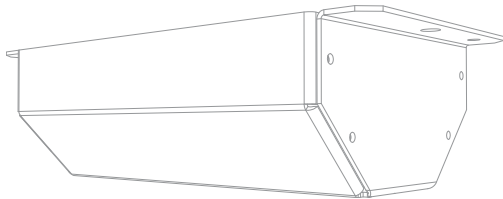# Upgrading the color sensor board

Learn how to replace the 4.2 color sensor board with the new 6.0 color sensor board.

Affected products

These instructions apply to the following projectors with this style of guard:

- CP43XX-RGB series projectors
- 4K40-RGB series projectors

Required tools and parts

Before replacing components in the projector, ensure the following tools and parts are available:
- Color sensor board and housing upgrade kit (P/N: 003-006740-XX)
- 2mm hex driver or key
- 2.5mm hex ball-drive
- 3mm hex ball-driver
- Lint-free gloves
- Color meter (not provided)

Replacing the color sensor board

Remove the color sensor board and replace it with the upgraded board. A mechanical upgrade to the housing is also required.

⚠️ **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.

- Always connect the ground or earth first to reduce shock hazard.

- Observe all electrostatic precautions. Use a grounded wrist strap and insulated tools when handling, servicing, or cleaning electronic assemblies.

1. Disconnect the projector from power.

    Allow approximately 10 minutes for the projection system and mirror to cool-down before servicing.

2. Raise the projector feet to create a clearance under the projector of approximately 12 cm or 4 ¾ in.

    Alternatively, tip the projector so it is resting on its side.

    Before performing the upgrade procedure on a CP4325-RGB projector, consider inverting the projector onto either its side or top-face for all service operations. If re-orienting the projector is troublesome due to environmental or logistical constraints, all service operations can be completed in typical landscape orientation, however there is increased difficulty in component access, tool manipulation, and an increased risk in component damage if glass elements are not handled very carefully.

3. Remove the bottom cover.

4. Loosen the two captive fasteners from the installed cover (A).
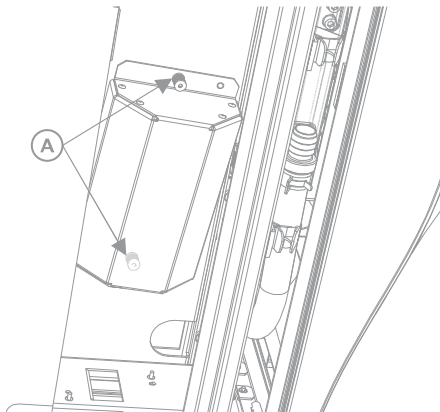
5. Remove the cover and set it aside.

6. Locate and loosen the four captive fasteners on the color sensor housing (B).
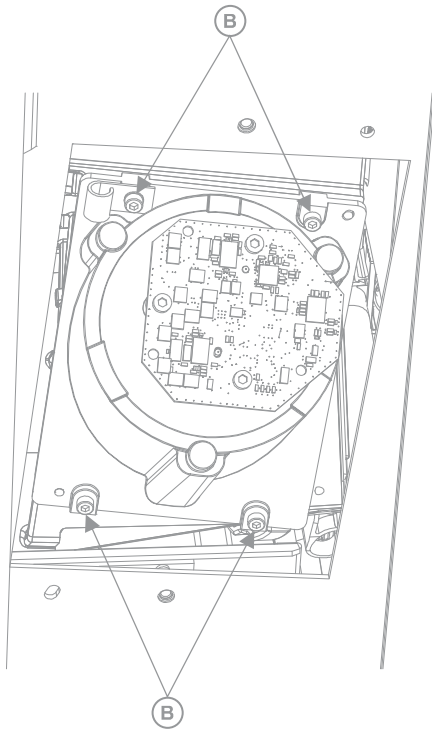
7. Gently pull the housing off the locating pins, allowing the assembly to hang by the harness.
8. Disconnect the harness from the PCB header and the harness retention clip.

    The cover, housing, PCB, and captive fasteners can be discarded.
9. (CP4325-RGB only) *Replace the coupling elbow mirror* (on page 4). After replacing the mirror, return to this procedure.

    The fold mirror installed directly behind the color sensor housing must be exchanged for the new version supplied in the upgrade kit. The surface of the legacy fold mirror is silver/reflective on both sides, while the surface of the new fold mirror is silver/reflective on one side and black with a pin-sized through-hole to allow partial light transmission on the other side.
10. On the new housing, locate and loosen the captive faster holding the metal guard to the housing.
11. Slide the metal guard from the shoulder screws holding it in place. Discard the guard.
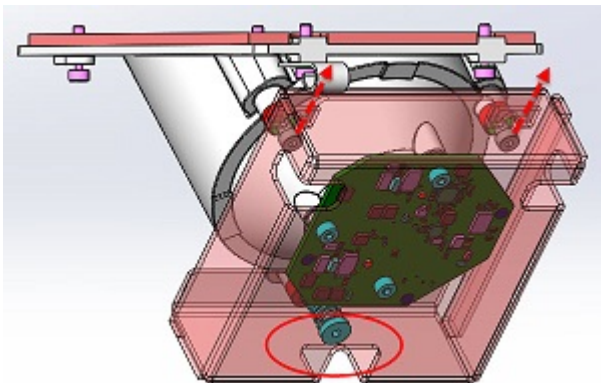
12. Remove the two shoulder screws holding the board to the housing. Discard the screws.

13. Connect the harness to the new board.

14. Using the locating pins, position the PCB on the housing and reinstall the three cap screws. Do not over-torque the screws.

15. Route the harness through the housing clip.
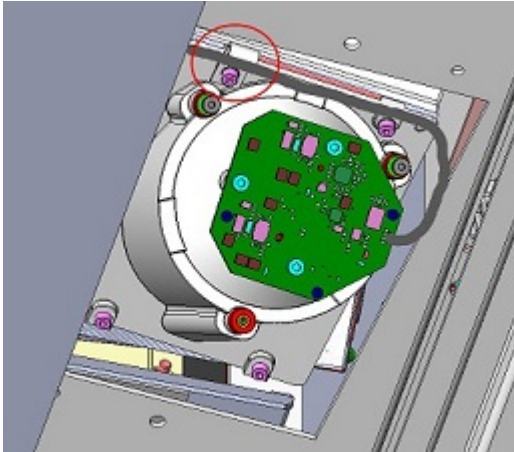
16. Install the new housing in the same position as the previous housing.

    It may be necessary to use a flashlight to see the screw locations.

17. Perform a DAC and Color sensor color calibration.

    Calibration of the color sensor board must be completed after replacing the LOS or the color sensor board. When replacing the LOS, only the Color sensor color calibration is required.

18. Reinstall the color sensor cover removed in step 5.

19. Reinstall the bottom cover.

Removing the coupling elbow mirror assembly

1. *Remove the card cage* (on page 4).

2. Remove the four screws securing the mirror.

3. Rotate the four spring clips clear of the mirror.

4. Replace the mirror assembly.

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

6. After re-installing the assembly, perform optical adjustments and software calibration.
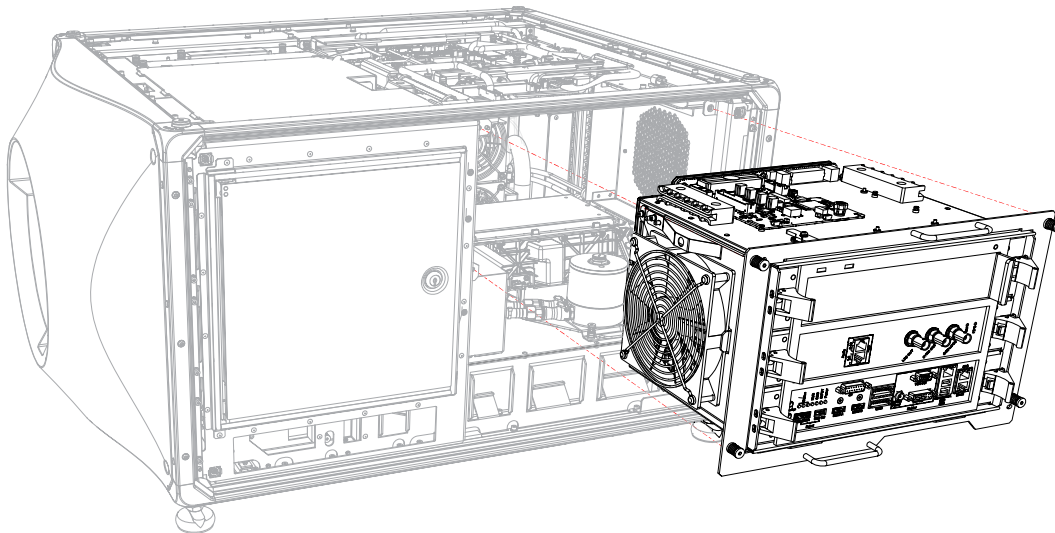
Removing the card cage

The card cage contains the slots for the F-Main electronics card.

1. Remove the top cover.

2. Remove the electronics-side cover.

3. Disconnect all external card cage connections and any input sources.

4. Using a 3 mm driver, remove the two screws securing the electronics bracket and remove bracket.
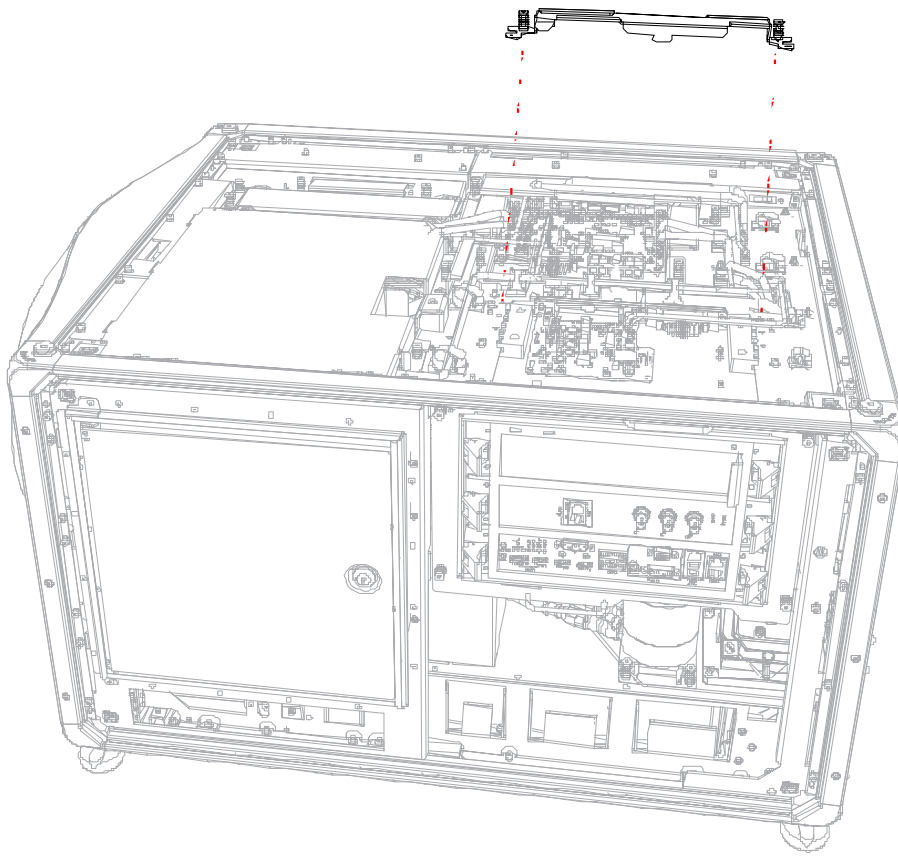
5. Disconnect the red, green, and blue mini-SAS harnesses from the card cage through the projector service access door.

6. Disconnect the three harnesses (J5, J7, J87) from the SSCB on top of the card cage.

7. Disconnect the two harnesses (J17, J18) from the backplane board.

8. Loosen the four captive screws securing the card cage.

9. Pull on the locking pin that is located through the access door, above the card cage intake fan.

10. Slide the card cage out along the guides.

     To avoid possible damage, carefully place the card cage on a clean, flat surface.

Cleaning optics (excluding lens)

Unnecessary cleaning of optics can be more harmful than helpful by increasing the risk of damage to delicate coatings and surfaces.

Only clean optics when dust, dirt, oil, fingerprints or other marks are obvious or are the cause of performance problems. Maintenance of optical components requires a qualified service technician. Inspect exposed optical surfaces periodically in a clean, dust-free environment using a flashlight. Always wear appropriate gloves when servicing any optical surfaces.

Supplies for cleaning optical surfaces

- Soft camel-hair brush
- Dust-free blower: Filtered dry nitrogen blown through an anti-static nozzle
- Dust-free lens tissue, such as: Optowipes (18LAB022), Kim Wipes, or equivalent
- For lens only: Lens cleaning solution
- Cotton swabs with wooden stems only
- Lens cleaning cloth/microfiber

Replacing the color sensor board harness

If the color sensor board harness becomes damaged during installation, replace it with the enhanced harness included with the kit.

1. Remove the following system components:

   a. Side intake cover

   b. Radiator module

   c. Radiator fan intake module

   d. Light engine fan intake module

   e. HKBB cover (A)
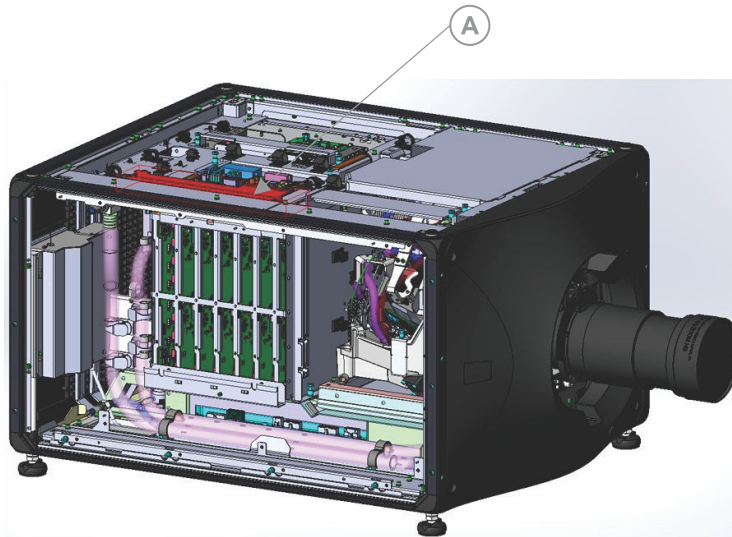
2. Detach the color sensor board from the housing and disconnect the harness. Set the board aside.

3. Remove harnesses from clips on the color sensor housing.

4. Standing at the radiator-side of the projector, disconnect the color sensor board harness from the HKBB at J85.

5. Remove the color sensor board harness from routing clips starting near the HKBB and finishing at the P-clip fastened to the base plate in front of the IOS.

6. Gently pull the harness out from underneath the IOS.

    Take care when removing the hose as there is a square hole on the underside of the unit which may have sharp edges.
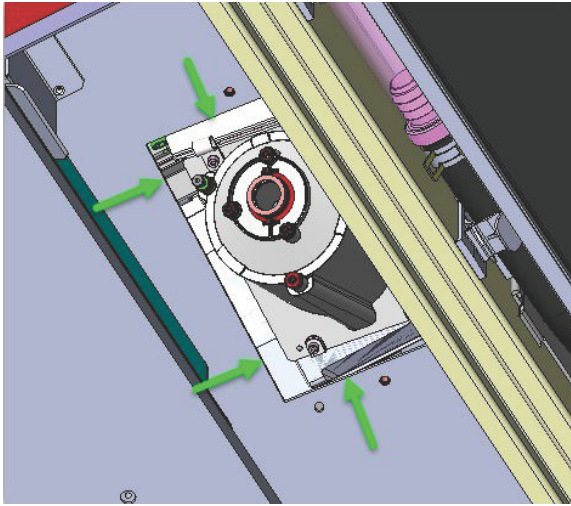
7. Install the new color sensor board harness (P/N: 001-113506-02) starting near the HKBB, routing through all routing clips and finishing at the lowest P-clip.
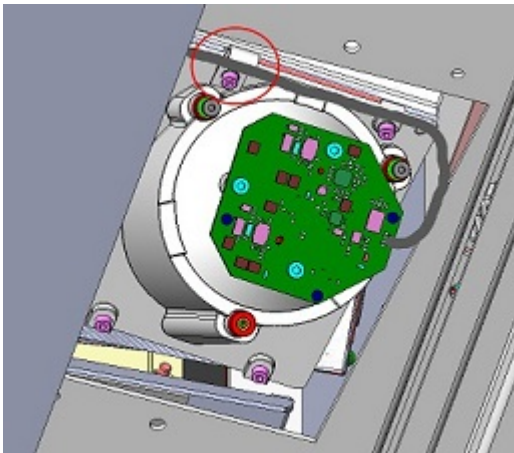
8. Gently route the color sensor board harness under the IOS and pull it into position at the underside of the projector.
9. Connect the harness to the color sensor board.
10. Reinstall the color sensor board PCB.
11. Reinstall all modules and covers previously-removed.

Performing the DAC calibration

Calibrate the black levels for the new color sensor board.

1. Enable direct communication to photon controller.
    a) Set the IP address of the projector and the IP address of the laptop to be on the same subnet.
        This connection can be a direct connection to the management port on the FMAIN through Wired/wireless network.

    b) Connect the laptop to the projector using Net Terminal or Kore Librarian, with port 5000.

    c) Log in as the Service account.

    d) To enable the communication to the photon controller, send the command `(CAL+PASS 1)`.

2. Connect the laptop to the photon controller using Net Terminal or Kore Librarian, with port 5103.

3. Turn off the laser and close the shutter.

4. To start the DAC calibration, send the following command: `(ENG+CALB 0 0)`.

   This process takes approximately one minute. DAC calibration is only required after replacing the color sensor board.

5. To complete the calibration, reboot the projector.

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 an applicable 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.

   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.

    All temperatures returned from serial commands are in degrees Celsius.

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 Color sensor 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 )" )
proj.sendstring( "(CAL+FANS 17 45 )" )
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proj.sendstring( "(CAL+FANS 22 45 )" )
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
```

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 identified 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*