Entero RPMWU/RPMSP/RPMHD-LED01

SERVICE MANUAL

020-100368-05

CHRISTIE®

Entero RPMWU/RPMSP/RPMHD-LED01

SERVICE MANUAL

020-100368-05

NOTICES

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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.

This Class A digital apparatus complies with Canadian ICES-003.
Cet appareil numérique de la classe A est conforme à la norme NMB-003 du Canada.

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

Canadian manufacturing facility is ISO 9001 and 14001 certified.

GENERAL WARRANTY STATEMENTS

For complete information about Christie's limited warranty, please contact your Christie dealer. In addition to the other limitations that may be specified in Christie's limited warranty, the warranty does not cover:

a. Damage occurring during shipment, in either direction.
b. Projector lamps (See Christie's separate lamp program policy).
c. Damage caused by use of a projector lamp beyond the recommended lamp life, or use of a lamp supplied by a supplier other than Christie.
d. Problems caused by combination of the product with non-Christie equipment, such as distribution systems, cameras, video tape recorders, etc., or use of the product with any non-Christie interface device.
e. Damage caused by misuse, improper power source, accident, fire, flood, lightening, earthquake or other natural disaster.
f. Damage caused by improper installation/alignment, or by product modification, if by other than a Christie authorized repair service provider.
g. For LCD projectors, the warranty period specified applies only where the LCD projector is in "normal use." "Normal use" means the LCD projector is not used more than 8 hours a day, 5 days a week. For any LCD projector where "normal use" is exceeded, warranty coverage under this warranty terminates after 6000 hours of operation.
h. Failure due to normal wear and tear.

PREVENTATIVE MAINTENANCE

Preventative maintenance is an important part of the continued and proper operation of your product. Please see the Maintenance section for specific maintenance items as they relate to your product. Failure to perform maintenance as required, and in accordance with the maintenance schedule specified by Christie, will void the warranty.

1: Introduction

2: Service Guidelines

3: Troubleshooting

4: Parts and Module Replacement

1 Introduction

1.1 Using this Manual

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

This manual provides technical information for assisting qualified Christie service technicians in the servicing and repair of all ***Entero RPMSP/RPMWU-LED01*** projectors.

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

1.1.1 Labels and Marking

Observe and follow any warnings and instructions marked on the projector.

⚠ DANGER Danger symbols indicate a hazardous situation which, if not avoided, will result in death or serious injury. This signal word is to be limited to the most extreme situations.

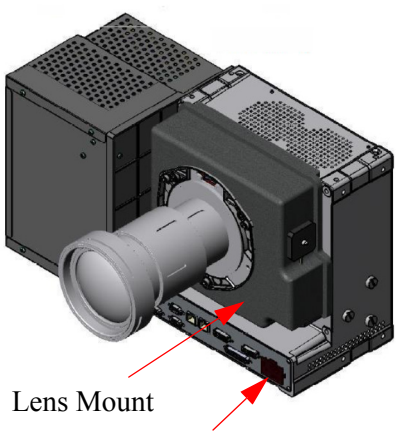
⚠ WARNING Warning symbols indicate a hazardous situation which, if not avoided, could result in death or serious injury.

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

NOTICE: *Notices address practices not related to personal injury.*

1.2 Projector Description

Entero RPMSP/RPMWU-LED01 are professional quality SXGA+ and WUXGA projectors featuring the latest in DLP™ display technology to achieve high brightness, high resolution multimedia and video projection images. These projectors use the exclusive Christie KoRE™ electronics and firmware to accept data, graphics, and video input signals for projection onto flat, front or rear projection screens.The modular design of these projectors makes them an ideal choice for rear screen projection and multi-display walls. With built-in flexibility, each projector is configurable for straight throw or 90° mirrored applications. The unique 6-axis adjustment mechanism enables accurate alignment of the lens to the screen minimizing distortion at all corners and edges of the display. The purpose-built design of these projectors makes them an ideal choice for the demanding needs of 24/7 command and control centers, telecommunications, surveillance and broadcasting applications.



2 Service Guidelines

2.1 Before Servicing

Read all instructions before servicing. Always take extra precautions to secure all harnessing properly, especially in high voltage circuitry areas.

2.1.1 Lead Dress

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

2.1.2 Order Parts

When ordering replacement parts, quote the part numbers of the items required. See **Table 4.1 Service Parts List** and *2.2 Safety Warnings and Guidelines*. Also quote the projector model number, serial number, and date of manufacture.

NOTE: *Some parts identified in the service parts list may not be available separately. In addition, some parts stocked as inventory are available only until the current supply lasts. All part numbers are subject-to-change.*

2.1.3 Replace Modules

Check module markings, parts lists and the relevant disassembly/replacement procedure outlined in *Section 4 Parts and Module Replacement* to make sure you have the correct module for the projector and that the module is replaced correctly.

Components must be replaced with exact equivalents. Failure to do so may result in unsafe operation.

2.2 Safety Warnings and Guidelines

⚠ DANGER **Perform servicing ONLY after becoming thoroughly familiar with these service guidelines. Noncompliance will increase the risk of hazards and injury to the user. Do not modify any circuit. Do not look directly into the lens or into an open projector. The extreme light output could cause permanent eye damage.**

⚠ WARNING **All servicing must be performed by Christie accredited service technicians. Use replacement parts that are manufacturer-approved only. Use of any other part other than the ones specified by the manufacturer can result in fire, electric shock or risk of personal injury and irreparable equipment damage.**

⚠ WARNING **Do not service the projector while it is still connected. There are exposed voltages that could cause severe physical injuries and possibly death. Always power down and disconnect/disengage all power sources to the projector before servicing or cleaning.**

If any of the following conditions exist, immediately disconnect the projector from the power outlet and consult a Christie accredited service technician.

- The power cord is damaged.
- The internal cooling fans do not turn ON when the projector is first powered up.
- Liquid is spilled into the projector.
- The projector is exposed to excessive moisture.
- The projector is not operating normally or performance has severely decreased over a short period of time.
- The projector has been dropped or the shipping case (if applicable) is badly damaged.

2.2.1 Repair Cautions

- **Do not** short transistors or ICs during circuit checks.
- **Do not** short or remove bias resistors while the projector is operating.
- **Do not** operate with heat sinks removed.
- **Do not** overload transistors or ICs. Make sure the projector is disconnected from AC power before testing, removing, or installing modules.
- **Do not** operate the projector with an internal part removed. If, for testing purposes, you **must** operate the projector without the lid or the lamp door, make sure to wear **UV glasses** and stand **well back** from the projector at all times.

2.2.2 General Precautions

⚠ WARNING **Do not operate the projector with any internal part remove. If for testing purposes you must operate the projector without the lid or the lamp door, wear UV glasses and stand well back from the projector at all times.**

Make sure the projector is disconnected from AC power before you start repairing, removing, or installing any modules. This projector is internationally approved and is designed for safe and reliable operation. To assure complete safety at all times it is imperative the following precautions be taken during servicing and the original projector design remain intact.

2.2.3 AC /Power Precautions

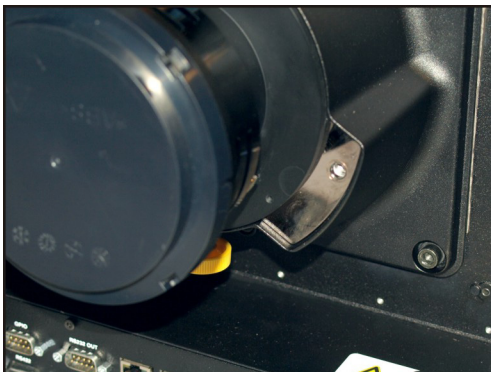
⚠ WARNING **Power should always be disconnected from the illumination module before servicing, to avoid the possibility of inadvertent exposure to visible and invisible LED radiation. Directly viewing the illumination module optical output through optical instruments within a distance of 100 mm may pose an eye hazard.**

⚠ CAUTION **Always power down and disconnect/disengage all power sources to the projector before servicing or cleaning.**

NOTICE: *This projector must be operated in an environment that meets the operating range specification, as listed in Section 5 Specifications.*

2.2.4 Lamp Precautions

Be aware of the caution label on the projector warning of possible eye hazard if the projected visible and invisible LED radiation light is viewed directly through certain optical instruments at close range. The following image indicates where the label is located.



2.3 Cleaning

⚠ WARNING Always power down and disconnect/disengage all power sources to the projector before servicing or cleaning.

NOTICE: *Always wear gloves and follow proper ESD precautions when handling, servicing or cleaning internal projector components.*

Maintaining the cleanliness of all internal components during a service procedure is critical. All of the optics must remain free of contaminants in order to perform at the level specified for the projector. Even a small amount of dust or a fingerprint may degrade the image or cause a noticeable reduction of brightness. During servicing, take all necessary measures to avoid touching or contaminating optical surfaces. A minimum amount of cleaning may be required during and after servicing. If contamination is noticed, see *2.3.1 Guidelines for Cleaning* to determine the appropriate cleaning action. For more information, see the maintenance section of the ***Entero RPMWU/RPMSP/RPMHD-LED01 User Manual (P/N: 020-100367-XX).***

NOTE: *The projector must be powered OFF and disconnected from AC before the lens or the projection head covers/doors are loosened and removed.*

2.3.1 Guidelines for Cleaning

COMPONENTS	PREVENTATIVE MEASURES	CLEANING TECHNIQUE
Illumination Optics System, general	**Do not** touch or blow on exposed components. Wear gloves (supplied).	Use ionized pneumatic guns only. Keep imaging components and yourself grounded at all times.
Illumination System, internal lenses/prisms	**Do not** touch or blow on interior components. Wear gloves (supplied). **NOTE:** *Normally the internal parts should not be accessed.*	Blow off particles with clean, dry de-ionized air. If necessary, wipe in a single direction with a clean high quality optical cloth.
Light Engine components	**Do not** touch or blow on components. Wear gloves (supplied).	Blow off particles with clean, dry de-ionized air. If necessary, use a split Q-tip with pure isopropyl alcohol on the glass surface.
Light Engine, DMD panels	**Do not** touch or blow on the panels.	Blow off particles with clean, dry de-ionized air.
Projection Lens	To avoid the risk of scratching the lens, only clean the lenses if absolutely required. A small amount of dust on the lenses will have very little effect on picture quality. The projection lens should be free of dust and fingerprints. If the lenses must be cleaned, use a DRY soft cotton cloth. Rub gently in a circular motion.	Use filtered compressed air to blow out dust. Remove fingerprints or dirt with Melles Griot Cleaning Fluid 18LAB011(or equivalent) and a clean lint-free cloth.

2.4 General Maintenance

DESCRIPTION	FREQUENCY	HOW TO CLEAN
Fans	As required	Remove the fan from the projector, as outlined in the removal procedure for each specific fan. Use compressed air to blow particles off of the fan and away from the projection unit.
External Projector Covers	As required	Before cleaning the modules, it is recommended that you install the lens cap. This will keep dust particles from settling on the glass surface of the lens. Clean dust from external covers using a clean, lint-free cotton cloth as required.

Air vents are located around the projector to keep it at a consistent operating temperature. Make sure that the empty space around these vents ("stay out zone") is within the limits specified in *Section 5 Specifications*. This will prevent the blockage of air flow and prevent overheating. The projector is equipped with active thermal monitoring. The speed of the cooling fans will adjust to the projector temperature.

- **Do not** put the projector on a radiator or heat register.
- **Do not** put the projector in an enclosure without correct ventilation.
- **Do not** put objects into the ventilation openings of the projector. They can touch dangerous voltages or short-circuit components resulting in a fire or shock hazard.
- **Do not** spill liquids into the projector. If a spill occurs, immediately disconnect the projector and have it serviced by a Christie accredited service technician.

2.5 Replace the Light Module

⚠ DANGER **Do not service the projector while it is still connected. There are exposed voltages that could cause severe physical injuries and possibly death. Always power down and disconnect/disengage all power sources to the projector before servicing or cleaning.**

The light module is a non-serviceable part of the projector and must be replaced.

3 Troubleshooting

3.1 Overview

The ***Entero RPMSP/RPMWU/RPMHD-LED01*** offers a comprehensive system of diagnostics, tracking a wide range of conditions and alerting the operator to a potential problem by display specific status information at the status display, through the WebUI, or by the available internal or external LEDs. This system includes:

- ❒ Status Panel LED Indicators
- ❒ Projector OSD Status Menu
- ❒ Web User Interface Status Page
- ❒ Internal PCB-specific LEDs and Main AC status LED

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

3.2 Troubleshooting Trees

This section provides troubleshooting procedures that can help direct you to the most likely cause of a specific performance problem. Refer to this section if you cannot eliminate the problem through proper adjustment of the projector. See the ***Entero RPMWU/RPMSP/RPMHD-LED01 User Manual (P/N: 020-100367-XX)***. Note the symptoms present and work through the appropriate troubleshooting steps to determine the probable source of the problem.

3.3 Troubleshooting Guidelines

Read, understand and observe all warnings and precautions when diagnosing and servicing the projector.

- Make sure that the projector is plugged in.
- Make sure that all cables are connected and not damaged.
- Power OFF the projector, wait 90 seconds to allow for cooling, and Power ON the projector. Check for a normal power up sequence.
- Check the projector status for error conditions. See *3.4 System Warnings / Errors*.
- Check source reliability. Switch sources if possible.
- Use RS-232 serial communications to communicate with the projector during diagnosis.

3.4 System Warnings / Errors

When the projector finds a system malfunction, it displays a **System Warning** or a **System Error** message. Status and error information is available through:

- LEDs on the input panel of the projector. See *3.4.1 LED Status Display On the Projector*.
- Status page in the menu system: **Main menu > Status**.
- Status page on the WebUI: **Main Tab > Status** and click on any category with a yellow or red indicator. See the ***Web User Interface*** section in the ***Entero User Manual (020-100367-XX).***
- On-screen error messages:
  Main Menu > Configuration > Menu Preferences > Display Error Messages (All)
  NOTE: *Display error messages must be set to* ***Screen*** *or* ***All*** for *system messages to appear on screen.*

The status pages in the OSD menu system and the WebUI update automatically when the error condition is corrected. The error code displayed on the projector status panel must be cleared manually by pressing **Exit** from the presentation level (no OSD on screen).

If an error code recurs, try resetting the projector by turning the projector OFF and ON. A persistent error code may indicate that you need to contact a Christie accredited service technician.

System Warnings

A system malfunction exists. A system warning message replaces the input signal message and disappears when the input signal status changes. The projector will remain operational, but the message may show a possibly serious problem that must be reported to the manufacturer. Reset the projector by powering it OFF and ON again, cooling when necessary.

System Errors

A serious malfunction exists and must be reported to the manufacturer as soon as possible. The projector will no longer operate. Reset the projector by powering it OFF and ON again, cooling when necessary.

3.4.1 LED Status Display On the Projector

Projector status is indicated by a single 3-color LED adjacent to a 2-digit status display. See the following table for a description of LED variations that indicate operation status. A solid red LED indicates a system error and the corresponding error code indicates what the error is. See **Table 3.2 Error Codes** for a list of possible error codes. Press **Exit** twice to acknowledge and clear the error code.

Table 3.1 LED Operational Status Codes

LED STATUS	2-CHARACTER DISPLAY	DESCRIPTION
Solid yellow	Rotating	Warming up
	Pr (Programming TI)	
	FS (Fail-safe mode)	EM in fail safe mode See the ***Visual Environments Projector Software Upgrade Instruction Sheet (020-100443-XX)***
	— — (static)	Standby mode
	— — (up and down)	Brief cool down period
Solid green	**BO**	(Booting) when power first applied. The projector LED will go through phases.
	B1	(Boot phase 1) starting main script
	B2	(Boot phase 2) starting projector code
	B3	(Boot phase 3) initializing connections
	ON	Projector powered on
	SH	Shutter mode is active
Flashing green		Keypad command sent - Command received
Solid red		System error, see *3.4.2 Error Codes*
Flashing red		Keypress error Wrong protocol sent
blank	— —	Waiting to establish a connection with PHM
blank	Rotating	Initializing hardware and connecting to PHM

3.4.2 Error Codes

If the status display window shows one of the codes in the Error Codes table you may need a Christie accredited service technician to repair the component identified by the error code.

Error codes are displayed in a three phase format:

- First 2 digits represent the component or error category
- Second 2 digits represent the specific problem
- Display off

This cycle repeats. The LED will be red while the error code is displayed.

Acknowledge and clear the error by pressing **Exit** twice when at the presentation level (no OSD on the screen). If the error recurs then try resetting the projector by powering OFF and ON again. Contact the dealer if the problem persists or if you see a code not listed in the following table.

Table 3.2 Error Codes

ERROR CODE	ITEM	DESCRIPTION
Light Engine		
LE	01	Light engine link error
	02	Light engine initialization error
	03	Red LED Feedback Failure
	04	Green LED Feedback Failure
	05	Blue LED Feedback Failure
Link		
LI	01	Error on EM network
	02	Error on PHM network
	03	Error on ArrayLOC link
Projector Head Module (PHM) Fan		
FP	01	PHM FD Fan 1 stalled
	02	PHM FD Fan 2 stalled
	03	PHM LMC Fan 1 stalled
	04	PHM LMC Fan 2 stalled
Electronic Module (EM) Fan		
FE	01	EM Fan 1 stalled
	02	EM Fan 2 stalled

Table 3.2 Error Codes (Continued)

Projector Head Module (PHM) Sensors		
SP	01	PHM FD sensor 1 overtemp (not connected)
	02	PHM FD Air inlet overtemp or sensor not functioning
	03	PHM QDPC board overtemp or sensor not functioning
	04	PHM FD DMD overtemp or sensor not functioning
	05	PHM QDPC board overtemp or sensor not functioning
	06	LM Air inlet overtemp or sensor not functioning
	07	LM Air exhaust over temp or sensor not functioning
	08	LM Power supply overtemp or sensor not functioning
	09	LM LED Driver overtemp or sensor not functioning
	10	LM ambient overtemp or sensor not functioning
	11	LM Red thermistor overtemp or sensor not functioning
	12	LM Green thermistor overtemp or sensor not functioning
	13	LM Blue thermistor overtemp or sensor not functioning
	14	LM IR thermistor overtemp or sensor not functioning
Electronics Module (EM) Sensors		
SE	01	EM Inlet
	02	Panel Driver Temperature
	03	Image Processor Temperature
	04	Option Card 1 Temperature
	05	Option Card 2 Temperature
	06	Option Card 3 Temperature
	07	Option Card 4 Temperature
Miscellaneous		
PR	01	EM/PHM Firmware mismatch; upgrade required
	02	Image processor card is missing or not seated correctly

3.5 Projector Does Not Power ON

- Make sure that the projector is plugged in.
- Make sure that all cables are connected and not damaged.

3.6 Light Module Suddenly Goes OFF

- Check the shutter setting - if status display shows **SH** then the shutter is active. Toggle through shutter modes. In **gray** shutter mode, it is possible to display menus.
- Verify that the **RGB Brightness** is set sufficiently higher than zero to make sure there is a visible image. The DMD may be overheated. Check for an alarm condition.

3.7 Displays

3.7.1 The Projector is ON, but No Display

- Make sure the lens cover is removed from the lens.
- Make sure the correct display button is selected in the channel setups.
- Make sure AC power is connected.
- Check the cable connections and make sure that the active source is selected.
- Make sure that the DVI cable from the PHM to the EM is connected.
- Are the test patterns accessible? If so, check source connections again.

3.7.2 The Display is Jittery or Unstable

- If the display is jittery or blinking erratically, make sure that the source is properly connected and of adequate quality for detection. With a poor quality or improperly connected source, the projector repeatedly tries to display an image, however briefly.
- The horizontal or vertical scan frequency of the input signal may be out of range for the projector.
- The sync signal may be inadequate. Correct the source problem.

3.7.3 The Display is Faint

- The source may be double-terminated. Make sure that the source is terminated only once.
- The source (if non-video) may need sync tip clamping.
- Check **RGB Brightness** setting and **Brightness Uniformity** control.
- If the ChristieTWIST™ software was used, test by disabling the blend.

3.7.4 The Upper Portion of the Display is Wavy, Tearing or Jittery

- Check your source (this can occur with video or VCR sources).
- Check that the **RGB Brightness** setting is not unexpectedly low.

3.7.5 Portions of the Display are Cut Off or Warped to the Opposite edge

Resizing may need adjustment. Adjust until the entire image is visible and centered.

3.7.6 Display Appears Compressed (Vertically Stretched)

- The frequency of the pixel sampling clock is incorrect for the current source.
- Sizing and positioning options may be adjusted poorly for the incoming source signal.
- Check the geometry correction for warp or keystone correction.

3.7.7 Data is Cropped from Edges

- To display the missing material, reduce image size to fill the display area available in the projector, then stretch vertically to fill the screen from top to bottom. Add the anamorphic lens to regain image width.
- Check blend settings and masking.

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

- The source input signal may be of low quality.
- The horizontal or the vertical frequency of the input may have changed at the source end.

3.7.9 Display Suddenly Freezes

If the screen blacks out inexplicably, it is possible that excessive voltage noise on the AC or ground input has interrupted the ability to lock on to a signal. Power the projector OFF and ON again.

3.7.10 Colors in the Display are Inaccurate

The color, tint, color space and/or color temperature settings may require adjustment at your input source, or on the web user interface **Channel > Page2**. Make sure the correct PCF, TCGD and/or Color Space file for the source is used.

3.7.11 Display is not Rectangular

- Check leveling of the projector. Make sure the lens surface and screen are parallel to one another.
- Make any necessary adjustments to the vertical offset on the lens mount.
- Check geometry corrections settings, for example keystone adjustment.

3.7.12 Display is Noisy

- Display adjustment at the input source may be required. Adjust pixel tracking, phase and filter. Noise is very common on YPbPr signals from a DVD player.
- Make sure the video input is terminated (75 ohms). If it is the last connection in a loop-through chain, the video input must be terminated at the last source input only.
- The input signal or signal cables carrying the input signal may be of poor quality.
- If the distance between the input source device and the projector is greater than 25 feet, signal amplification/conditioning may be required.
- If the source is a VCR or off-air broadcast, detail may be set too high.

3.8 ArrayLOC

3.8.1 Cannot Find Color Adjustment Controls

Use the color adjustment options under the ArrayLOC menu: **Main Menu > Configuration > ArrayLOC**. Color adjustments by X,Y and color saturation options are not available for general use; they are part of the pass code protected service menu.

3.8.2 Color/Image Settings Are Greyed Out

To enable ArrayLOC:

- **Main Menu > Configuration > ArrayLOC > Bright/ColorLOC Mode**
- Set to **Fixed**, **Cool**, or **Bright**.

If ArrayLOC is enabled:

- ArrayLOC handles brightness and color settings, and will override other color settings.
- **Main menu > Configuration > ArrayLOC > Array Color Target**
  NOTE: *Color settings are available for the master projector and are greyed out for all other projectors.*

To make your projector the master:

- **Main menu > Configuration > ArrayLOC > Synchronize to This Projector**
  NOTE: *Any projector in the array or BC group can be the master. The last projector to be set as the master is the master for the array (All) or BC group (Group). This setting is saved between session.*

3.8.3 Sensor Isn't Calibrated (yellow alert)

Sensor calibration must be performed by Christie accredited service technicians. Contact customer support.

3.8.4 Invalid Target Gamut (yellow alert)

A color setting is not valid for the current color space, for example a white point is outside of the gamut.

- **Main Menu > Configuration > ArrayLOC > Array Color Target**
- Check XY settings for the colors.

3.8.5 Unable to Achieve Target Brightness/Gamut (yellow alert)

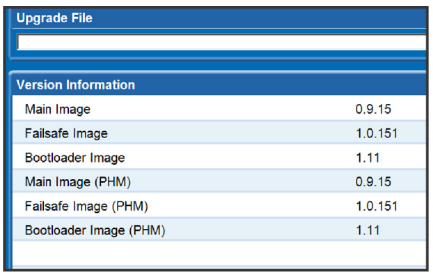
A projector in an array that cannot achieve minimum brightness or target color space will disable **BCLOC** and cease contributing data to performance calculations.

- Lower the target brightness or color gamut settings until all the projectors can achieve the same performance.
- If the discrepancy is too big, the light module may need to be replaced. Call Customer Support.

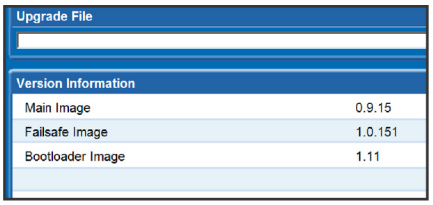
3.9 Software

3.9.1 EM to PHM Connection

When the initial fail-safe screen appears in the web browser, it should contain 6 revision lines. This indicates that the EM and PHM have successfully communicated.



If the fail-safe screen appears with only 3 revision lines, then the EM has not connected to the PHM. If you continue with the upgrade, the EM will receive the upgrade package, but the PHM will not. This may cause functional problems with the projector and in the worst case may prevent the EM and PHM from connecting properly.



If only 3 items are displayed:

1. Wait 5 seconds and press **F5** on the PC to retry the operation. If 6 software versions are now displayed then the EM and PHM have connected and the upgrade can proceed normally. If not, proceed to step 2.
2. Disconnect the DVI cable on the PHM and connect it to the alternate DVI port. Press **F5** on the PC. If 6 software versions are now displayed then the EM and PHM have connected and the upgrade can proceed normally. If not, proceed to step 3.
3. As a final step, retry the operation. Reboot to product mode. When the product WebUI appears, reboot to fail-safe again and repeat from step 1.

3.9.2 EM to PHM Mismatch

Firmware mismatch may occur if the EM to PHM connection was not valid during an upgrade. In this case, the EM would upgrade and the PHM would not. Mismatch may also occur if a service item EM or PHM was installed and its version is different.

Consequences of a Firmware Mismatch

Depending on the firmware versions, a mismatch may:

- Cause the projector to be inoperable, but will allow an upgrade to re-synchronize firmware versions.
- Prevent the EM from communicating with the PHM.

Unable to Communicate

Version 1.0 firmware and versions after 1.0 use a different scheme to generate addresses for the internal network that connects the EM to the PHM. Newer versions (after 1.0) use a static mechanism that is much more reliable. These 2 mechanisms are not compatible and a module running 1.0 will only be able to talk to another module running 1.0.

Identify a Firmware Mismatch

If the projector internal network can still communicate, mismatched firmware will show on the status panel as a **"Pr 01"** error. If the projector internal network is not communicating, the status panel will contain a **"- -"** with no yellow LED displayed. The **"- -"** is displayed temporarily before a connection is made; do not assume that it is broken. Give the projector 5 minutes to power ON. If the display is still showing **"- -"** after this time then the projector has failed to communicate and possibly has mismatched firmware.

NOTE: *Context is important here, if the projector fails to work following the upgrade, then there is a chance that the firmware has become mismatched.*

Correct a Firmware Mismatch

If the projector internal network can communicate, you should be able to use the WebUI to enter fail-safe and upgrade normally to re-synchronize.

If the projector internal network is not communicating:

1. Use the WebUI to enter fail-safe.
2. Downgrade to a previous version of firmware (likely vepsw.1.0.0.shar).
3. Once complete, reboot to product mode.
4. Wait 3 minutes. The projector should connect. The status panel will show **"- -"** and a yellow LED.
5. Reboot to fail-safe.
6. Check the number of version lines displayed. See *3.9.1 EM to PHM Connection* for details. If 6 version lines are displayed, then upgrade to the desired version of firmware.

Service Units at Different Firmware Levels

An EM or PHM unit from service stock may be at a different revision level than is required in the current system. Optimally, the replacement unit can be upgraded to the appropriate version at the service depot in order to minimize time on site. If this is not possible then the part may be installed and then upgraded individually.

If the service unit is an EM then it should be possible to use the WebUI and boot into fail-safe mode. Do not be concerned—in this case—if the PHM revisions are not displayed, since the units are likely not communicating due to mismatch. Upgrade the EM to the firmware level that matches the customer system. Follow the upgrade procedure and reboot. For details, see the ***Visual Environments Projector Software Upgrade Instruction Sheet (P/N: 020-100443-XX)***.

If the service unit is a PHM then follow the procedure outlined in *3.9.5 Direct Ethernet Connection from PC to PHM*, to push the PHM into fail-safe mode and update it individually.

3.9.3 WebUI Indicates Early Completion

Due to a bug in fail-safe mode, the WebUI and the upgrade service on the projector can occasionally get out of sync. When the upgrade is started, the process may abort early and either appears as complete or that an error has occurred. The upgrade takes approximately 20 minutes to complete. If the WebUI returns in a significantly shorter time (1 minute) then this may indicate that it is out of sync.

Refresh and Re-sync

Press **F5** to refresh the WebUI. It should re-synchronize and indicate that the upgrade is still in process. If this is not the case, **do not attempt to upgrade the file again as this will corrupt the flash on the projector**. Leave the projector in fail-safe mode for 30 minutes as the upgrade is likely taking place in the background. After 30 minutes, reboot the projector. As standard procedure, always push **F5** to refresh the browser after a successful download. Six version information lines should be present and match the version of the upgrade target.

3.9.4 Power Lost During Upgrade

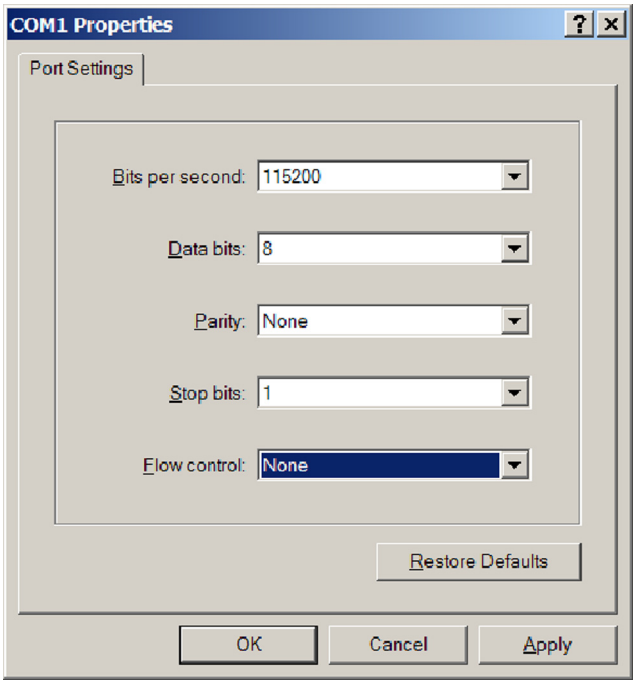
A loss of power during an upgrade will usually corrupt the main flash image. This is normally recoverable, but requires a special procedure to place the unit into fail-safe. Typically, you would be aware if the power failed during an upgrade operation. However, if not, the symptom would typically be that the projector remains with **BO** on the status panel, indicating that it is booting, but never makes it to the main code.

For this procedure the following tools are needed:

- PC with a serial port or a USB-to-serial adapter
- Serial cable

1. Connect the serial cable to the RS-232 IN port on the device you need to recover.
2. Start Microsoft Hyperterminal (**Start > Programs > Accessories**) and type a name for your connection.
3. Click **OK**.
4. Select the appropriate COM port and click **OK**.
   NOTE: *This will depend on your PC configuration.*

5. Enter the information shown into the Port Settings window.
6. Enable AC power to the projector.
7. The hyperterminal window will display projector booting messages. When the message "`Please press enter to remain in fail-safe mode`" appears you have 1 second to press **Enter**. If done correctly you will then see a message "`65535 0001 FYI999 Staying in Fail-safe`". If you do not press **Enter** quickly enough, cycle AC power and retry.
8. If no characters are seen, this either indicates that the serial port is not setup correctly or the wrong port is being accessed. Check your settings and COM port, and retry. It could also mean that the board may have a corrupt fail-safe. This cannot be fixed on site and requires the module to be sent to the factory for repair.



9. Open the web browser and point it at the projector. For the EM use the IP address that the customer has set. For the PHM the default address is 192.168.1.89.
10. The fail-safe WebUI should come up. For this upgrade operation it is OK if only 3 versions are reported since only 1 device is being upgraded (unlike the procedure to upgrade the EM and the PHM together). Select the .shar file and upgrade.

NOTE: *You will need to repeat the preceding instructions to separately upgrade the EM and the PHM.*

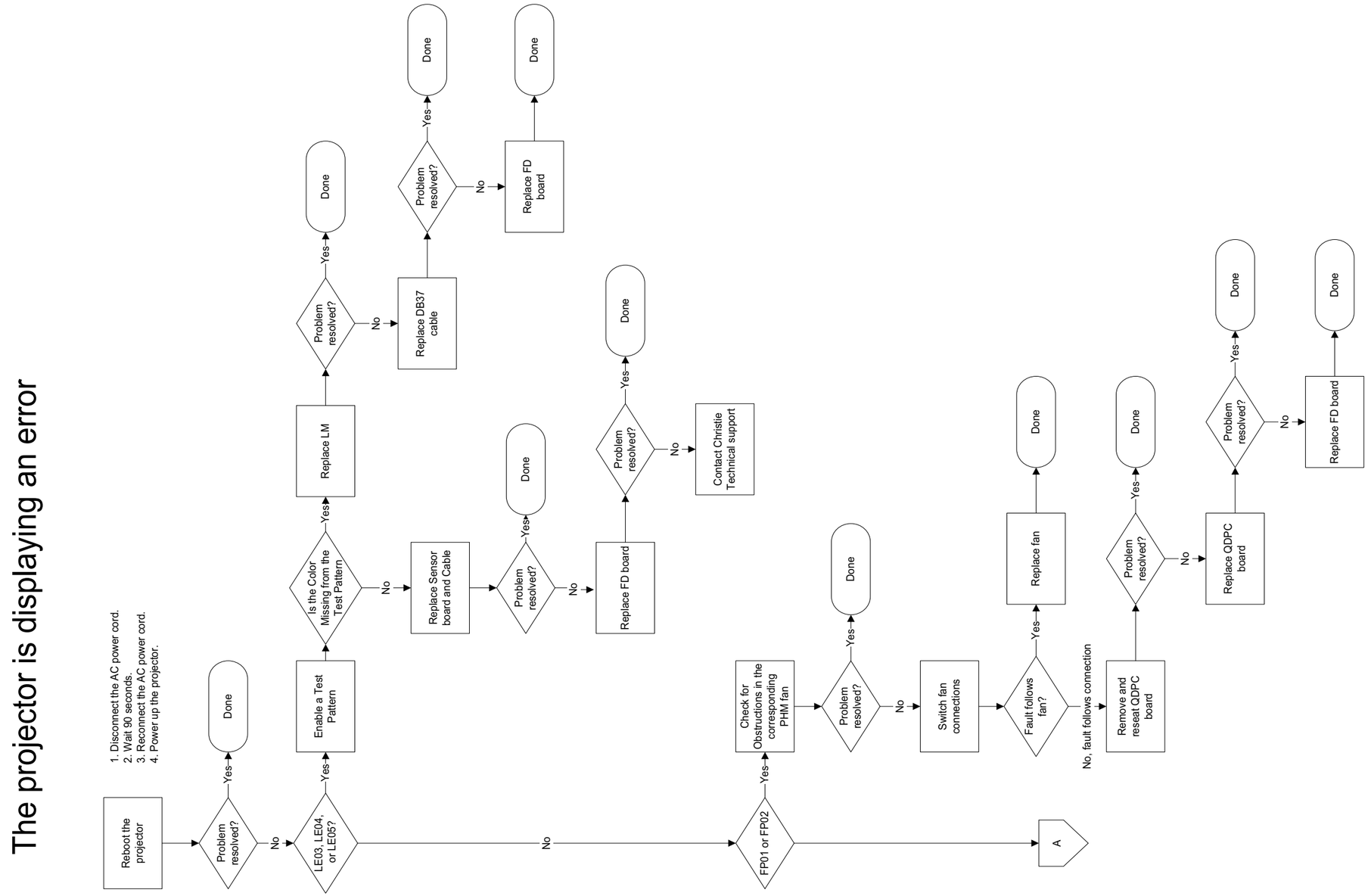
3.9.5 Direct Ethernet Connection from PC to PHM

To upgrade a stand-alone PHM you will need to set up the PC and directly connect to the PHM.

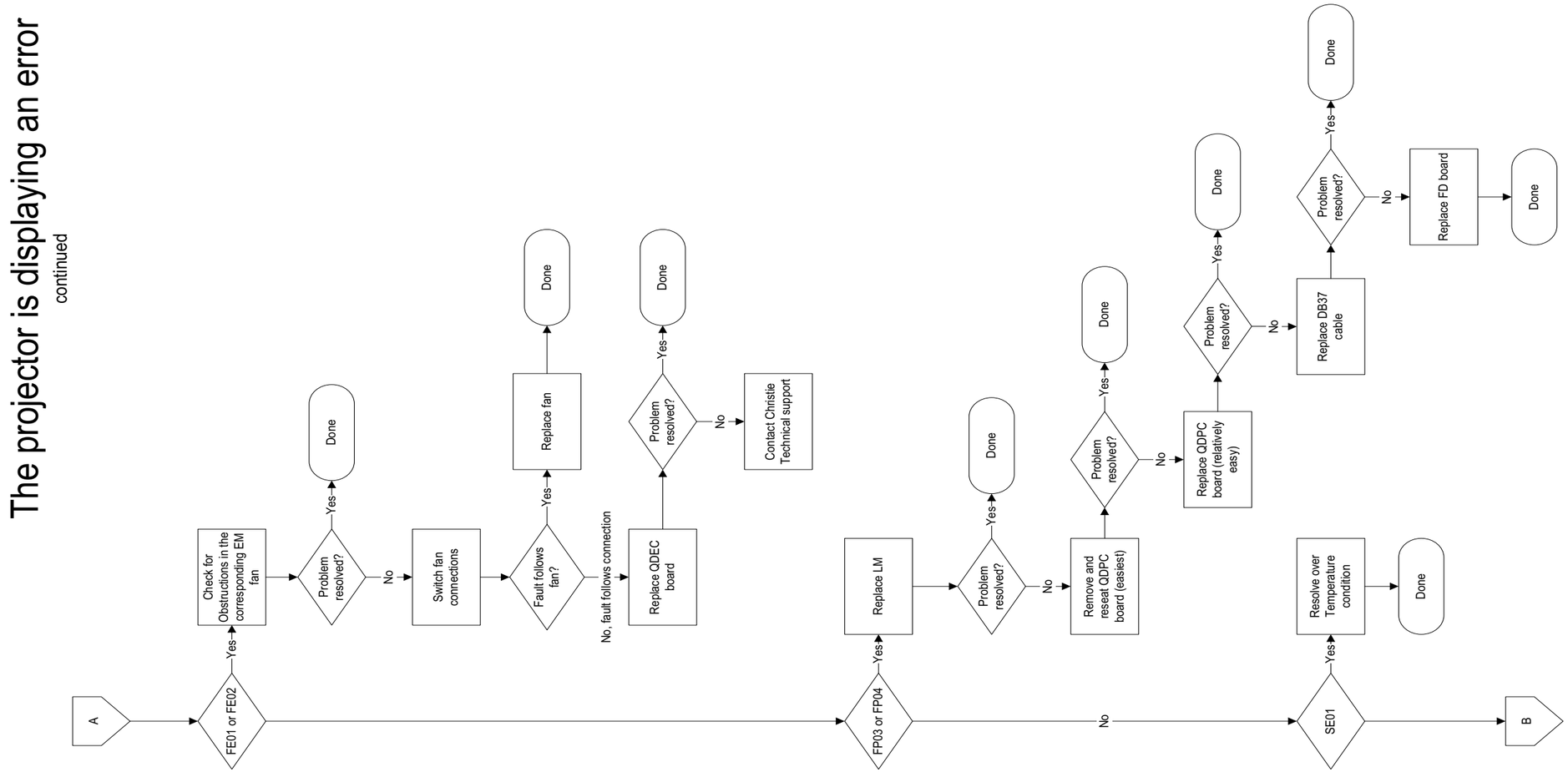
1. Connect an ethernet cable from the PC to the PHM ethernet port labeled **PHM Network**. It should currently be unused.
   NOTE: *The PHM ethernet port may be obstructed by a cover plate, which should be removed temporarily.*
2. On the PC select: **Start > Settings > Network Connections**.
3. Select the appropriate internet connection. Typically **Local Area Connection**, but this will depend on the PC configuration. Right click and select **Properties**.
4. Select **Internet Protocol (TCP/IP)** and click **Properties**.
5. Make note of the current configuration before changing anything. Set the IP address to 192.168.1.1 and the subnet mask to 255.255.0.0 and Click **OK**.
6. You should now be able to access the PHM via this Ethernet connection. The IP address of the PHM will be set to 192.168.1.89 by default.
7. Break into fail-safe, see *3.9.1 EM to PHM Connection*.
8. Open a web browser and enter 192.168.1.89 to access the module. Perform the upgrade when the WebUI appears.
9. Once complete, set the PC Internet Protocol (TCP/IP) properties back to their original settings.

3.10 ArrayLOC Troubleshooting Trees

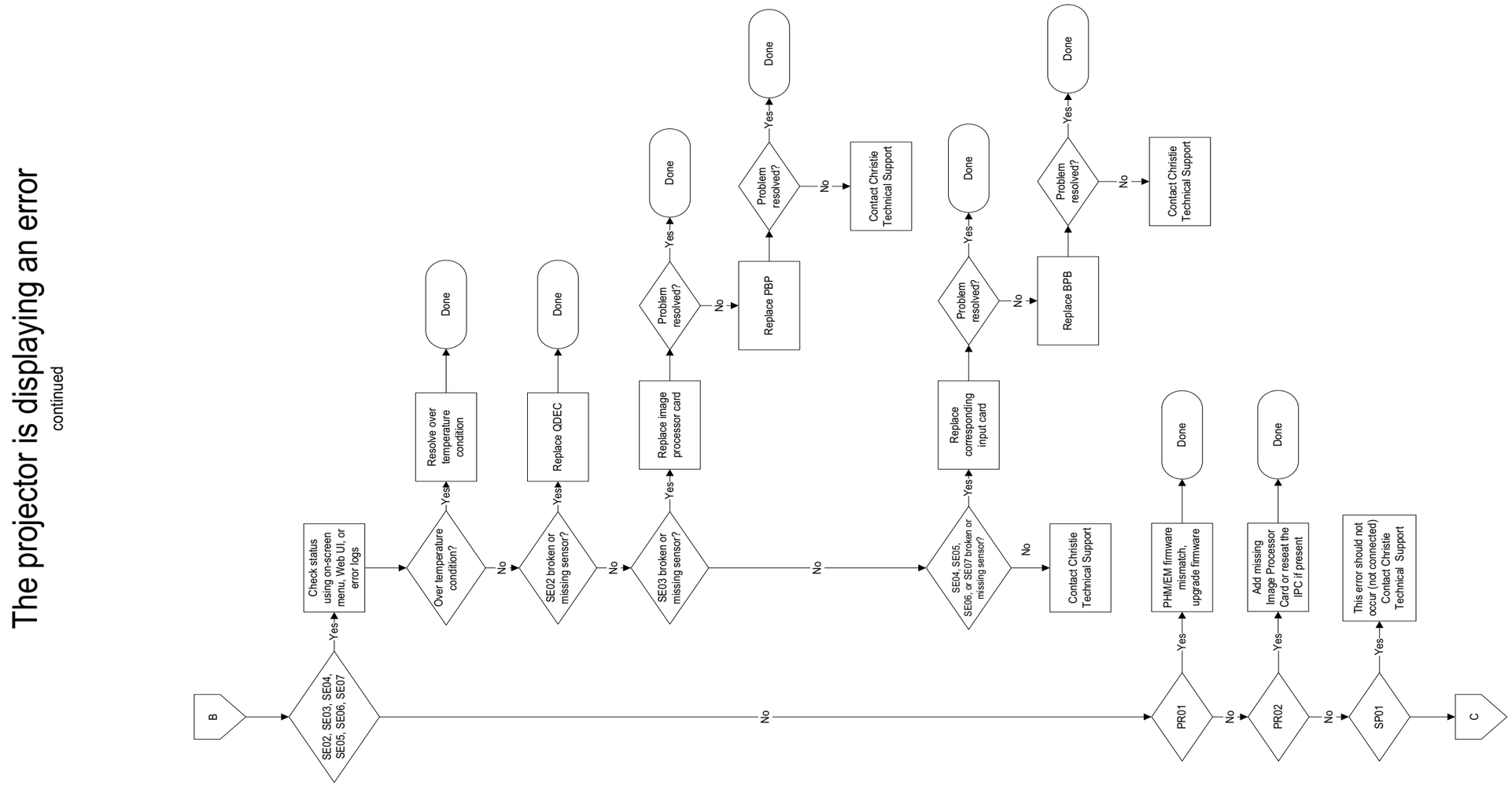
3.10.1 Troubleshooting Tree - Color And Brightness Array



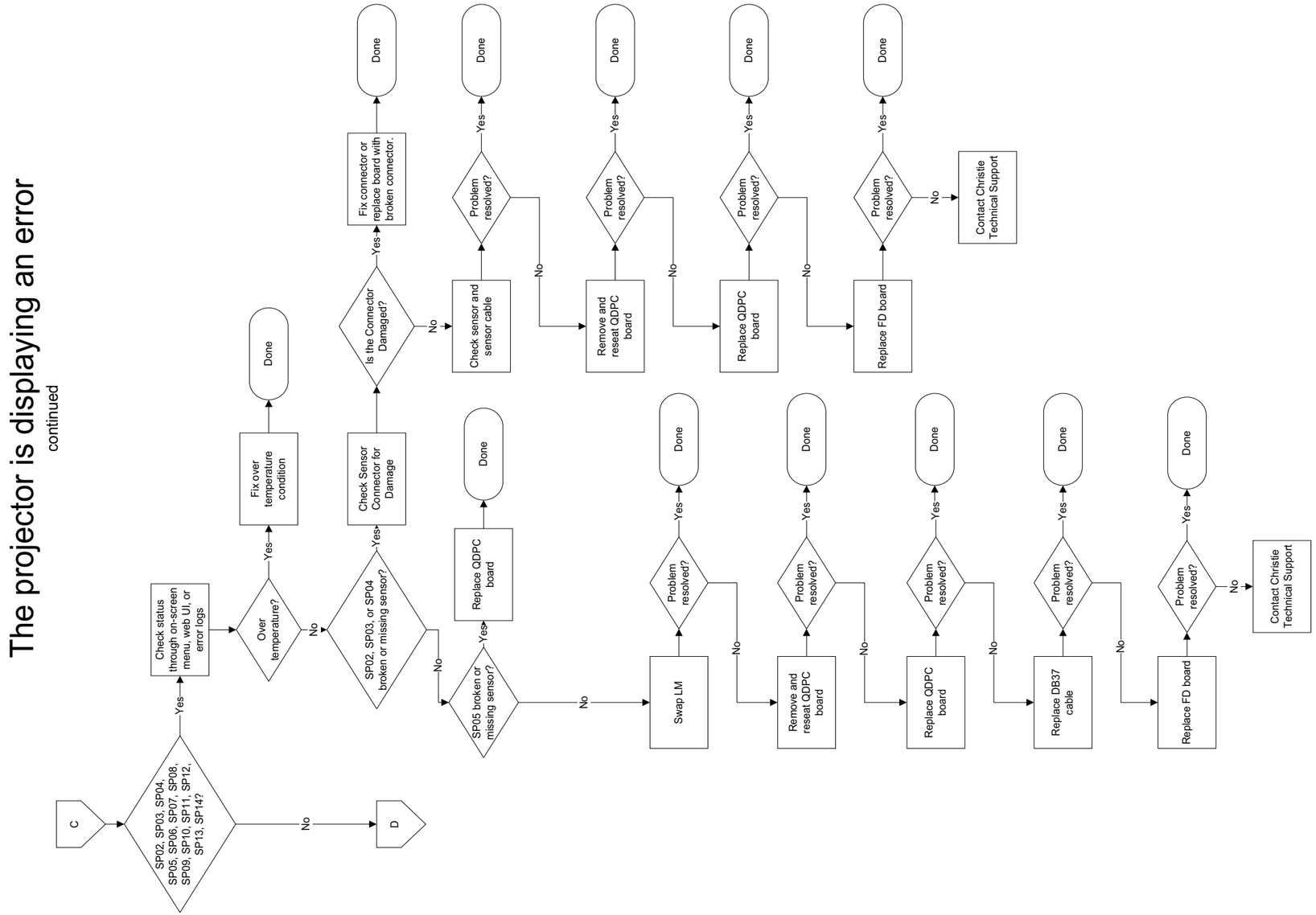
3.10.2Troubleshooting Tree - Array Brightness



3.10.3Troubleshooting Tree - Array Colors



3.10.4Bright/ColorLOC Setup Walkthrough



3.10.5Array Status Decoder & Setting The RGB Brightness Target Unit

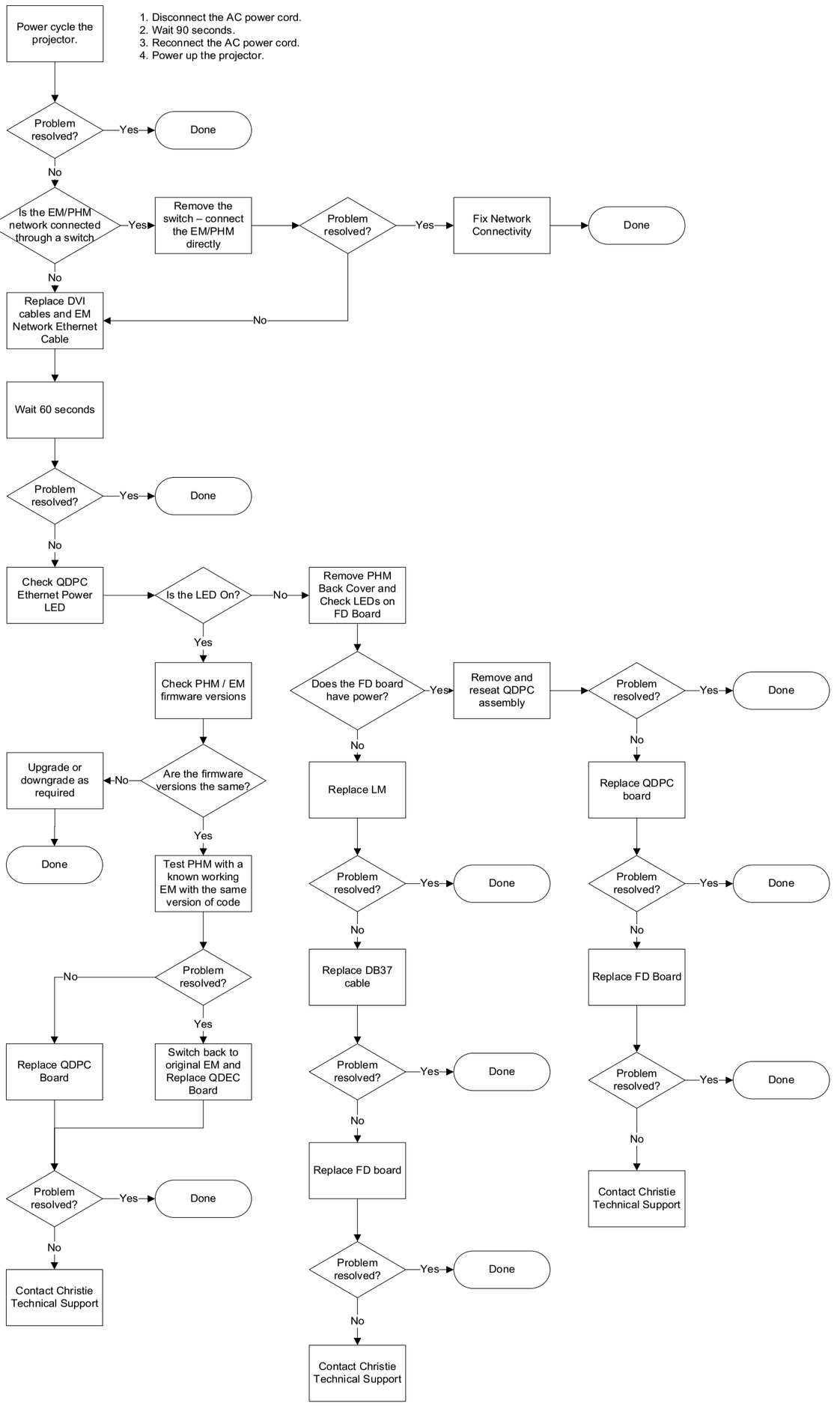
3.11 Hardware Troubleshooting Trees

3.11.1 Troubleshooting Trees - Error Codes

3.11.2 Troubleshooting Trees - Error Codes Continued

The projector will not Initialize (Projector Status Display is Rotating with Status LED Off)

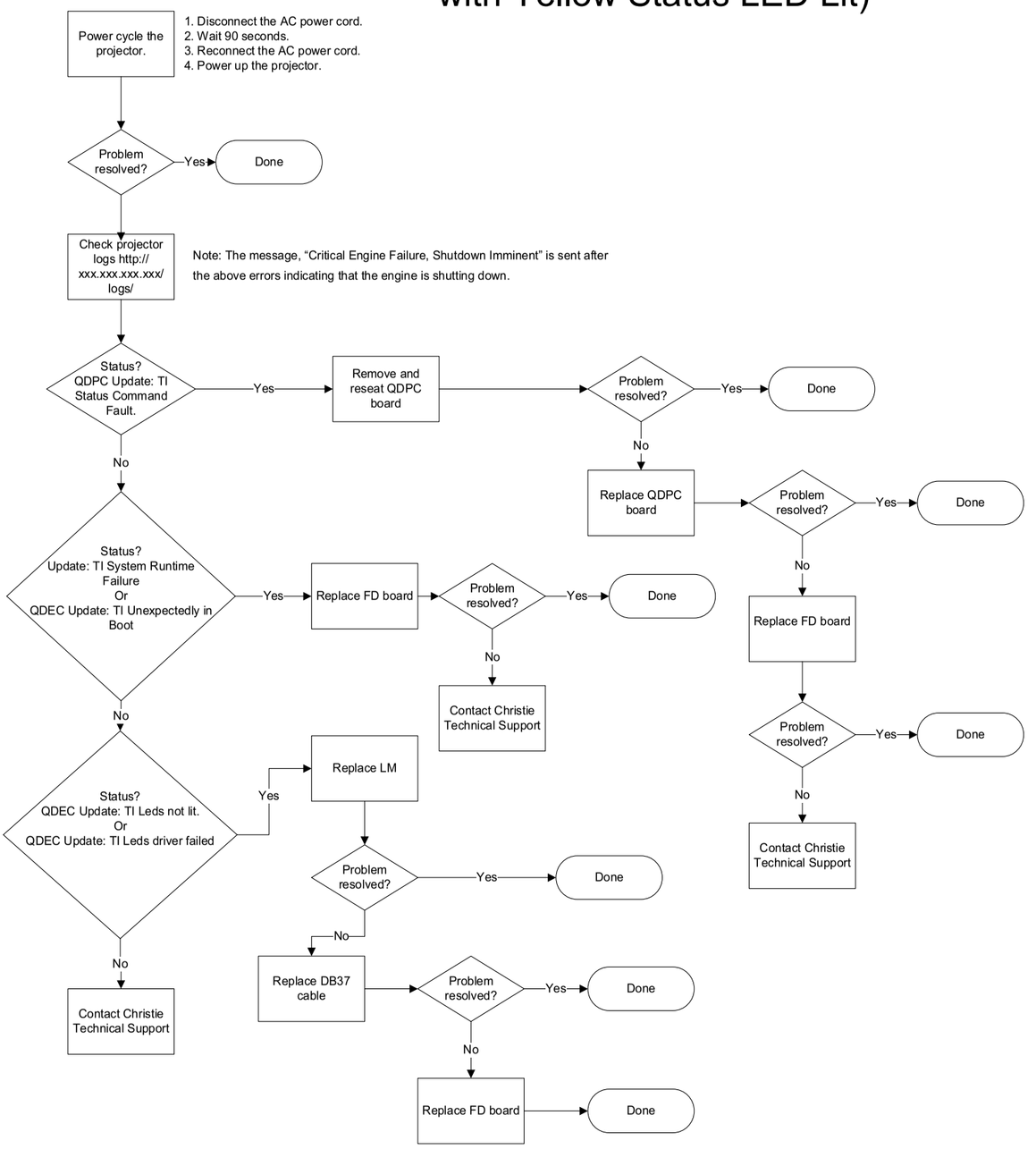
The projector will not connect (Projector Status is “--“ with no status LED lit)



3.11.4 Troubleshooting Trees - Error Codes Continued

3.11.5 Troubleshooting Trees - Error Codes Continued

The projector will not turn on, does not stay on, returns to stand by (Projector Status is “--“, with Yellow Status LED Lit)



4 Parts and Module Replacement

4.1 Order Parts

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

- Projector Model
- Projector Serial Number
- Manufacture Date

4.2 Index of Parts and Modules

All replacement parts and accessories for ***Entero RPMSP/RPMWU-LED01*** projectors can be found in the following table.

Table 4.1 Service Parts List

PART NUMBER	DESCRIPTION	CRWU	CRSX	BEGINS ON PAGE...
Electronic Module				
003-002678-XX	ASSY Electronic Module CR	✓	✓	*4-10*
003-002138-XX	ASSY Fanpack 12V .5A 92mm	✓	✓	*4-13*
003-002501-XX	Fuse 12A	×	✓	*4-14*
003-100585-XX	RTSM x3 in PHM, x2 in EM	✓	✓	*4-8*,*4-9*
003-100465-XX	ASSY PCB Backplane	✓	✓	*4-12*
003-002738-XX	Status Display	✓	✓	*4-13*
003-002681-XX	ASSY Quad DVI EM Controller	✓	✓	*4-11*
003-002680-XX	ASSY QDPC	✓	✓	—
001-100686-XX	SIPC	✓	✓	*4-10*
108-312101-XX	DDIC	✓	✓	*4-10*
Projection Head Module				
003-002737-XX	ASSY Proj. Head Mod. CR SXGA	×	✓	—
003-002740-XX	ASSY Proj. Head Mod. CR WUXGA	✓	×	—
003-002676-XX	ASSY Dual Fan Package	✓	✓	—
Light Module				
003-101307-XX	LM RGB	✓	✓	*4-5*
Accessories				
000-101642-XX	6-axis adjuster	✓	✓	—
125-108100-XX	User Kit CR	✓	✓	—
125-103105-XX	Lens PROJ 0.64:1 SXGA+	✓	✓	*4-3*

4.3 Replacement Procedures

4.3.1 Tools Required

- #1, #2 Phillips® magnetic-tip screwdrivers (long handle)
- Hex keys: 5 mm
- Nut driver: 5 mm
- Hex driver: 2.5 mm, 3 mm, 4 mm, 5 mm (medium length handle)
- Small-slotted screwdriver (medium length handle)
- Ratchet
- Sockets: 5/32-inch, 1/4-inch
- ESD Protective Strap
- Side Cutters

4.3.2 Servicing Guidelines

- Always power down and disconnect/disengage all power sources to the projector before servicing or cleaning.
- Follow all service safety guidelines.
- When re-installing a module, follow the *removal* instructions in reverse unless otherwise indicated.
- See *Section 6 Interconnections* when re-connecting harnesses.

4.4 Projection Head Module (PHM)

4.4.1 Lens Replacement

Estimated Replacement Time: 1 minute

⚠ WARNING The projector is a class 2M source of visible LED radiation. Directly viewing the LED output with certain optical instruments within a distance of 100 mm may pose an eye hazard.

NOTE: *This projector comes shipped with the lens.*

Remove Lens

1. Place the front lens cap onto the lens.
2. Remove (2) 5 mm hex screws securing the lens to the lens mount (**Figure 4-1, left**).
3. Loosen the yellow lens lock knob.
4. Grasp and slide the lens out of the lens mount (**Figure 4-1, middle and right**).
5. Place the rear lens cap back onto the lens and store in a safe location.

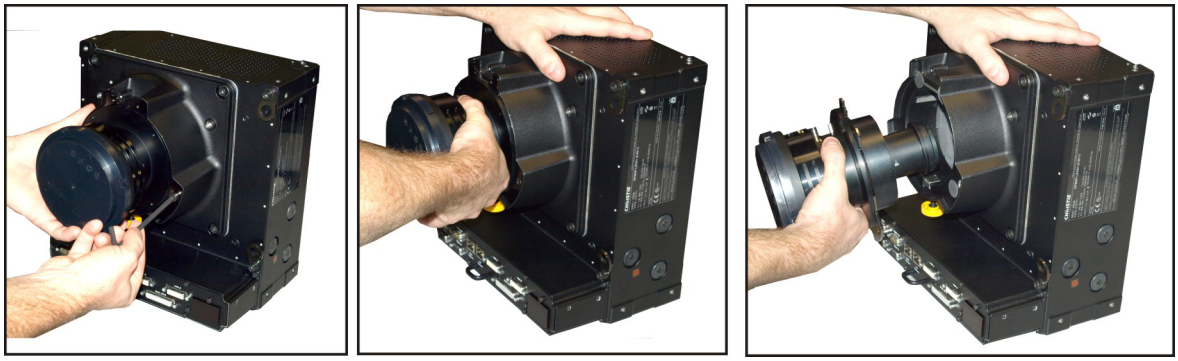
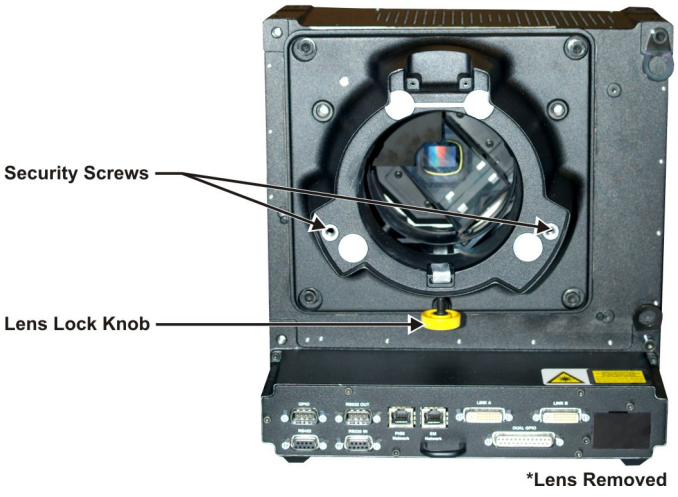


Figure 4-1 Remove Lens

Install Lens

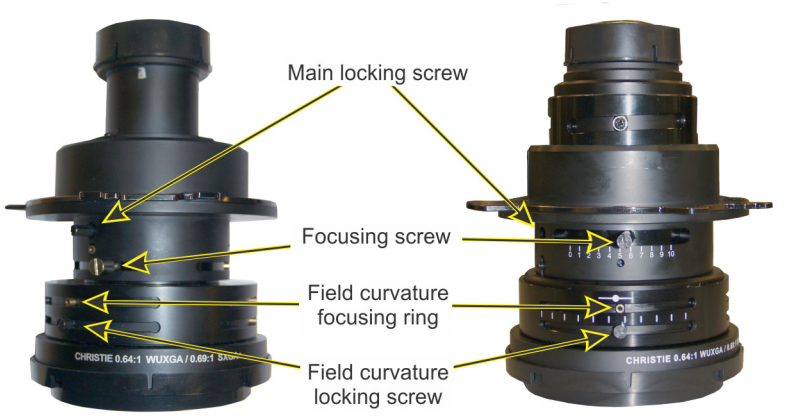
1. Remove the rear lens cap from the lens. Keep the front lens cap on the lens.
2. Align the lens interface plate with the lens mount. Fully insert the assembly straight into the lens mount opening without turning. Press using your hand to engage the magnetic lock.
   NOTICE: *Make sure the lens IS NOT inserted at an angle as this can cause damage.*
3. Tighten the yellow lens lock **before** fastening the security screws.
4. Fasten the security screws.
   NOTICE: *Security screws MUST be installed.*
5. Remove the front lens cap.



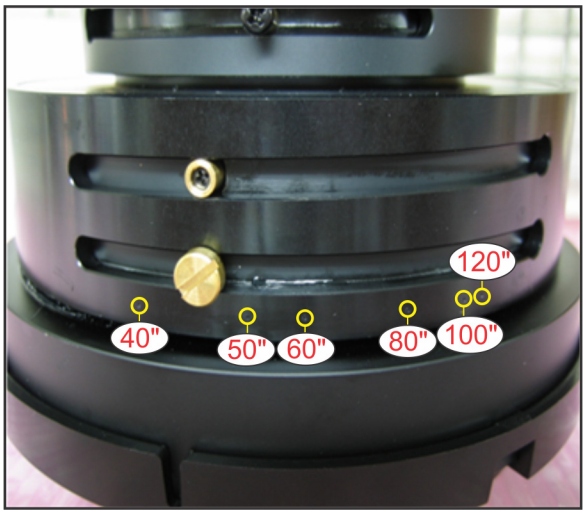
4.4.2 Lens Focus Adjustment

Estimated Replacement Time: 2 minutes

The 0.64:1 WUXGA and the 0.69:1 SXGA+ lenses have 2 types of adjustment—focus and field curvature correction—which are both used to sharpen the projected image. For any configuration other than a 67-inch screen scenario, adjustment of the lens focus will make sure the projected image is uniformly focused and free from geometric distortion.



1. Loosen the main locking screw and the focusing screw.
2. Adjust the focusing screw to achieve the best focus at the center of the image.
3. Loosen the field curvature locking screw and adjust the field curvature focusing ring to sharpen the corners of the image.
   NOTE: *Several preset adjustment locations are present for common screen sizes.*

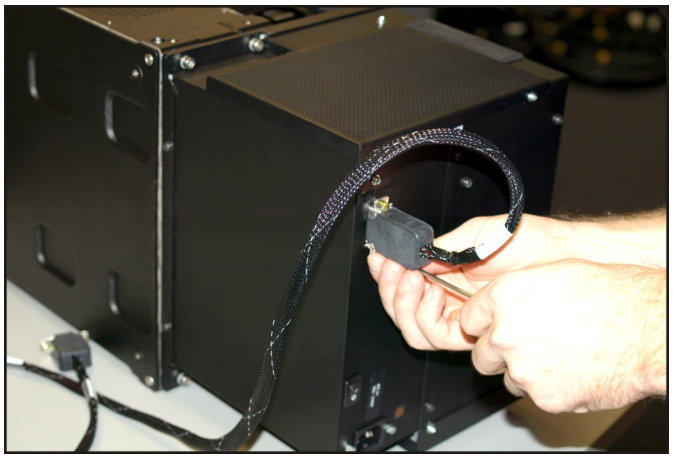


4. Re-adjust the focusing screw for the best overall screen focus.
5. Tighten the main locking screw to a maximum torque setting of 4 in-lb.

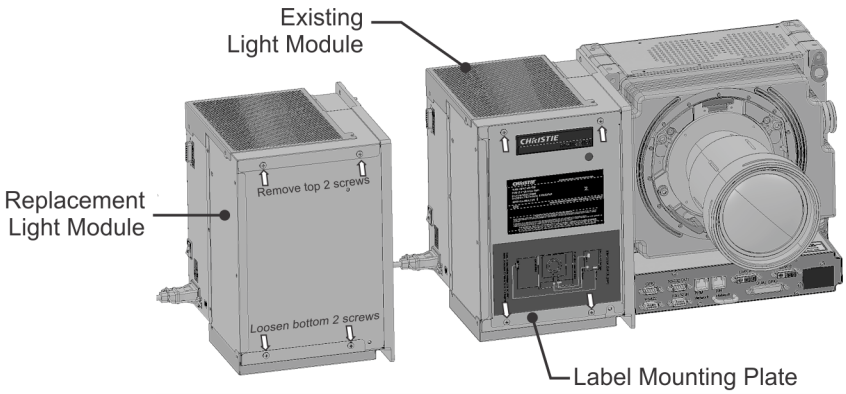
4.4.3 Light Module (LM)

Estimated Replacement Time: 5 minutes

The LM is located on the left-side of the projector head module (PHM) assembly when facing the lens. This assembly houses the RGB LED light sources and contains no serviceable parts. Its purpose is to supply light in the form of red, green and blue, to be routed through the IRO and processed at the DMD.



1. Tilt the PHM on its back.
2. Remove (2) slotted screws securing the electronics module (EM) harness to the LM.
3. Remove (2) screws securing the top of the label mounting plate to the original LM.
4. Loosen (2) screws securing the bottom of the label mounting plate to the original LM.
5. Pull upwards on the label mounting plate to remove it from the original LM.
6. Install the label mounting plate onto the replacement LM and secure it with (4) screws (2 on the top/2 on the bottom).



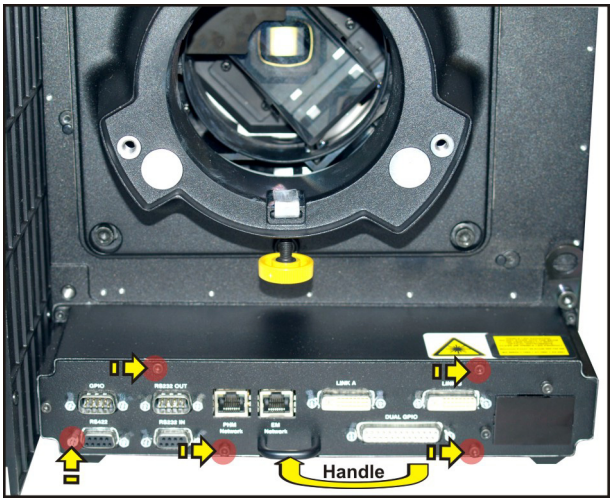
7. Remove (4) 4 mm hex screws securing the light module to the PHM (2 on the top/2 on the bottom).
8. Carefully remove the light module and store in a safe location.
   NOTE: *When reinstalling the light module, make sure the pins on the light module harness do not bend.*


*Two additional screws on bottom of light module

4.4.4 Quad DVI PHM Controller (QDPC)

Estimated Replacement Time: 5 minutes

The QDPC board provides an interface between the EM and the FDWU/FDSP board in the PHM module to route the video and communication signals from the EM, as well as provide a separate line for communications straight to the PHM. This board slots in through the front of the PHM housing and connects directly to the FDWU/FDSP board.



NOTICE: *Wear an ESD protective strap when replacing the QDPC.*

1. Remove the ethernet, power and DVI link A and B harnesses from the faceplate connections.
2. Remove (5) 2.5 mm hex screws along the assembly face plate.
3. Slide the QDPC assembly out of the PHM housing by pulling on the front handle, located on the faceplate below the RJ45 connections.
4. Place in an ESD protective bag.

4.4.5 PHM Fan Pack Assembly 12V .5A 92mm

Estimated Replacement Time: 6 minutes

The PHM fan pack assembly is located against the inside of the PHM housing above the integrator and optics assembly (IRO).

NOTICE: *Wear an ESD protective strap when replacing the PHM fan pack assembly.*

1. Remove the lens. See *Remove Lens*.
2. Place the PHM module face down in order to access to the back plate.
3. Loosen (4) 4 mm hex screws from the back plate of the PHM housing and remove it.

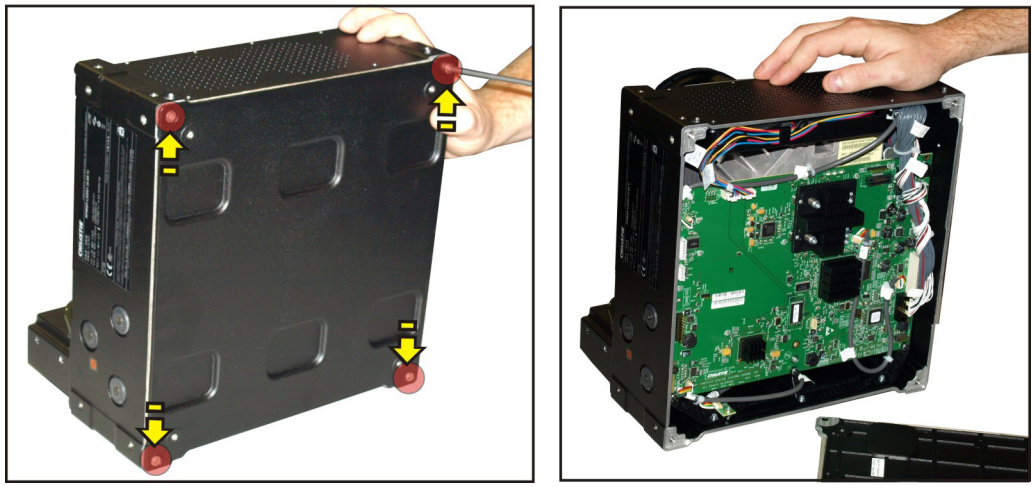


Figure 4-2 Remove PHM Back Plate

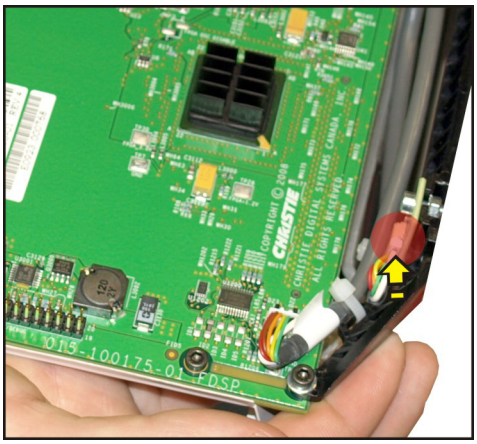
4. Remove (2) #1 Phillips® screws from the outside corners of the PHM fan pack assembly.
5. Use side cutters to cut the cable tie securing the RTSM harness to the fan pack assembly.
6. Unplug the RTSM harness from the RTSM attached to the fan pack.
7. Unplug both fan harnesses from the FDWU/FDSP assembly.
8. Remove the PHM fan pack assembly and place in an ESD protective bag.

4.4.6 Remote Temperature Sensor Module #2 (RTSM) (Air Inlet)

Estimated Replacement Time: 10 minutes

RTSM #2 is located at the bottom-left corner of the PHM housing, secured to the FDWU/FDSP assembly. It is responsible for providing the temperature reading of the main air intake of the PHM assembly.

NOTICE: *Wear an ESD protective strap when replacing RTSM #2.*

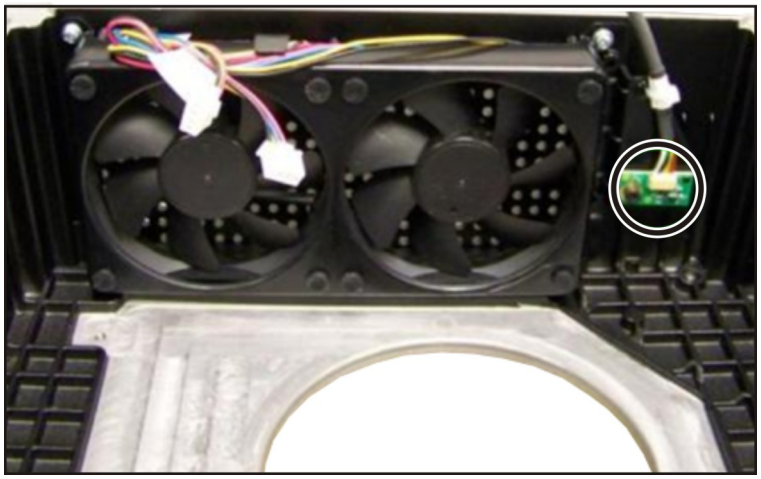


1. Remove the lens. See *Remove Lens*.
2. Place the PHM module face down to access the back plate.
3. Loosen (4) 4 mm hex screws from the back plate of the PHM housing and remove the back plate (**Figure 4-2**).
4. Unplug the harness from RTSM #2 and use side cutters to cut the cable tie securing the harness to RTSM #2.
5. Remove (1) 2.5 mm hex screw securing RTSM #2 to the FDWU/FDSP mounting bracket.
6. Remove RTSM #2 and place in an ESD protective bag.
7. Reverse these instructions to reinstall. Use a small cable tie to re-secure the harness to RTSM #2.
   NOTE: *It may be necessary to secure the clamping nut onto the opposite side of the FDWU/FDSP mounting bracket when re-securing RTSM #2.*

4.4.7 Remote Temperature Sensor Module #3 (RTSM) (Air Exhaust)

Estimated Replacement Time: 10 minutes

RTSM #3 is located on the top-right corner of the PHM housing. It is responsible for providing temperature readings of the main air intake of the PHM assembly.



NOTICE! *Wear an ESD protective strap when replacing RTSM #3.*

1. Remove the PHM fan pack assembly. See *4.4.5 PHM Fan Pack Assembly 12V .5A 92mm*.
2. Remove (1) 2.5 mm hex screw securing RTSM #3 to the fan pack assembly.
3. Remove RTSM #3 and place in an ESD protective bag.
   NOTE: *There may be an insulator between the RTSM and the fan pack. Leave this insulator in place when removing the RTSM.*

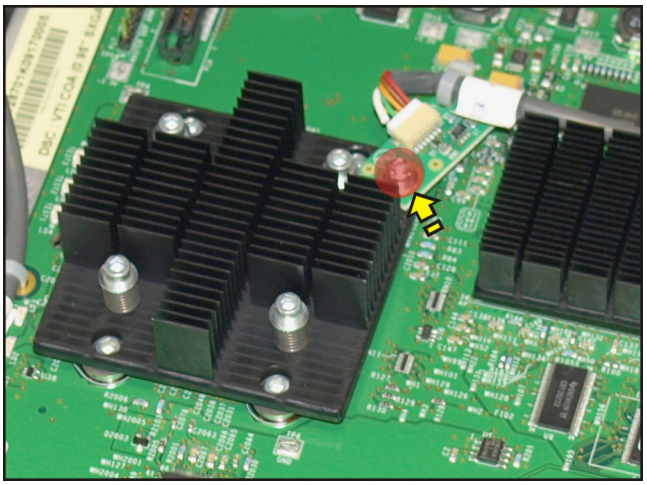
4.4.8 Remote Temperature Sensor Module #4 (RTSM) (DMD Heat Sink)

Estimated Replacement Time: 10 minutes

RTSM #4 is located on the bottom-right corner of the DMD heats sink. It is responsible for providing temperature readings of the DMD.

NOTICE: *Wear an ESD protective strap when replacing RTSM #4.*

1. Remove the lens. See *Remove Lens*.
2. Place the PHM module face down in order to access the back plate.
3. Loosen (4) 4 mm hex screws from the back plate of the PHM housing and remove the back plate of the PHM (**Figure 4-2**).
4. Unplug the harness from RTSM #4. Use side cutters to cut the cable tie securing the harness to RTSM #4.
5. Remove (1) #1 Phillips ® screw securing RTSM #4 to the bottom-left corner of the DMD heat sink.
6. Remove RTSM #4 and place in an ESD protective bag.



4.5 Electronics Module

If you have ordered a replacement EM, it no longer contains the Dual Link DVI Input Card (DDIC). This change to the service assemblies is due to an end-of -life component on the DDIC and a newer version being released. Because the minimum software version required on the new DDIC is version 1.4.5 we are advising customers who prefer to retain their current DDICs without updating the software, to remove the DDIC from the existing EM and install it into the replacement.

4.5.1 Image Processor Card

Estimated Replacement Time: 1 minute

The image processor card slots into the face of the electronics module (EM) above the input card slots below the communication inputs. This card is responsible for the bulk of the image processing on the projectors input signals.

NOTICE: *Wear an ESD protective strap when replacing the image processor card.*

1. Loosen (2) #2 Phillips® captive screws from the processor card.
2. Carefully, pull on the processor board clips to release the board from the cardcage.
3. Slide the processor board out along the guides and place in an ESD protective bag.

4.5.2 Dual DVI Input Card (DDIC)

Estimated Replacement Time: 1 minute

The DDIC is located in option slot #1 below the SIPC. The DDIC can only be used with software version 1.4.5 or higher. The projector software must be upgraded to version 1.4.5 (or higher) prior to installing the new DDIC.

NOTICE: *Wear an ESD protective strap when replacing the DDIC.*

1. Loosen (2) #2 Phillips® captive screws securing the DDIC.
2. Carefully, slide the board out along the guides and place in an ESD protective bag.

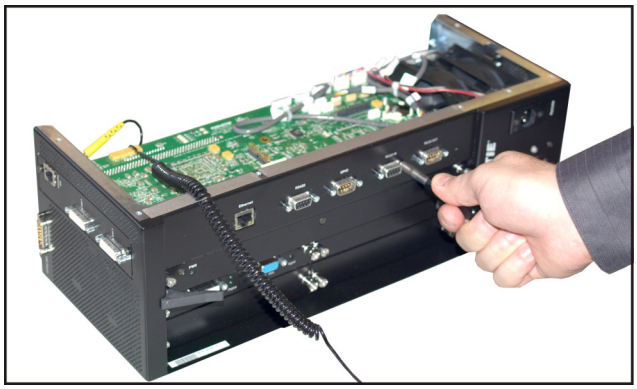
4.5.3 Quad DVI EM Controller (QDEC)

Estimated Replacement Time: 30 minutes

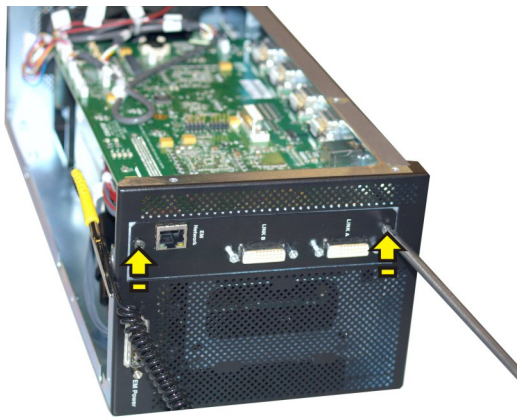
The QDEC is located at the top of the electronics module above the SIPC and connects to the passive backplane module. Its purpose is to control and interface the processed content from the EM to the PHM.

NOTICE! *Wear an ESD protective strap when replacing the QDEC.*

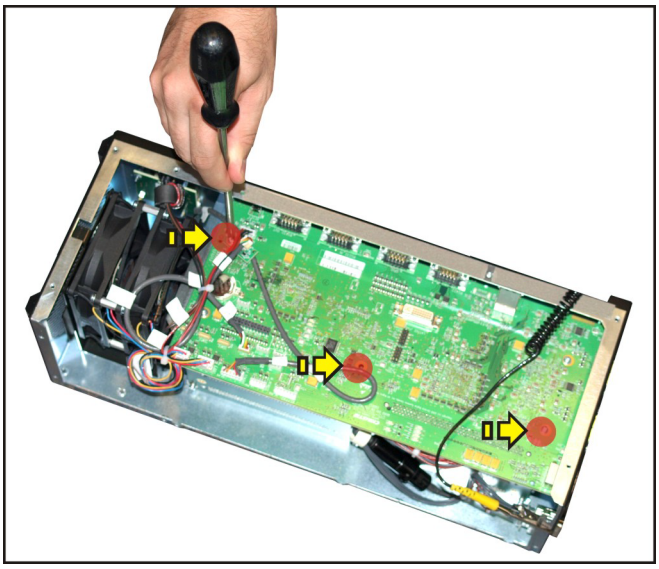
1. Remove the SIPC.
   See *4.5.1 Image Processor Card*.
2. Remove the DDIC.
   See *4.5.2 Dual DVI Input Card (DDIC)*.
3. Disconnect the DVI, ethernet and power connections from the end of the electronics module (EM).
4. Remove (6) #1 Phillips® screws from the top of the EM cover.
5. Remove (6) #1 Phillips® screws along the bottom of the cover.
6. Remove the EM cover.
7. Disconnect all the harnesses from the QDEC. This includes the LED status display, fan 1, fan 2 and the remote XLR connection.
8. Using a side cutter, cut the cable ties from the harnesses.
9. Remove (4) 5 mm standoffs from the link A and link B connectors.
10. Remove (8) 5 mm standoffs from the front plate of the EM, lining the communications inputs.



11. Remove (2) #1 Phillips® screws from the side of the EM to remove the panel surrounding the DVI connections to the PHM.



12. Remove (3) #1 Phillips® screws from the standoffs securing the QDEC to the EM frame.
    NOTE: *One of these stand-offs secures the RTSM to the board.*



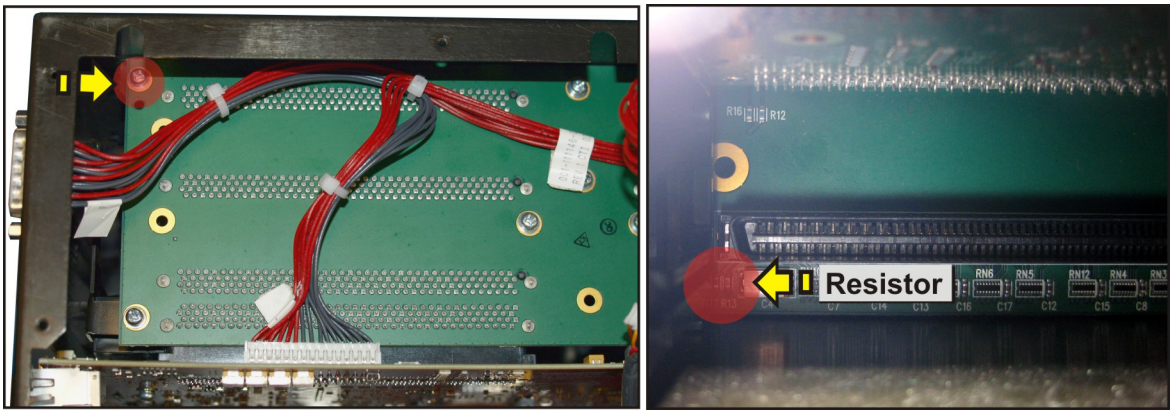
13. Remove (8) #1 Phillips® screws securing the backplane module to allow the QDEC and backplane to slide out of the EM together.
14. Disconnect the power harness from the bottom of the QDEC (from fuse 12A harness on Entero LED).
15. Unlock the plastic cable fastener attached to the center of the backplane module and remove the fuse/breaker harness from the fastener.
16. Disconnect the QDEC from the backplane module.

4.5.4 Passive Backplane Module

Estimated Replacement Time: 30 minutes

1. Remove the QDEC. See *4.5.3 Quad DVI EM Controller (QDEC)*.
2. Transfer your settings to the new backplane. See *7.2 Replace Backplane*.
3. Remove (8) #1 Phillips® screws securing the back plane module.

NOTICE: *When reassembling the back plane, make sure to avoid contact with the resistor located on the opposite side of the top-left mounting screw.*



4.5.5 EM Fan Pack Assembly

Estimated Replacement Time: 10 minutes

The EM fan pack assembly is located inside the EM housing, next to the LCD status display panel. This fan pack provides airflow to cool the boards within the EM.

1. Remove (6) #1 Phillips® screws along the top and bottom of the EM cover in order to remove it.
2. Use side cutters to cut the cable ties securing the harnesses at the rear-right corner of the QDEC.
3. Remove the two fan pack harnesses from the QDEC.
4. Remove (1) #1 Phillips® screw from the side of the EM by the LED Status.
5. Disconnect and remove the fan pack assembly.

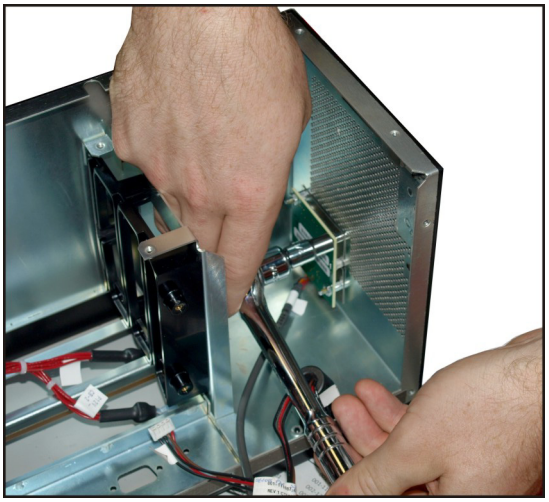
4.5.6 LED Status Display

Estimated Replacement Time: 15 minutes

The LED status display is located on the face of the EM. It provides a visual representation of the current projector status and display any error codes that are generated.

NOTICE: *Wear an ESD protective strap when replacing the LED status display.*

1. Remove the fan pack assembly. See *4.5.5 EM Fan Pack Assembly*.
2. Disconnect the LED status display harness from the LED status display.
3. Remove (4) 1/4-inch socket head screws from the back of the LED display.
4. Remove the LED display and place in and ESD protective bag.



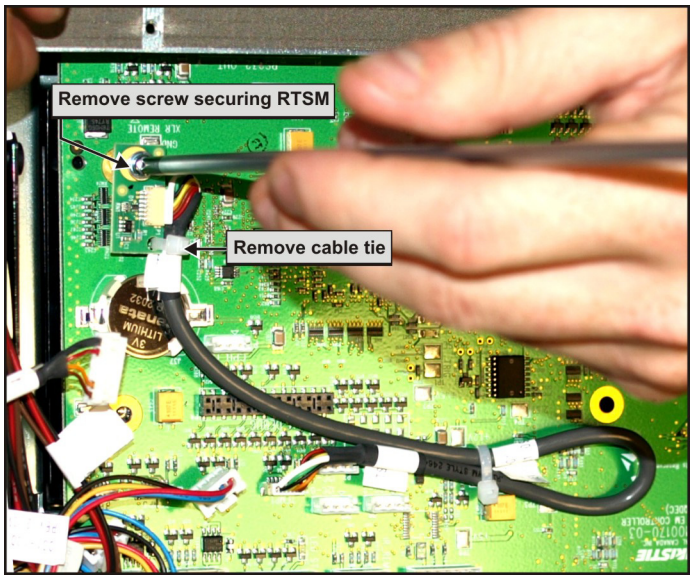
4.5.7 Remote Temperature Sensor Module #1 (RTSM) (QDEC)

Estimated Replacement Time: 10 minutes

RTSM #1 is located on top of the QDEC assembly at the front right corner when facing the unit. It is responsible for providing temperature reading of the QDEC temperature.

NOTICE: *Wear an ESD protective strap when replacing RTSM #1.*

1. Remove the SIPC. See *4.5.1 Image Processor Card*.
2. Remove the DDIC. See *4.5.2 Dual DVI Input Card (DDIC)*.
3. Remove (6) #1 Phillips® screws along the top of the EM cover and (6) #1 Phillips® screws along the bottom of the EM cover. Remove the EM Cover.
4. Locate the RTSM mounted on the standoff at front-right corner of the QDEC. Use a pair of side cutters to cut the cable tie and unplug the harness from the RTSM.
5. Remove (1) #1 Phillips® screw securing the RTSM to the QDEC standoff.
6. Remove RTSM #1 and place in an ESD protective bag.



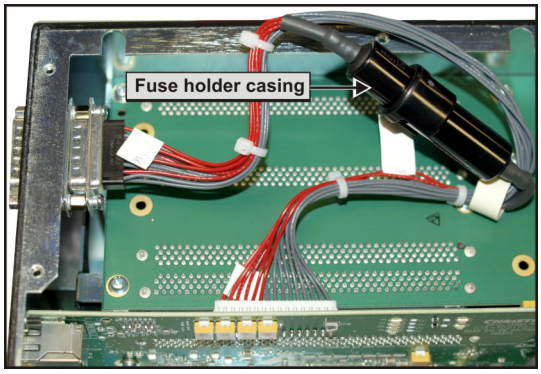
4.5.8 Fuse 12A

Estimated Replacement Time: 10 minutes

The 12A Fuse is located in the EM behind the passive backplane board, inside of the harness running from the power cable connector from the PHM to the bottom of the QDEC. It is intended to prevent any potential current surges from damaging boards within the EM. In the event that a surge were to occur, the fuse is designed to burn up at a measurement of 12 Amps or greater.

NOTICE: *Wear an ESD protective strap when replacing the fuse.*

1. Remove (6) #1 Phillips® screws along the top and bottom of the EM cover in order to remove it.
2. Locate the Fuse harness between the power input connection from the PHM and QDEC.
3. Unscrew the black casing of fuse holder (1/4-turn) and remove. Place in an ESD protective bag.



CHRISTIE

5 Specifications

		RPMSP-LED01	RPMWU-LED01	RPMHD-LED01
Imaging technologies	imaging	• 1-chip DLP	• 1-chip DLP	• 1-chip DLP
	native resolution	• SXGA+ (1400 x 1050)	• WUXGA (1920 x 1200 - HD compatible)	• HD (1920 x 1080)
	illumination	• Light Emitting Diodes (red, green, blue)	• Light Emitting Diodes (red, green, blue)	• Light Emitting Diodes (red, green, blue)
Standard cube options		• 50” (24” depth) • 67” (31” depth) • Other sizes available built to order	• 72” (33” depth) • Other sizes available built to order	• 70” (35” depth) • Other sizes available built to order
Inputs	standard	• Digital DVI-I with analog VGA		
	scan rates	• Horizontal: 15-120Hz • Vertical: 23.97-150Hz • Pixel clock: 165 MHz		
	expansion	• 3 input module slots available		
	optional modules	• VGA, Digital (DVI), Analog (RGB), dual SDI/HDSI, twin HDMI		
	compatibility	• Compatible with Christie TVC series display wall controllers or other input sources from VGA to QXGA, as well as standard HD formats.		
Illumination	technology	• LED (RGB)		
	LED life rating[1]	• >60,000 hrs		
	brightness[2]	• 600 ANSI lumens		
Color	temperature range	• 3200 – 9300 K		
	gamut	• Beyond 100% EBU		
	adjustment and control	• Screen to screen: ArrayLOC automatic brightness and color management • Individual: Comprehensive Color Adjustment (CCA™)		
Optical	lens type	• Low distortion zero offset short throw fixed lens with field curvature correction (0.69:1 throw for SXGA+, 0.64:1 throw for WUXGA)		
	screen size range	• 40 – 100” diagonal		
	brightness uniformity	• Brightness uniformity control provides up to 100% uniformity capability for critical applications.		
	contrast ratio[3]	• >100,000:1 (full field using shutter mode) • 1400:1 (full field); up to 450:1 ANSI		
Control/ networking	ports/controls	• 2 RS232 ports and 1 RS422 port • Field upgradable software via RS232 network or Ethernet • IR remote control • GPIO port • On-board ChristieNET™ connectivity (RJ45)		
Upgradability	software	• Christie KoRE 10-bit librarian communication software for field upgrade of firmware		
Optional accessories	inputs	• See input option modules above		
	other	• Wired remote control		
Physical characteristics	dimensions	See Service Manual (P/N: 020-100368-xx)		
	weight (approx.)	• 60 lbs (27 kg)		
	shipping weight (approx.)	• 68 lbs (31 kg)		
Environment	operating temperature[4]	• 40 - 95° F (5-35° C)		
	non-operating temperature	• -4 – 122° F (-20 – 50° C)		
	humidity	• 20-80% non-condensing		
	altitude	0 – 300 m (0 – 10,000 ft)		
Power rating (projection engine)	voltage	• 100 – 240 VAC 50/60Hz		
	current	• 4.5A		
	consumption	• Rating: 370W		
	dissipation (maximum)	• 1263 BTU/hr		

		RPMSP-LED01 RPMWU-LED01 RPMHD-LED01
Reliability and serviceability	MTBF	• > 50,000 hrs MTBF for all major modules
	MTTR	• < 15 minutes with modular design • > 5 minutes for lamp

Regulatory approvals		• Directives: (EC) 2002/95/EC (RoHS)
		• Regulation (EC) No. 1907/2006 (REACH)
		• CAN/CSA C22.2 No. 60950-1
		• UL 60950-1
		• IEC 60950-1
		• FCC, Part 15, Subpart B, Class A
		• EN55024/CISPR24
		• Certifications marks (check with Christie for latest update)
		  • cULus (Canada & US)
		  • CE (EU)
		  • CCC (China)
		  • GoST-R (Russia)
		  • KC (Korea)
		  • PSE (Japan)
		  • C-Tick (Australia & New Zealand)

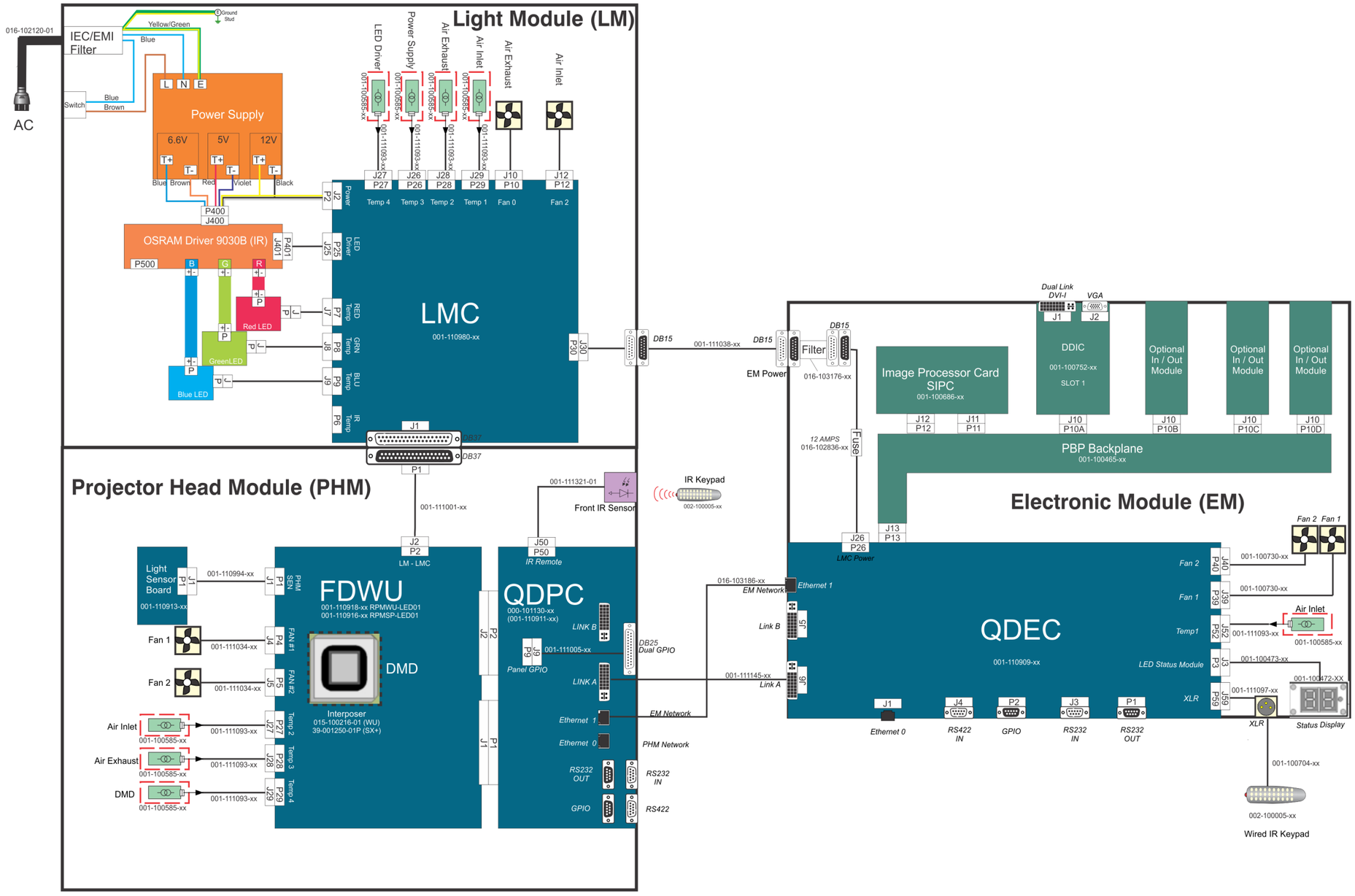
Calibration		• All projection units are factory calibrated for best color performance
Limited warranty		• 2 years parts and labor • Contact an authorized Christie representative for full details of our limited warranty
Additional features and benefits		• Integrated 6-axis adjustment system for precise geometry alignment • Full-function remote keypad with easy-to-use menu system • Multiple set-up memories to manage multiple input sources • Extensive scaling capability • Window/screen processing — external inputs can be displayed across an array of screens up to 3 x 3 without an external processor (a single input must be distributed to all cubes or it can be daisy-chained through the cube's optional Twin HDMI module) • 3x redundant cooling fans • Innovative water-filled, sealed heat pipe cooling system (maintenance free, no motorized pumps, hazardous chemicals or concern of leakage)

[1]LED lifetime is based on expected useful life (50% of original brightness). [2]Brightness specifications are at reduced color space settings. [3]The contrast ratio specified is the "natural" contrast ratio measured by both full field and ANSI methods. Such values are critical for proper contrast performance assessment – especially for video walls. [4]For best long-term performance and reliability, Christie recommends that all electronic equipment, such as projection systems, are regularly operated at temperatures below 77° F (25° C).

6 Interconnections

The ***Entero RPMSP/RPMWU/RPMHD-LED01 interconnect diagram*** illustrates the path of electrical connections between modules. Manufacturer's part numbers are included.
NOTE: *Part numbers are subject to change.*

6.1 Interconnect Drawing

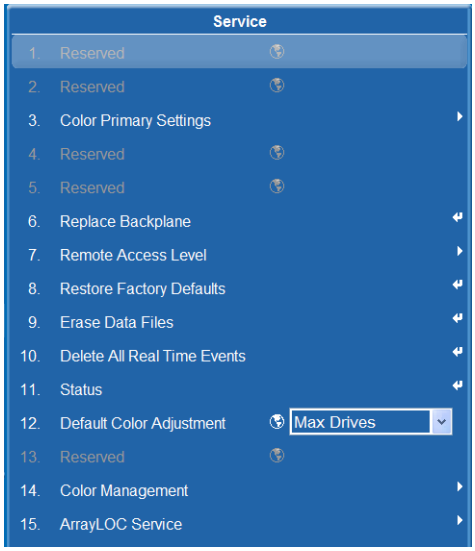


7 Service Menu

The service menu is accessible only by password:

- **Main Menu** > **Configuration**

The service menu items give the service technician more control over individual projector settings than is available to the user.



7.1 Color Primary Settings

- **Service Menu > Color Primary Settings**

This menu contains information about the native LED colors that the projector needs in order to match colors when **Bright/ColorLOC** is turned OFF (see *7.10 ArrayLOC Service*).

NOTE: *These values are factory-set and should NOT be changed unless the projector is not operating correctly with ArrayLOC turned* OFF.

To update values:

1. Bright/ColorLOC must be turned OFF by selecting:
   - **ArrayLOC Configuration** > **Bright/ColorLOC Mode** = **Off**
2. Color adjustment must be disabled by selecting:
   - **Color Saturation** > **Select Color Adjustment** = **Max Drives**
3. LED brightness should be set to native or the preferred projector by selecting:
   - **Advanced Color Adjustment** > **Color Mode** = **Native**
4. Go to: **Service Menu > Color Primary Settings**
   a. When the red menu items are selected a red test pattern should appear. If not, select **Auto Color Enable**. Measure its color and update the values.
   b. Repeat the measurement for the green, blue and white colors.

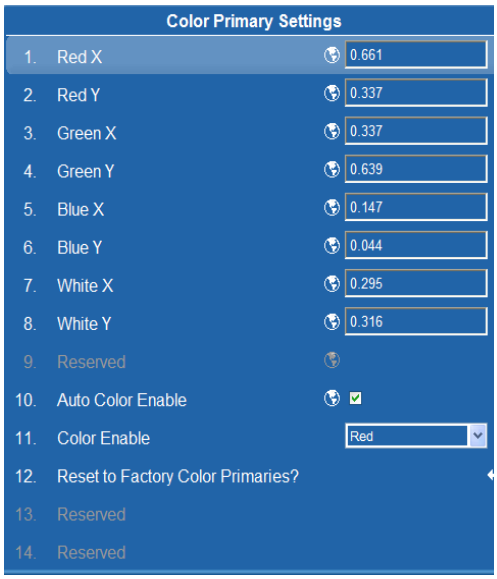


Figure 7-1 Color Primary Settings

5. Color adjustment can be re-enabled by selecting:
   - **Main Menu > Configuration > Service > Color Saturation > Select Color Adjustment** and choosing any other option other than **Max Drives**.

7.1.1 Red, Green Blue and White X, Y

Selecting each of these items allows a different value to be entered using the remote. The value entered represents the X or Y coordinates of the selected color point.

7.1.2 Auto Color Enable

Checking the box (**Figure 7-1**, **item 10**) automatically selects Color Enable based on the control being adjusted.

7.1.3 Color Enable

This control allows the primary colors (red, green and blue) to be turned ON or OFF separately. It is used to look at the colors one at a time or in pairs when doing convergence, light measurements, etc. Secondary colors (yellow, cyan and magenta) can also be observed one at a time.

7.1.4 Reset to Factory Color Primaries?

Selecting this option will reset all primaries to their factory default settings. Once selected, the user is given the opportunity to leave the settings as-is without resetting them to factory defaults.

7.2 Replace Backplane

- **Service Menu > Replace Backplane**

The projector serial number and other factory settings are located on the backplane, and will be lost when a defective backplane is replaced. Settings must be transferred to another module before powering the projector down. The unit should then be disconnected from all power sources, replace the defective backplane, and power up the unit again. On the next power up, the settings will automatically be transferred to the new backplane.
NOTE: *After selecting this item, an option to cancel the operation is provided.*

7.3 Remote Access Level

- **Service Menu > Remote Access Level**

This option allows the remote serial protocol access level to be set for ethernet, RS-232 and RS-422 ports. Choices available are **Free Access**, **No Access** or **Login Required**.

7.4 Restore Factory Defaults

- **Service Menu > Restore Factory Defaults**

Factory defaults of any type can be set by selecting this control. To restore all defaults, the command must be entered with a value of **111**. Once selected, an option to cancel is provided.

Unlike **Reset to Factory Color Primaries**, which only updates the color primary values, this option (**Restore Factory Defaults**) restores many settings (including the color primary settings).

7.5 Erase Data Files

- **Service Menu > Erase Data Files**

Selecting this control will erase all saved data files, including all custom warp, blend, logo, gamma files, etc. Once selected, an option to cancel is provided.

7.6 Delete All Real Time Events

- **Service Menu > Delete All Real Time Events**

Real time events are custom triggered actions that have been configured on the web interface. Use this control to delete all of these events from the system. Once selected, an option to cancel is provided.

7.7 Status

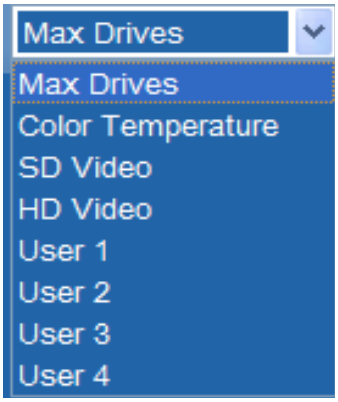
- **Service Menu > Status**

Choosing this item provides information specific to the projector.

7.8 Default Color Adjustment

- **Service Menu > Default Color Adjustment**

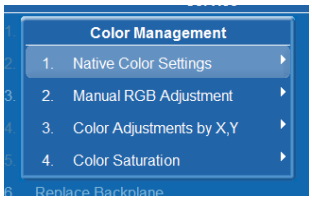
This specifies the default color adjustment to use for each new channel. It allows the user to specify a standard color applied by default to all new sources. The user may override this for any specific channel.



7.9 Color Management

- **Service Menu > Color Management**

A popup provides access to 4 additional submenus, as shown.

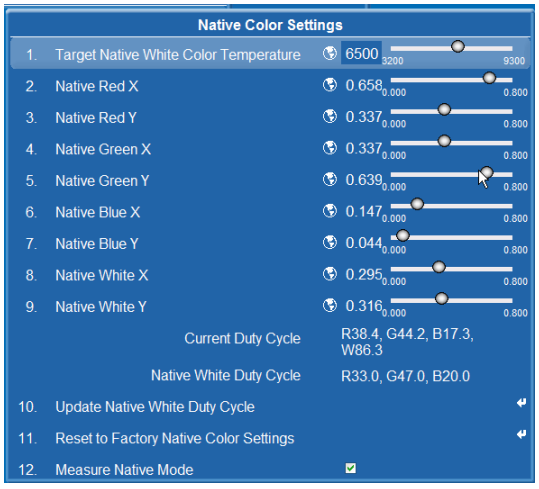


7.9.1 Native Color Settings

- **Color Management Menu > Native Color Settings**

The Native Color Settings menu is used to tell the projector what native colors it produces. This allows the projector to determine how it should optimize brightness. The best duty cycle to use depends on the color space the projector is being asked to achieve, and the performance of the LEDs in the light module. When **Bright/ColorLOC** is enabled, the color sensor is used by the projector to monitor the LED performance, but when **Bright/ColorLOC** is disabled the sensor is no longer used. In these cases, the system relies on data entered at the factory that tells the projector what the native color space is.

This is a calibration step performed in the factory. From a service perspective this may be required if the light module is replaced in the field.



NOTES: 1) *An external color meter is needed to set these values.* **2)** *The factory native color settings are stored separately. If the settings made in this procedure are no longer needed, select item 11: Reset to Factory Native Color Settings.*

Calibration Procedure

1. Upon entering the native color settings menu, **Measure Native Mode** is selected by default. This disables all projector features that may interfere with accurate primary measurement, including **Bright/ColorLOC**. It will also select a default duty cycle.
2. Measure **Native Red, Green, Blue X/Y**

   As each menu item is selected, the test pattern color will change. Using a color meter, measure the x and y coordinates for each color. Use the slide bars or enter values that match the measured x and y color coordinates for each of the primary colors.
3. Measure **Native White X/Y**

   A white test pattern will automatically appear when these items are selected. Again, use the color meter to measure x and y color coordinates. Use the slide bars or enter values that match the measured x and y color coordinates for the native white output of the projector.
4. Update **Native White Duty Cycle**

   Selecting this item forces the **Native White Duty Cycle** R, G and B values to match the R, G and B values in the **Current Duty Cycle** field. These are described here:

   Current Duty Cycle

   This text string identifies the current duty cycle.

   The string format is "**R 99.9 G 99.9 B 99.9 W 99.9**" where:

   - The numbers after the "R", "G" and "B" indicate the red, green and blue strobe width as a percentage of the sum of the red, green and blue strobe widths.
   - The number after the "W" indicates the ratio (as a percentage) of the sum of the red, green and blue strobe widths to the frame time.

Native White Duty Cycle

This text string identifying the stored native duty cycle.

The string format is "**R 99.9 G 99.9 B 99.9**" where:

- The numbers after the "R", "G" and "B" indicate the stored **Native Red Duty Cycle**, **Native Green Duty Cycle** and **Native Blue Duty Cycle** percentages.

5. Set target **Native White Color Temperature**

   This slide bar sets the target color temperature for duty cycle selection when **Bright/ColorLOC** is disabled. The default is 6500°K.

6. Disable the **Measure Native Mode** by exiting the menu.
7. Make sure **Bright/ColorLOC** is disabled and the production state normally used to measure CCA white point is set up. The PHM will then select a duty cycle that is most appropriate for the desired target native white color temperature.
8. From the **Color Primary Settings** menu, measure the color primary and white coordinates with a color meter and enter these values in the appropriate controls. For the most part, the values for the primaries should be very similar or the same as those in the **Native Color Settings** menu, but the white coordinates may differ.

With **Bright/ColorLOC** enabled, the color sensor is used by the projector to monitor the LED performance, but when **Bright/ColorLOC** is disabled the sensor is no longer used. In these cases, the system relies on data entered in the factory that tell the projector what its native color space is.

This calibration step is performed in the factory and may be required if the light module is replaced in the field.

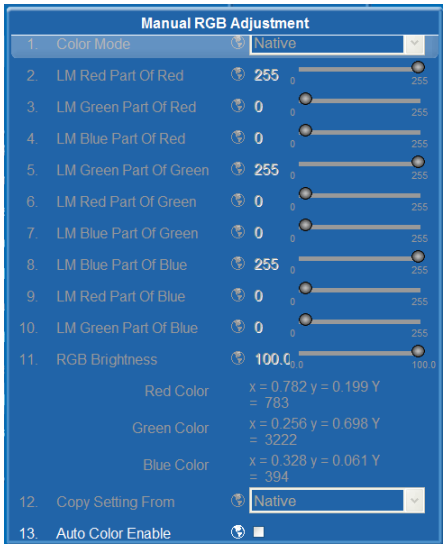
NOTE: 1) *An external color meter is needed to set these values.* **2)** *The factory native color settings are stored separately. If the settings made in this procedure are no longer needed, select item 11: Reset to Factory Native Color Settings.*

7.9.2 Manual RGB Adjustment

- **Color Management Menu > Manual RGB Adjustment**

The Manual RGB Adjustment menu allows the adjustment of the native projector color space by adjusting the LED power levels. Use LED color adjustment to define a color gamut that is slightly larger than the target color gamut. Finish with the traditional video-based comprehensive color adjustment. LED color adjustment significantly increases the brightness of saturated colors compared to the Comprehensive Color Adjustment (CCA) on its own.

NOTE: *This menu provides access to manually change the LED brightness. It is only to be used when Bright/ColorLOC is either OFF or in Fixed mode. In all other Bright/ColorLOC modes the Color Mode in this menu should be set to native.*



⚠ WARNING These adjustments can turn on multiple RGB LEDs simultaneously, which uses more power and increases the possibility of overheating. Using these adjustments will also desaturate the color gamut.

Color Mode

The menu allows the selection of **Native**, **EBU** or **User Color Mode** presets. These are the presets that control the settings of the LM LED powers for each color.

LM Red, LM Green & LM Blue Parts of Primary Colors

These slide bars control the power supplied to each color LED for each of the 3 primary colors.

RGB Brightness

This setting controls the overall brightness of the LEDs.

Copy Setting From

This control allows you to copy the **Color Mode** settings from an existing preset (**Native**, **EBU** or **User Color Mode** to the current preset.

Auto Color Enable

Automatically selects **Color Enable** based on control being adjusted.

7.9.3 Color Adjustments by X,Y

- **Color Management Menu > Color Adjustments by X,Y**

It allows the primary colors (red, green and blue) to be adjusted by specifying the X,Y color coordinates of each desired primary color and white. If your projector supports P7 color correction, then you also have the ability to adjust three secondary colors (yellow, cyan and magenta). The projector then determines the necessary mix of the projector's native colors required to produce these desired colors. This submenu and the **Color Saturation** submenu (item 4) accomplish the same thing but with different user interfaces.

NOTE: *This menu is used to manage color if Bright/ColorLOC is disabled. It should not be used (and the Selected Color Adjustment should be Max Drives) when Bright/ColorLOC is enabled.*

Select Color Adjustment

Select the output color adjustment most suited to this input signal from the drop-down menu.

The choices are:

Max Drives - All color adjustments are turned off, allowing the projector to run at maximum brightness.

Color Temperature - This allows a color temperature from 3200 to 9300°K to be selected based on the setting of the color temperature slide bar. Lower numbers give a reddish-white while higher numbers appear bluish. There are four standard settings:

- 9300°K is close to the white of many computer monitors.
- 6500°K is the standard for color video, in both standard and high definition forms.
- 5400°K is a standard for graphics and black-and-white video.
- 3200°K is useful if the projected image is to be filmed or shot as part of a studio set illuminated with incandescent lights.

For all color temperatures, the color primaries (red, green and blue) are unchanged and reflect the native colors of the projector.

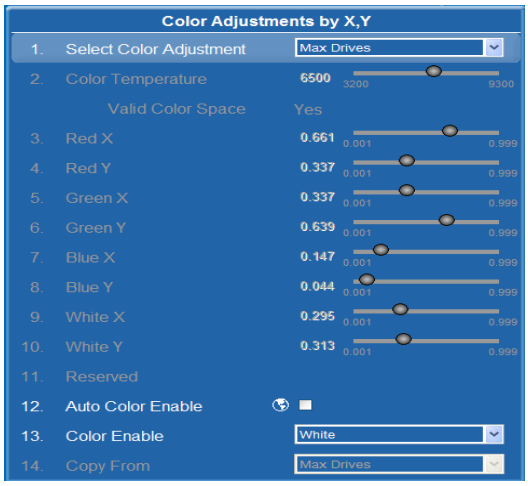


Figure 7-2 Select Color Adjustment

SD Video & HD Video - These settings set the output colors to specific standard values. They adjust the color of red, green and blue, as well as white.

User x - These select one of 4 user defined color adjustments. These are defined in the **Configuration** menu.

Color Temperature

This slide bar allows adjustment of the color temperature of the image. The selected output color table must be on **Color Temperature** to enable this control.

Valid Color Space

This message indicates whether or not the requested primary colors can be achieved by the projector.

Essentially, if a triangle is created using red, green and blue coordinates from the **Color Primary Settings**, the color coordinates specified in this menu (**Color Adjustment by X, Y**) must lie inside that triangle for the color space to be VALID.

Red, Green, Blue, White X/Y

These slide bars allow the adjustment of X and Y coordinates for each of the primary colors plus white. They are available only when **User 1** through **User 4** are selected in the **Select Color Adjustment** drop-down.

Auto Color Enable

Selecting **Auto Color Enable** (**Figure 7-2, item 12**) will automatically select **Color Enable** based on the control being adjusted.

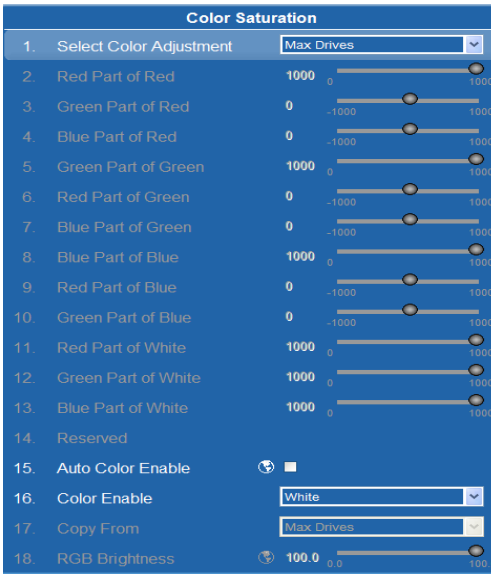
Color Enable

This control allows the three primary colors (red, green and blue) to be turned on or off separately. It is used to look at the colors one at a time or in pairs when doing convergence, light measurements, etc. Secondary colors (yellow, cyan and magenta) can also be observed one at a time.

Copy From

This control will copy values from the selected color adjustment and apply them to the current color adjustment.

7.9.4 Color Saturation



- **Color Management Menu > Color Saturation**

This menu allows the primary colors (red, green and blue) to be adjusted by specifying the amount of each of the three native colors, produced by the optical system, that are combined to produce each of the primary colors. This menu, and the **Color Adjustments by X,Y** menu accomplish the same thing but with different interfaces.

NOTE: *This menu is used to manage color if Bright/ColorLOC is disabled. It should not be used (and the Selected Color Adjustment should be Max Drives) when Bright/ColorLOC is enabled.*

Red, Green & Blue Parts of Primary Colors

Each of these sliders controls the amount that each color contributes to the 3 primary colors plus white. These adjustments are active only when **User 1** to **User 4** are selected from the **Select Color Adjustment** drop-down.

Auto Color Enable

Checking the box automatically selects Color Enable based on the control being adjusted.

RGB Brightness

This setting controls the overall brightness of the LEDs.

7.10 ArrayLOC Service

- **Service Menu > ArrayLOC Service**

Advanced configurations for the Array Bright/ColorLOC feature can be set from this option.

7.10.1 Bright/ColorLOC Mode

This allows the Array Bright/ColorLOC function to be enabled or disabled. Drop-down settings are **Off**, **Fixed**, **Cool** or **Bright.**

- **Fixed**: The system uses advanced color adjustment settings for LED brightness but modifies video levels to achieve a common gamut.
- **Cool**: The system automatically adjusts LED brightness and video levels to achieve the array target gamut but only one LED is turned on at any time.
- **Bright**: The system automatically adjusts LED brightness and video levels to achieve the array target gamut and may turn on more than one LED at a time to increase brightness if the common gamut is smaller than the native projector capability.

7.10.2 ArrayLOC Group

The ArrayLOC Group identifies a subset of projectors that run with the same ArrayLOC settings.

7.10.3 Broadcast Interval

This is the interval in seconds between ArrayLOC projector communication and is normally set to 1. It can be changed using the numeric keypad on the remote.

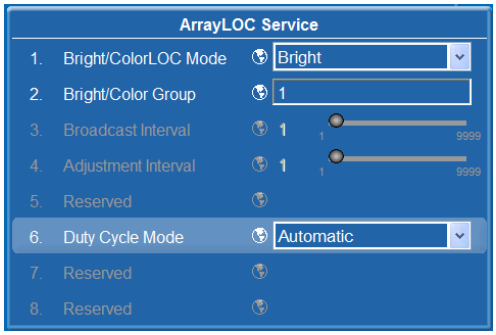
7.10.4 Adjustment Interval

This is the interval in seconds between ArrayLOC projector adjustments and is normally set to 1. It can be changed using the numeric keypad on the remote.

7.10.5 Duty Cycle Mode

This control allows the user to select how and when the system selects the LED duty cycle when Bright/ColorLOC is enabled. When Bright/ColorLOC is disabled the system always uses **Preset** mode. The 2 modes are:

- **Automatic** - Duty cycles are selected automatically by Bright/ ColorLOC based on the sensor reading of the current LED capability and the desired white point.
- **Preset** - Duty cycles are selected automatically by Bright/ ColorLOC based on the **Native Color Settings** and **Target Native White Color Temperature**.



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