the projector must be clear of debris, the projector must be level and stable, and the service person must be grounded. Follow the instructions provided below before removing covers or projector parts.

1. Remove power from the projector:
   a) Turn off the projector's breakers.
   b) Disconnect the AC input cable at the projector power source or open the breaker at the external breaker box.
2. To prevent shocks and protect sensitive circuitry, ground yourself.
3. Ensure the projector stand, pedestal, or rack is stable and level. This is important to prevent equipment damage.
4. Retain the projector feet using a Series II Rack Adapter kit. If no rack adapter kit is available, it is still important to ensure the projector's feet are retained.
5. Clear all objects from under and around the projector.

# Removing projector components to allow for LOS access

Carefully remove/disconnect the following items to gain access to and allow for safe removal of the LOS.
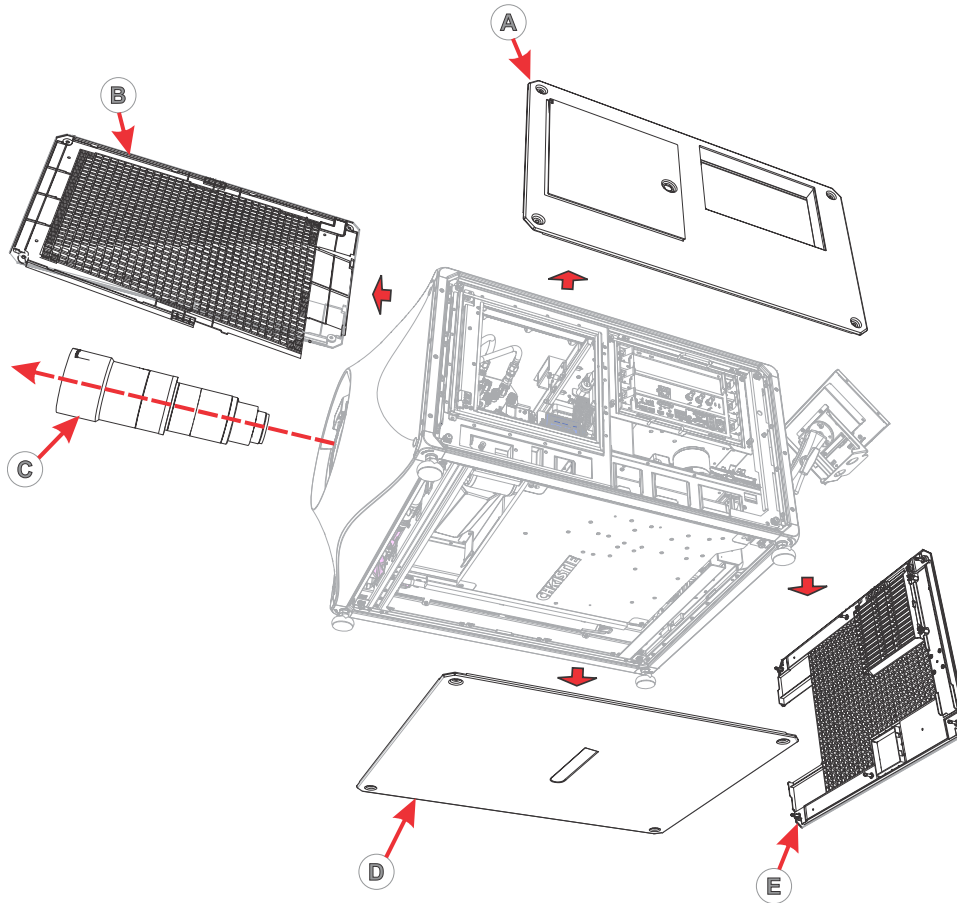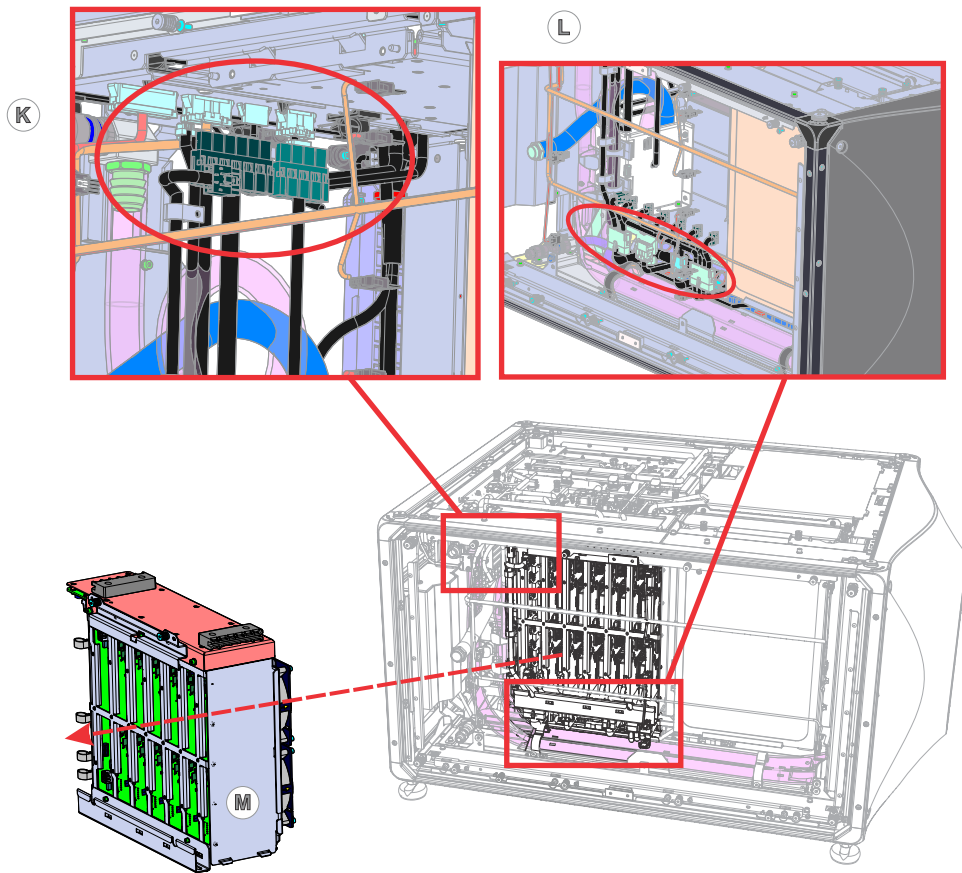

1. Remove the lens shown on callout C.
2. Remove the right-side cover (intake side) shown on callout B.
3. Remove the left-side cover (electronics side) shown on callout A.
4. Remove the bottom cover shown on callout D.
5. Remove the rear cover shown on callout E.
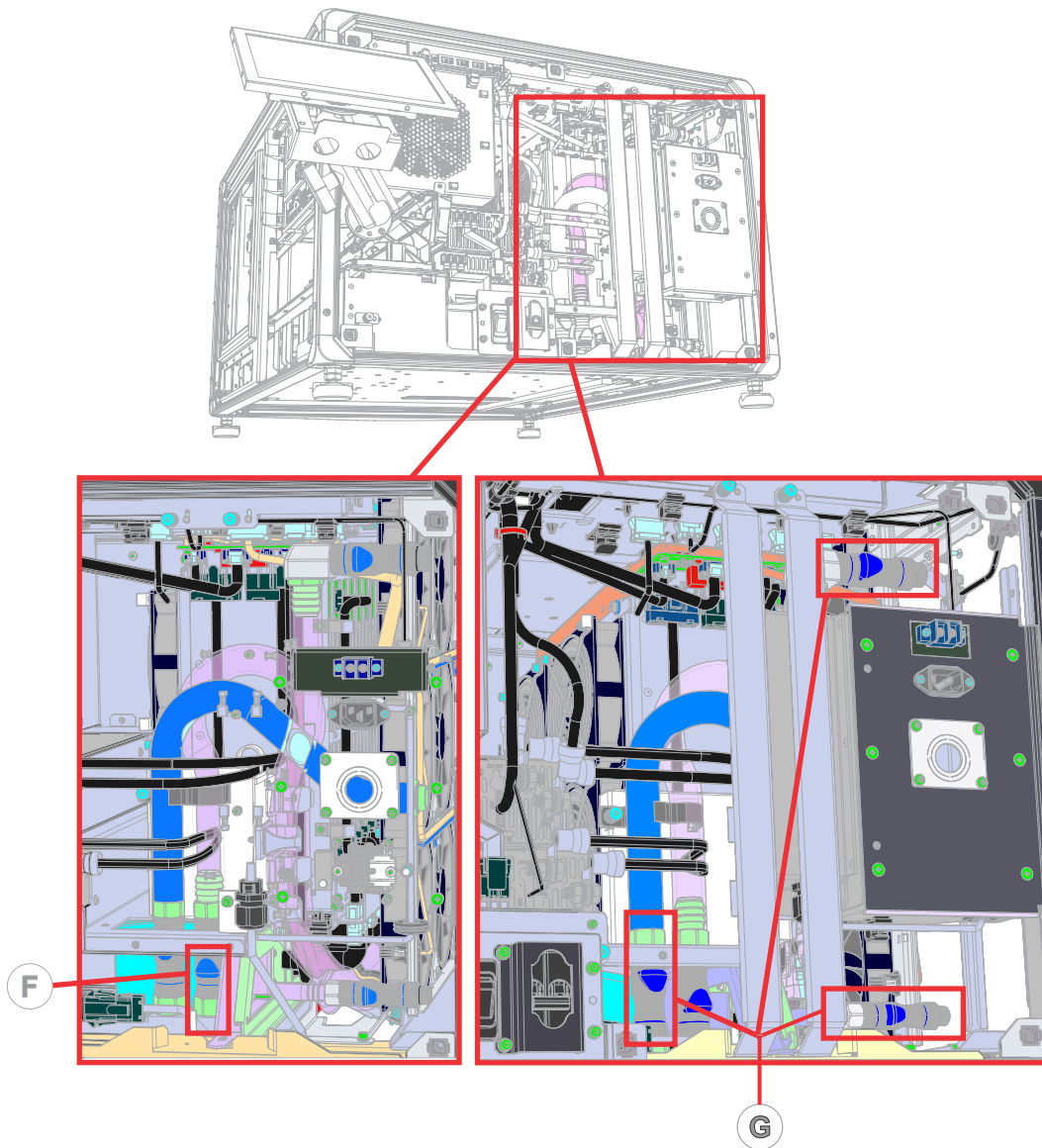
6. Disconnect the LOS cooling tube shown on callout F.

7. Disconnect the radiator cooling tubes at the three disconnects shown on callout G.
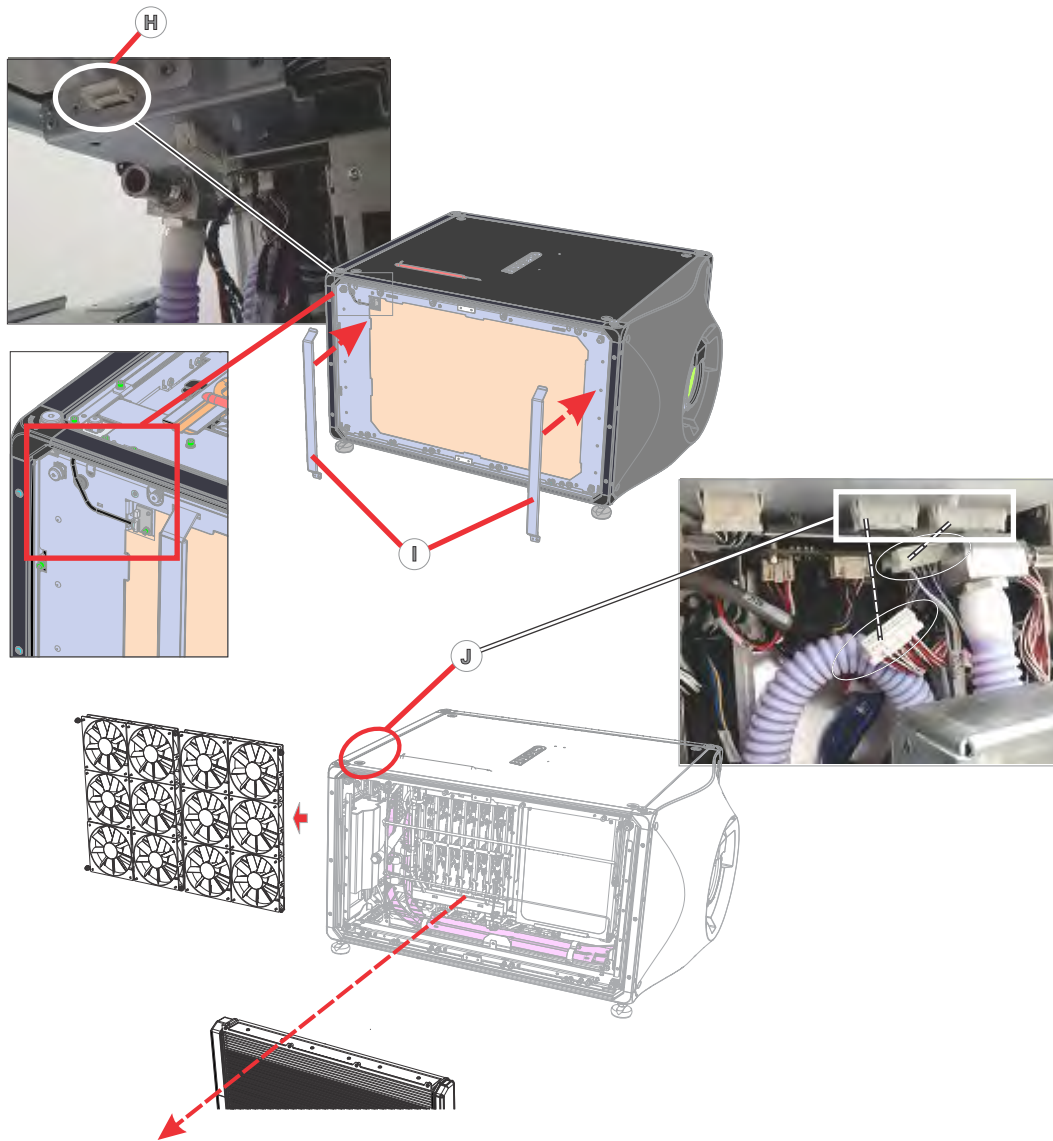
8. Disconnect the radiator harness (at the panel mount, coming from the HKBB) as shown on callout H.

9. Remove the radiator as shown on callout I by first removing the handles from the projector frame, then by reattaching them in their lift positions.

10. Disconnect the two fan harnesses shown on callout J.
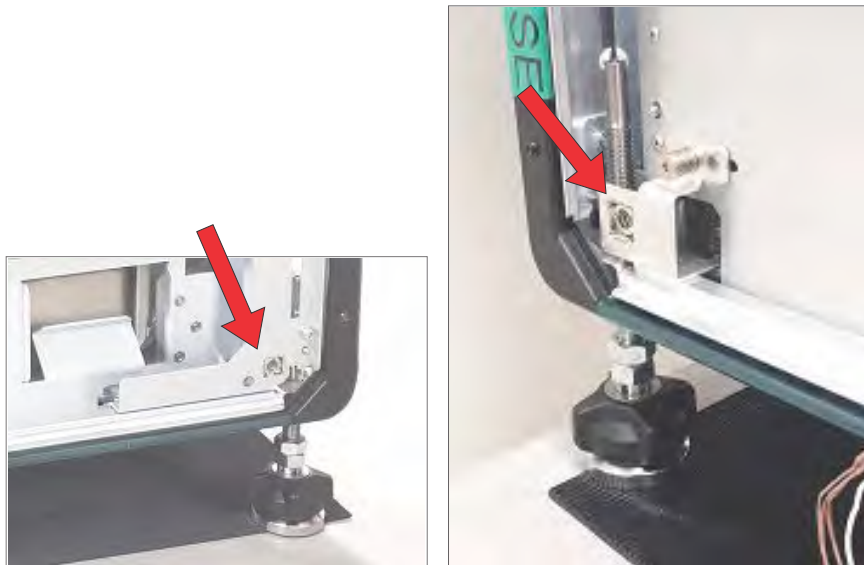
11. Remove the fan module assembly.

12. Disconnect the laser driver card cage (LDCC) harnesses shown on callouts K and L.

13. Remove the LDCC (callout M).
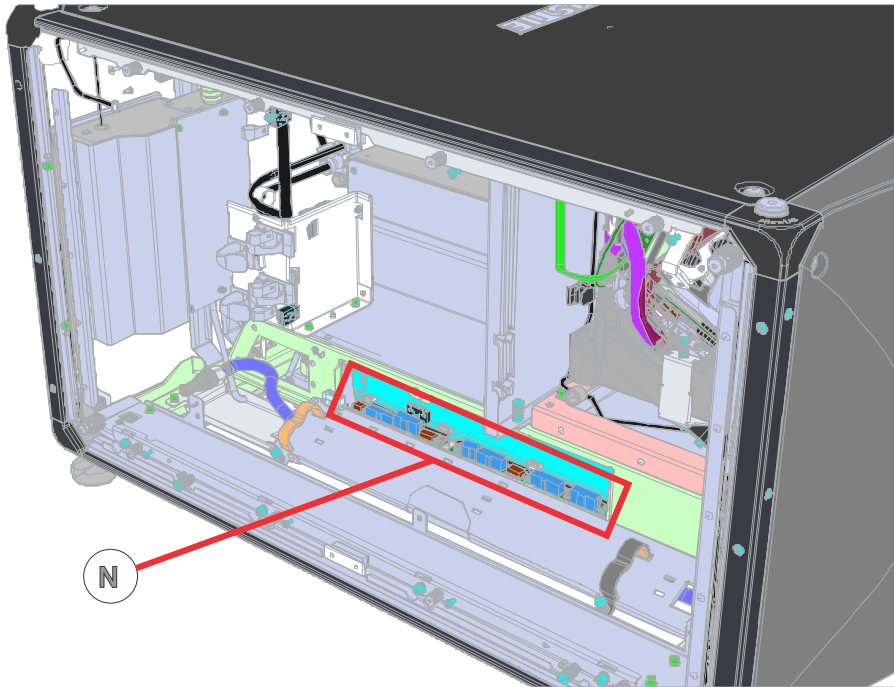
14. Disconnect the laser optical subsystem (LOS) harnessing shown on callout N.

The photographs above show the side view of the bracket in the left photo, and the front view on the right.

15. Remove the rear left bottom cover mounting bracket.

> Do not remove the coupling elbow within the rear IOS. The pins on the bottom of the coupling elbow are required for LOS realignment later in the installation procedure.

Removing the LOS

The height of the bench jack during removal of the LOS is important. The LOS must not drop or fall. Exercise due diligence and caution when performing the following procedure.
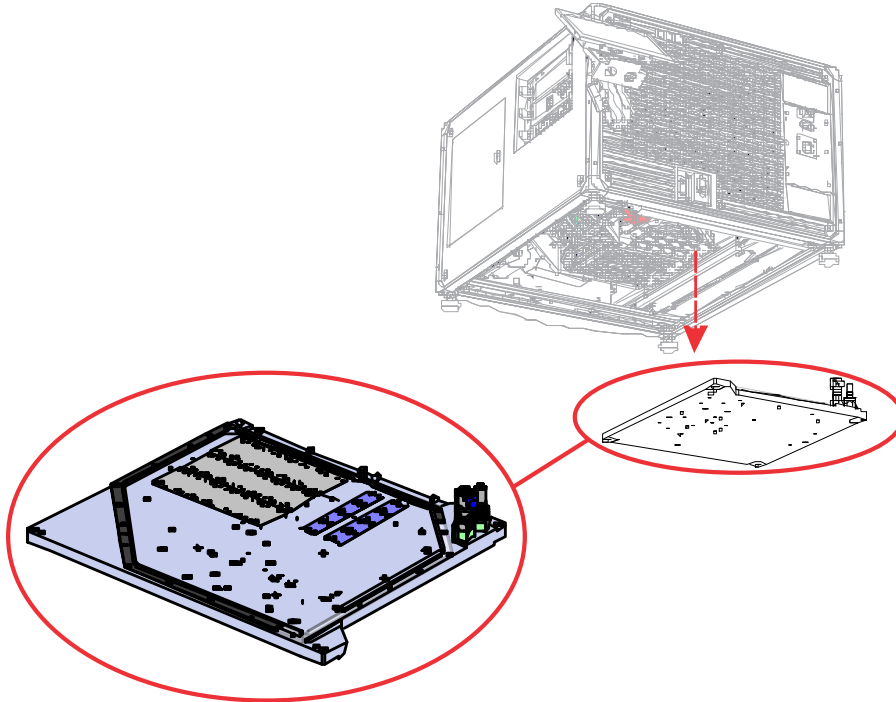
1. To begin, carefully evaluate and set the projector's elevation.

   a) Measure the distance between the projector chassis and the surface the projector is resting on.

   b) If the distance measured is less than 250 mm (10 inches), use the jacking nut on each foot of the projector to raise the projector chassis. The 250 mm distance is for clearance, to prevent LOS damage and to accommodate the bench jack during LOS removal and replacement.

      CP4325-RGB and CP4330-RGB (Cinema 4K-RGB) projectors are equipped with feet that raise the projector the entire 250mm distance. If replacing the LOS on a Cinema 4K-RGB projector, raise and level the projector as described in Steps 1 and 2 in this procedure, then proceed to Step 5.

      📝 Do not raise each foot the entire length of travel as this can destabilize the system and potentially cause damage or injury. Rather, raise each foot sequentially, using a cross or diagonal pattern, in 25 mm increments per foot, then repeat the entire sequence until the required height for each foot has been achieved.

2. Level the projector, using the jacking nuts to adjust.

3. Manually lift one end of the projector (either front or back) and position the stands (black) under the feet. Christie recommends that two people perform this task.

4. Repeat Step 3 on the other end of the projector. Again, two people should work together for both personnel and projector safety.

   If replacing the LOS of a D4K40-RGB, Mirage 4K40-RGB, or Roadie 4K40-RGB unit, use of the stands is mandatory to achieve the required 250mm height. The projector feet must also be set to maximum height for these projector models.

5. Position the bench jack in the approximate center of the LOS cold plate.

6. Raise the jack until the top surface of the bench just touches the bottom of the cold plate.

7. Loosen the four captive M5 screws securing the LOS to the baseplate (four corners).

> Exercise caution before and during removal of the screws. The jack must be high enough to prevent the LOS falling or dropping.

8. Slowly lower the bench jack until sufficient clearance is achieved above the LOS to safely remove the jack from under the projector without any contact occurring.

9. Move the bench jack out from under the projector and remove the LOS.

> Take great care when sliding the LOS off of the bench jack, as the upper platform surface of the bench jack is slippery.

Optional method for removing the LOS

An optional method for accessing the LOS is to place the projector on its top face, rather than use the bench jack method.

To use the alternate method, follow these steps.
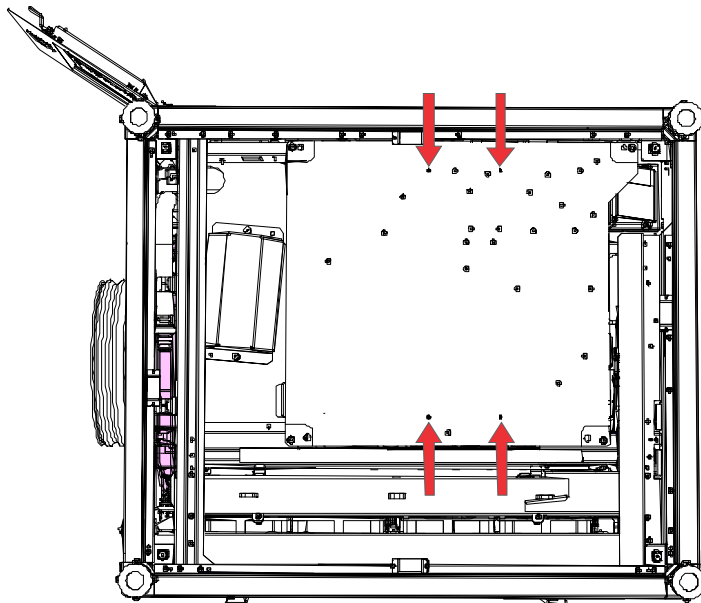
1. Gently lift and place the projector on its top face. Two people are required to do this.

2. Attach the two handles, included in the service kit, into the locations shown by the callout arrows in the graphic above and tighten the two screws per handle (total of four screws).

3. Loosen four captive M5 screws securing the LOS to the baseplate (four corners).

> Exercise caution before and during removal of the screws. The LOS must not be allowed to fall or drop.

4. Carefully remove the LOS.

Installing the replacement LOS

This procedure reverses the LOS removal procedure.

To avoid unnecessary repetition, refer to the previous *procedure* (on page 9) for graphical representations (not shown in this segment).

1. Position the cold plate of the replacement LOS in the center of the bench jack.

2. Remove the dust cap from the LOS output coupling (if not already removed).

3. Slide the jack under the projector into the approximate location for LOS re-installation.

> Ensure the LOS output coupling dust cap is removed before raising the jack.

4. Raise the bench jack and LOS into position for re-installing the four M5 screws.

> During raising, the LOS may hang up on several base plate corners and edges. If this occurs, carefully reposition the bench jack and LOS but **do not force the LOS into position**. The installation path of the LOS must be free of any obstructions.
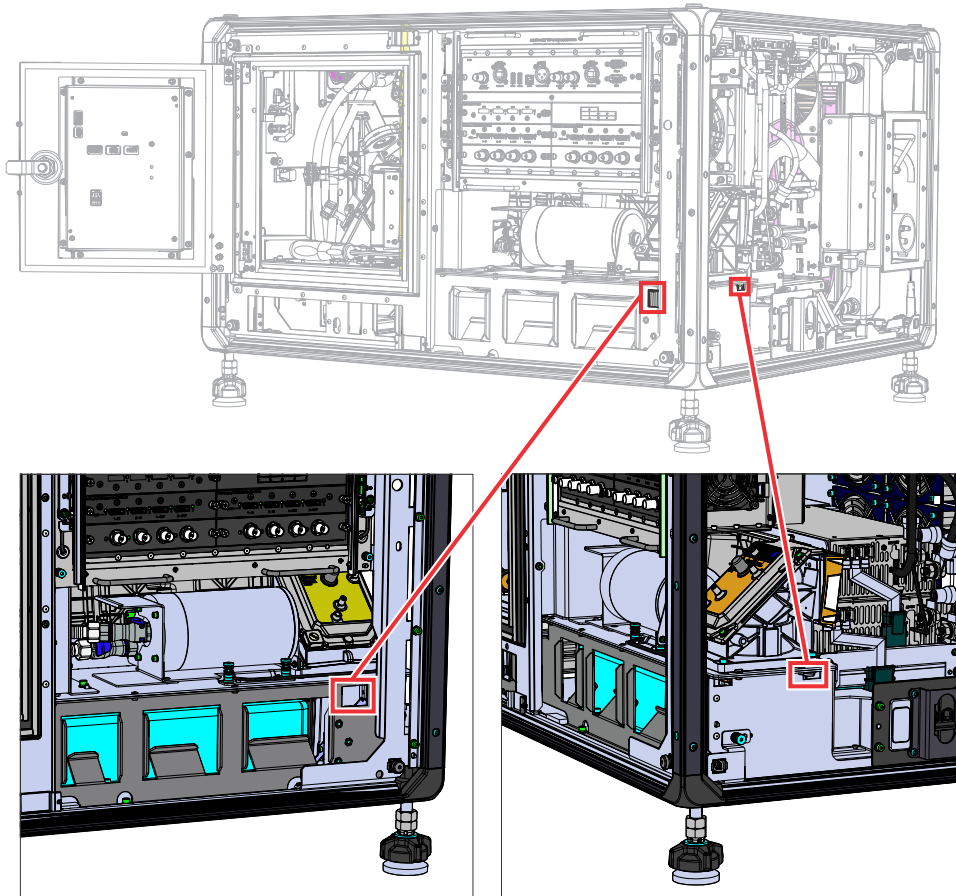
5. Look through the sight holes shown on the graphic above to ensure the LOS has successfully mated to the coupling elbow. If not, remove the LOS using the LOS removal instructions, and repeat this installation procedure until mating occurs.

6. To secure the LOS, tighten the four captive M5 screws.

7. Lower and remove the bench jack.

8. Re-install all other system components and connections that were removed/disconnected in previous steps.

9. Power the system on.

10. Adjust the LOS coupling mirror.

11. Perform the LiteLOC v1 calibration.

Adjusting the LOS coupling mirror

Understand how to adjust the LOS coupling mirror.

1. Decrease the red laser power to low (30% to 40%).

    To access the laser power settings, in the left navigation pane, tap **Laser Settings** > **Laser Power/LiteLOC Setup**.

2. On a tripod in front of the lens, set up an illuminance meter (such as the Konica Minolta T10 Illuminance Meter) aimed at the center of the projection beam sent to the screen.

    The illuminance meter must be facing the lens.

3. Set the green and blue laser power levels to 0.

4. Turn on the light source.

5. Wait 1 minute for the lasers to stabilize.

6. Remove the electronics-side cover.

7. Using a small, flat-head screwdriver, adjust the LOS coupling mirror to maximize the lux reading on the illuminance meter.

8. To set the white point to DCI white, increase the green and blue power levels.

    Make sure the red laser power is still set to low.

9. Visually check for uniformity and fine tune the elbow mirror adjustment.

10. Once the adjustment is complete, adjust the laser power to the preferred level.

11. Replace the electronics-side cover and, using a 3 mm driver, secure the cover using the four quick-access fasteners.

12. Proceed to adjusting the integrator rod and fold mirror.

Performing the LiteLOC v1 calibration

Due to the manufacturing tolerance of the color sensor board and the LOS system, calibrate the LiteLOC v1 response to the light intensity as the temperature of the laser devices changes.

1. Contact Christie Technical Support for a copy of the Horizon Factory Calibration Procedure spreadsheet.

2. On the projector, display a framing test pattern.

3. Setup the color meter in the same manner as used for creating laser and MCGD files.

4. Login to the projector with Installer access or higher.

5. Navigate to the laser power settings page.

6. Set the following values:

    - LiteLOC is disabled

- Maximum Expected Room temperature: 35 degrees Celsius
- Red power level: 78.3%
- Green power level: 63.2%
- Blue power level: 66.4%

7. Wait 15 minutes for the laser devices to acclimatize to the new values.

8. Adjust the blue and green power levels to achieve a DCI white point, as measured by the color meter. Do not adjust the red value.

   - For CP43XX-RGB series projectors, the DCI white point is x=0.314, y=0.351.
   - For 4K40-RGB series projectors, the D65 white point is x=0.313, y=0.329.

   Wait a few minutes for the lasers to stabilize and ensure that the white point is not shifting between measurements.

9. Re-establish the connection to the photon controller using NetTerminal or Kore 10-bit Librarian, on port 5103.

10. Send the command `(RGB + MEAS?)` to the photon controller.

    The current color sense X, Y and Z values are returned, showing the temperature of the different devices. For example:

    - Red: Color sense X value
    - Green: Color sense y value
    - Blue: Color sense Z value
    - Purple: Red devices temperature * 100
    - Brown: Blue devices temperature * 100

11. Enter the returned values into line 27 and line 63 of the spreadsheet.

    The temperature values reported in NetTerminal must be divided by 100 before being entered on line 27 and Line 63.

12. Use Kore Librarian to connect to the projector on port number 5000.

13. Login to the projector with Service access.

14. Switch to the Scripting tab.

15. To lower the fan speed and increases the internal temperature of the laser devices, use the script for the upgraded projector.

    Lowering the fan speed allows for another set of Csense measurements to be collected at a higher temperature without actually changing the room temperature.

    - **CP43XX-RGB series projectors**

      Kore Librarian must be used as NetTerminal is not capable of sending a script.

      ```
      sub main()
      proj.sendstring( "(CAL+FANS 5 45 )" )
      proj.sendstring( "(CAL+FANS 6 45 )" )
      proj.sendstring( "(CAL+FANS 7 45 )" )
      ```

```
proj.sendstring( "(CAL+FANS 8 45 )" )
proj.sendstring( "(CAL+FANS 9 45 )" )
proj.sendstring( "(CAL+FANS 10 45 )" )
proj.sendstring( "(CAL+FANS 11 45 )" )
proj.sendstring( "(CAL+FANS 12 45 )" )
proj.sendstring( "(CAL+FANS 13 45 )" )
proj.sendstring( "(CAL+FANS 14 45 )" )
proj.sendstring( "(CAL+FANS 15 45 )" )
proj.sendstring( "(CAL+FANS 16 45 )" )
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proj.sendstring( "(CAL+FANS 23 45 )" )
proj.sendstring( "(CAL+FANS 24 45 )" )
proj.sendstring( "(CAL+FANS 25 45 )" )
proj.sendstring( "(CAL+FANS 26 45 )" )
proj.sendstring( "(CAL+FANS 27 45 )" )
proj.sendstring( "(CAL+FANS 28 45 )" )
proj.sendstring( "(CAL+FANS 29 45 )" )
end sub
```

- **4K40-RGB series projectors**

  On 4K40-RGB series projectors, port 5103 is always opened in Core 4 Software and no password is required to run the commands required to change the projector fan speed.

  TrueLife accepts automation commands on port 3002.

```
sub main()
proj.sendstring( "(DGN 71 6 1 45 )" )
proj.sendstring( "(DGN 71 7 1 45 )" )
proj.sendstring( "(DGN 71 8 1 45 )" )
proj.sendstring( "(DGN 71 9 1 45 )" )
proj.sendstring( "(DGN 71 10 1 45 )" )
proj.sendstring( "(DGN 71 11 1 45 )" )
proj.sendstring( "(DGN 71 12 1 45 )" )
proj.sendstring( "(DGN 71 13 1 45 )" )
proj.sendstring( "(DGN 71 14 1 45 )" )
proj.sendstring( "(DGN 71 15 1 45 )" )
proj.sendstring( "(DGN 71 16 1 45 )" )
proj.sendstring( "(DGN 71 17 1 45 )" )
proj.sendstring( "(DGN 71 21 1 45 )" )
proj.sendstring( "(DGN 71 22 1 45 )" )
proj.sendstring( "(DGN 71 23 1 45 )" )
proj.sendstring( "(DGN 71 24 1 45 )" )
proj.sendstring( "(DGN 71 25 1 45 )" )
proj.sendstring( "(DGN 71 26 1 45 )" )
proj.sendstring( "(DGN 71 27 1 45 )" )
proj.sendstring( "(DGN 71 28 1 45 )" )
proj.sendstring( "(DGN 71 29 1 45 )" )
proj.sendstring( "(DGN 71 30 1 45 )" )
end sub
```

  On 4K40-RGB series projectors, to change the fan speed to 100% type the following command: `(DGN 71 <fan ID> 1 <speed>)`. For example, `(DGN 71 25 1 100)` sets fan 25 to run at 100%.

  To run the fan at the normal speed, send the command `(DGN 71 <fan ID> 0)`, or reboot the projector.

16. To execute the script, click the red arrow.

A confirmation that the command has been executed is displayed, and the projector noise level goes down.

17. In the projector software, set the following values:

    - LiteLOC is disabled

    - Maximum Expected Room temperature: 35 degrees Celsius

    - Red power level: 78.3%

    - Green power level: 66.3%

    - Blue power level: 70%

18. Wait 15 minutes for the laser devices to acclimatize to the new values.

19. Re-establish the connection to the photon controller using NetTerminal or Kore Librarian, on port 5103.

20. Send the command `(RGB + MEAS?)` to the photon controller.

21. Compare the new blue temperature to the original value.

    If the difference is less than eight degrees wait for a few more minutes and take another reading until the blue temperature is at least eight degrees higher than the original reading.

22. Adjust the blue and green power levels to achieve a DCI white point, as measured by the color meter. Do not adjust the red value.

23. Send the command `(RGB + MEAS?)` to the photon controller.

24. Retrieve the color sensor X, Y and Z values, and the blue and red devices temperatures.

25. Verify line 63 of the spreadsheet has the values identifed in step 10.

26. Enter the values returned in step 23 into line 64 of the spreadsheet.

    The spreadsheet automatically calculates the calibration data and populates line 96 on the calculator.

    The temperature values reported in NetTerminal must be divided by 100 before being entered on line 27 and Line 63.

27. Type the command on line 96 of the spreadsheet into NetTerminal or Kore Librarian and send it to the photon controller.

    The calibration data is saved to the color sensor board.

28. (CP43XX-RGB series projectors only) Close the LOS port. The port must be closed.

    a) To close the direct communication to Photon, connect the laptop to the projector using NetTerminal or Kore Librarian, with port 5000, and send the following command: `(CAL +PASS 0)`

    b) To verify the port is closed, connect to port 5103 and send the following command: `(SST?)`

       If a response is returned, the port is open and must be closed.

29. To reset all fans to the normal operating speed, reboot the projector.

Technical support

Technical support for Christie 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: +65 6877-8737 or *Support.APAC@christiedigital.com*
- Christie Managed Services: +1-800-550-3061 or *NOC@christiedigital.com*