



Technology Leadership  
for Digital Cinema



# **IMB and Christie Series-2 Projector**

## **Field Installer Manual**

Version 1.6

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## **Software License Agreement**

The software license agreement can be found at the following location:

<http://www.doremilabs.com/support/cinema-support/cinema-warranties/>

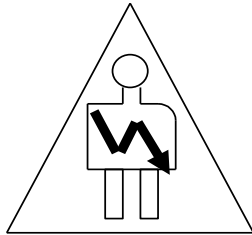
## **Hardware Warranty**

The hardware warranty can be found at the following location:

<http://www.doremilabs.com/support/cinema-support/cinema-warranties/>

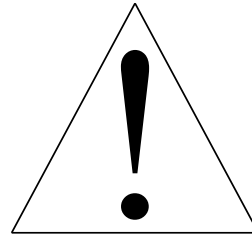
## WARNING!!

To prevent fire or shock hazard, do not expose this appliance to rain or moisture

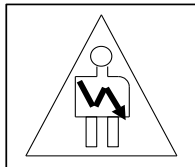


### CAUTION

RISK OF ELECTRIC SHOCK  
DO NOT OPEN



**CAUTION:** TO REDUCE THE RISK OF ELECTRIC SHOCK,  
DO NOT REMOVE COVER (OR BACK).  
NO USER-SERVICEABLE PARTS INSIDE.  
REFER SERVICING TO QUALIFIED SERVICE PERSONNEL.




The lightning flash with the arrowhead symbol superimposed across a graphical representation of a person, within an equilateral triangle, is intended to alert the user to the presence of uninsulated “dangerous voltage” within the product’s enclosure; that may be of sufficient magnitude to constitute a risk of electric shock.



The exclamation point within an equilateral triangle is intended to alert the user to the presence of important operating and maintenance (servicing) instructions in the literature accompanying the appliance.

## **CE NOTICE**

Marking by the symbol  indicates compliance of the device to the EMC (Electromagnetic Compatibility) directive and to the Low Voltage directive of the European Community. The marking is indicative that the device meets or exceeds the following technical standards:

- EN 55022 "Limits and Methods of Measurement of Radio Interface Characteristics of Information Technology Equipment."
- A "Declaration of Conformity" in accordance with the above standard has been made and is on file at Doremi.

## **HDMI**

The terms HDMI and HDMI High-Definition Multimedia Interface, and the HDMI Logo are trademarks or registered trademarks of HDMI Licensing LLC in the United States and other countries.

# 1 Introduction

## 1.1 Introduction

This document explains how to install the IMB into a Christie Series-2 projector. This document also describes the steps required to perform the “marriage” between the IMB SM and the projector electronics. Marriage is the process of engaging the DCI physical and software interlocks that enable the display of secured materials.

The IMB requires a Doremi ShowVault server in order to work. This document also explains how to set up and connect the ShowVault server to the IMB board.

## 1.2 Purpose

One of the key ideas behind marriage is that an authority figure examines the projector and ensures that it has not been tampered with before a marriage can be performed. This means that a person must be physically at the projector when the marriage is performed. It cannot be done remotely. To ensure an authority figure is present, there is a physical marriage button (or RFID key) on the projector which must be pressed in order for the marriage process to complete. Please contact your system administrator or Christie Technical Support for the required passwords.

## 1.3 Software Version

- This manual was written and performed on ShowVault software version 2.0.10.
- It also made (written) with IMB Revision E board, but it is valid for all IMB hardware revisions.
- This document is to be used with IMB SM 5.0.5 and higher.
- It is also to be used on Christie projector software 1.4 or higher with TI (ICP) firmware 2.2.294 or higher (this firmware is installed by the Christie installer program).

## 1.4 Contact

If in need of help or assistance, please contact Doremi Labs Technical Services:

### USA

24/7 Technical Services line: + [1-866-484-4004](tel:1-866-484-4004)

Technical Services Email: [cinemasupport@doremilabs.com](mailto:cinemasupport@doremilabs.com)

### Europe

24/7 Technical Services line: + **33 (0) 492-952-847**

Technical Services Link: <http://support.doremitechno.org/ticketing>

### Japan

Technical Services line: + **044-966-4855**

Technical Services Email: [support@doremilabs.co.jp](mailto:support@doremilabs.co.jp)

**Australia ~ China ~ India ~ Indonesia ~ Korea ~ Malaysia ~ New Zealand ~ Philippines ~ Singapore ~ Taiwan ~ Thailand**

Technical Services Email: [supportasia@doremilabs.com](mailto:supportasia@doremilabs.com)

## 2 Required Components for Installation

- Before beginning the installation, verify that the following components are present:



**AC POWER CABLE**



**ETHERNET CABLE**

**Figure 1: AC Power and Ethernet Cables**



**Figure 2: PCI-Express**



**Figure 3: IMB Revision E Board**

### 3 IMB Board Installation Procedure

- The IMB is illustrated below:



Figure 4: IMB with Christie Front Panel

#### 3.1 IMB Board

##### 3.1.1 HD-SDI Input

- Dual HD-SDI input compliant with SMPTE 292M and SMPTE 372M.
- HD-SDI input capable of supporting 3 GHz signals per SMPTE 424M. Mapping per SMPTE 425M is not implemented yet, but it will be available via a software update.
- The following are 2D formats that are currently supported on the HDSDI input of the IMB:

Format\fps	23.98	24	25	29.97	30	47.95	48	50	59.94	60
720p									X	X
1080i	X	X	X	X	X					
1080p	X	X	X	X	X					

##### 3.1.2 HD-SDI Output

- IMB Revision A: HD-SDI output is not available.
- IMB Revision E: Dual HD-SDI output compliant with SMPTE 292M and SMPTE 372M. HD-SDI output capable of supporting 3 GHz signals per SMPTE 424M.

**Note:** With the current firmware, the HD-SDI Output is not used.

### 3.1.3 HDMI Input

- The IMB incorporates High-Definition Multimedia Interface technology. HDMI®, HDCP compatible input, supporting deep color video up to 12-bit with the following formats:

Aspect ratio\fps	23.98	24	25	29.97	30	47.95	48	50	59.94	60
720p								X	X	X
1080i	X	X	X	X	X					
1080p	X	X	X	X	X	X	X	X	X	X

### 3.1.4 IMB Board Installation

Follow the steps below in order to install the IMB board inside the Christie projector:

- Power OFF the projector before beginning the IMB installation.
- Line up the IMB board with the guiding rails on each side of the slot and insert the IMB board gently into the projector.
- Lock the IMB board by using the two locking handles on each side.

## 4 ShowVault Server Installation

Follow the steps below to configure the ShowVault server with the Christie Series-2 projector:

- Connect one end of the Ethernet cable into the ShowVault "Eth0" socket and the other end into the Christie projector (Figure 5).



**Figure 5: Ethernet Cable Connection**

- Connect one end of the PCI-Express cable into the ShowVault and the other end into the IMB board on the Christie projector (Figure 6).

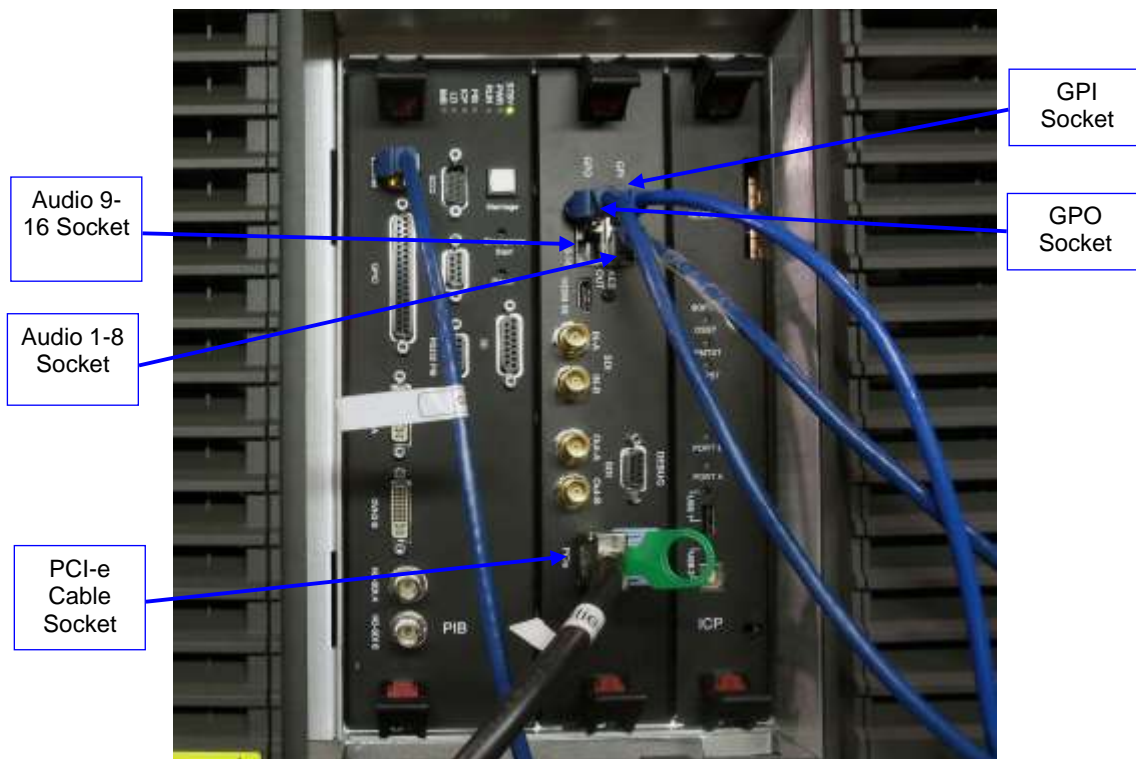


**Figure 6: PCI-Express Cable Connection**



**Figure 7: Power Cables Connected to ShowVault**

- Connect two power cables into the ShowVault; it is the same for both the ShowVault-3RU and ShowVault-4RU (Figure 7).



**Figure 8: IMB with Audio and GPIO Connections**

## 4.1 Audio and GPIO Installation

### 4.1.1 Audio and GPIO Pin-Out Information

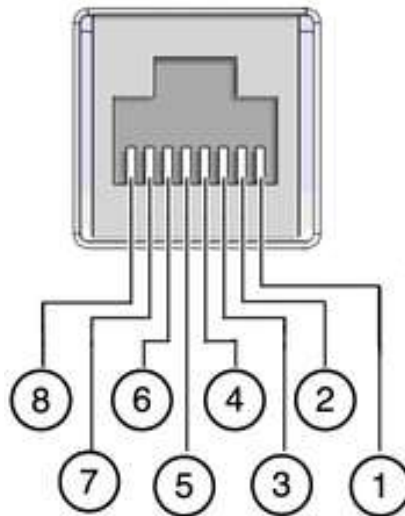


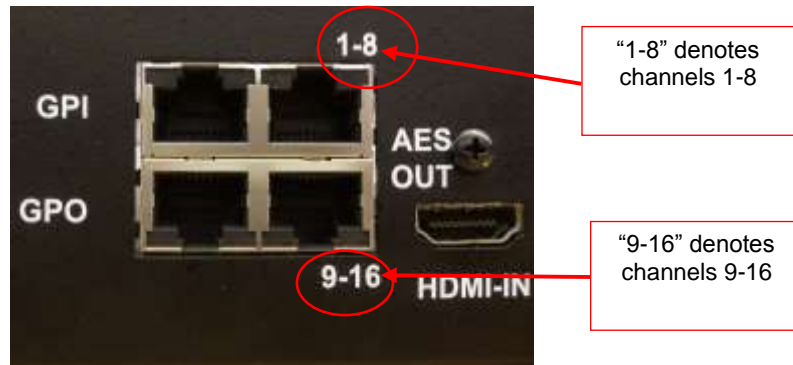
Figure 9: RJ45 Pinout Example

### 4.1.2 Audio CAT5 Cable Installation

- Plug one CAT5 cable end into the top AES slot (RJ-45 connector) for audio channels 1-8.
- Plug the other end of the CAT5 cable in the audio processor.
- Take another CAT5 cable end and plug it into the bottom AES slot (RJ-45 connector) for audio channels 9-16.
- Plug the other end of the CAT5 cable adapter in the audio processor.

### 4.1.3 GPIO CAT5 Cable Installation

- Plug one CAT5 cable end from the GPI slot into whichever automation controller is available or required.
- Take another CAT5 cable and plug it from the GPO slot into whichever automation controller is available or required.



**Figure 10: Audio and GPIO Connectors**

- There are 4 RJ-45 connectors on the IMB front panel (two are used for audio and two are used for GPIO connection).
- The following sections have information related to the pin-out structure for the audio and GPIO.

#### 4.1.3.1 Audio AES Pin-Out Information

Channels 9-16	Signal	Channels 1-8	Signal
1	Channel 9 & 10 plus	1	Channel 1 & 2 plus
2	Channel 9 & 10 minus	2	Channel 1 & 2 minus
3	Channel 11 & 12 plus	3	Channel 3 & 4 plus
4	Channel 13 & 14 plus	4	Channel 5 & 6 plus
5	Channel 13 & 14 minus	5	Channel 5 & 6 minus
6	Channel 11 & 12 minus	6	Channel 3 & 4 minus
7	Channel 15 & 16 plus	7	Channel 7 & 8 plus
8	Channel 15 & 16 minus	8	Channel 7 & 8 minus

#### 4.1.3.2 GPI Pin-Out Information

- GPI on RJ45 Connectors:

Pin #	Signal
1	GPI 0+
2	GPI 0-
3	GPI 1+
4	GPI 2+
5	GPI 2-
6	GPI 1-
7	GPI 3+
8	GPI 3-

#### 4.1.3.3 GPO Pin-Out Information

- 8 GPO on RJ45 Connectors:

Pin #	Signal
1	GPO 0
2	GPO 1
3	GPO 2
4	GPO 4
5	GPO 5
6	GPO 3
7	GPO 6
8	Ground

**Note:** At this stage, please refer to the Christie projector user manual in order to perform any projector specific setting.

- Power ON the ShowVault server by pressing the power button:

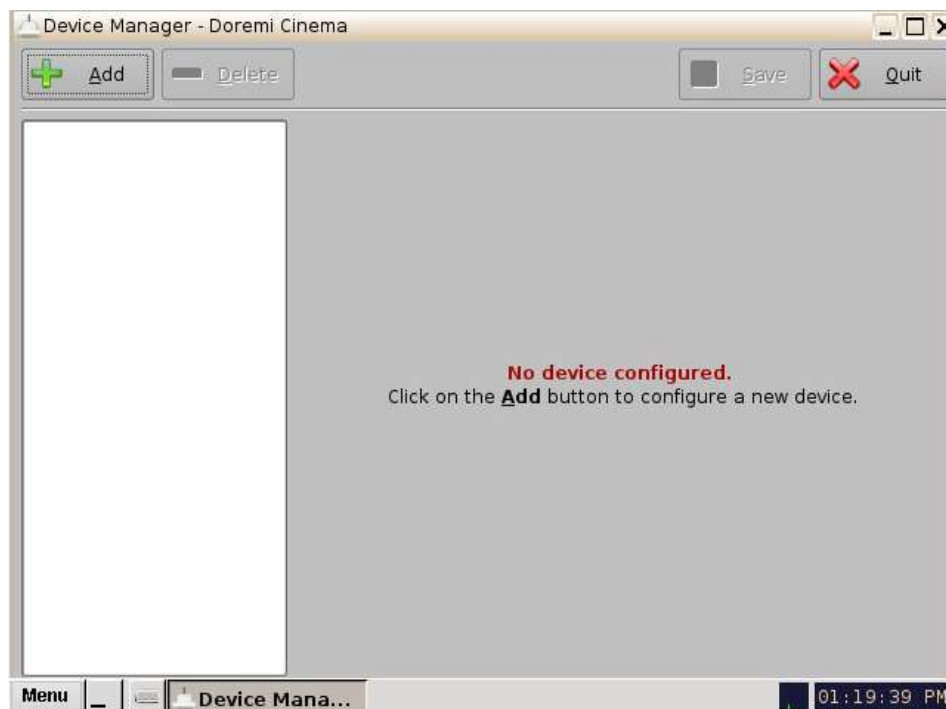


**Figure 11: ShowVault Server Power On**

- Continue to the next section to configure the Device Manager.

## **4.2 Device Manager Configuration**

- Run the "Device Manager" program to set up the Christie Series-2 Projector.
- Click on **"Menu"** → **"Doremi Apps."** → **"Device Manager."** The following window will appear:



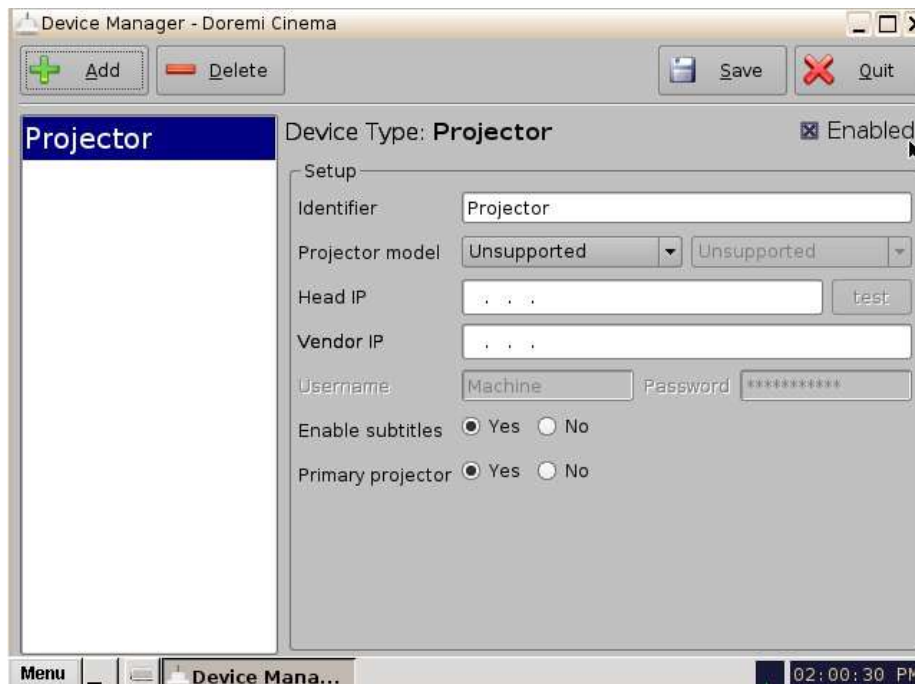
**Figure 12: Device Manager GUI**

- Click the "Add" button. The following window will appear:



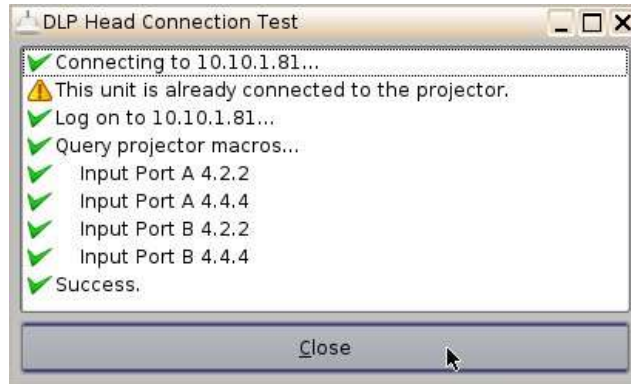
**Figure 13: Device Manager GUI - Add Device Window**

- Click on "Projector" and then click on the "Add" button.
- The following window will appear:

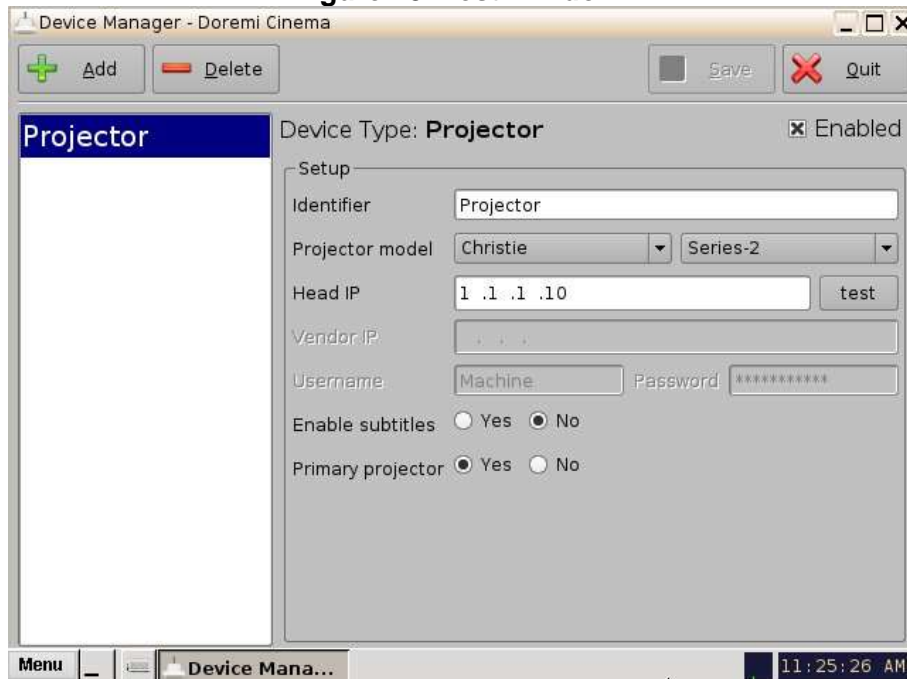


**Figure 14: Device Manager Menu With Projector Added**

- Select the "Projector model" and click on "Christie" and then select "Series-2".
- Enter the "Head IP" address for the projector.
- Click the "Save" button and then input the password to record the settings.
- Click the "test" button to verify the connection. The following window will appear:



**Figure 15: Test Window**



**Figure 16: Device Manager Menu With Device Added and Configured**

**Note:** The following section explains how to perform the marriage, which is the last step in configuring the Christie projector:

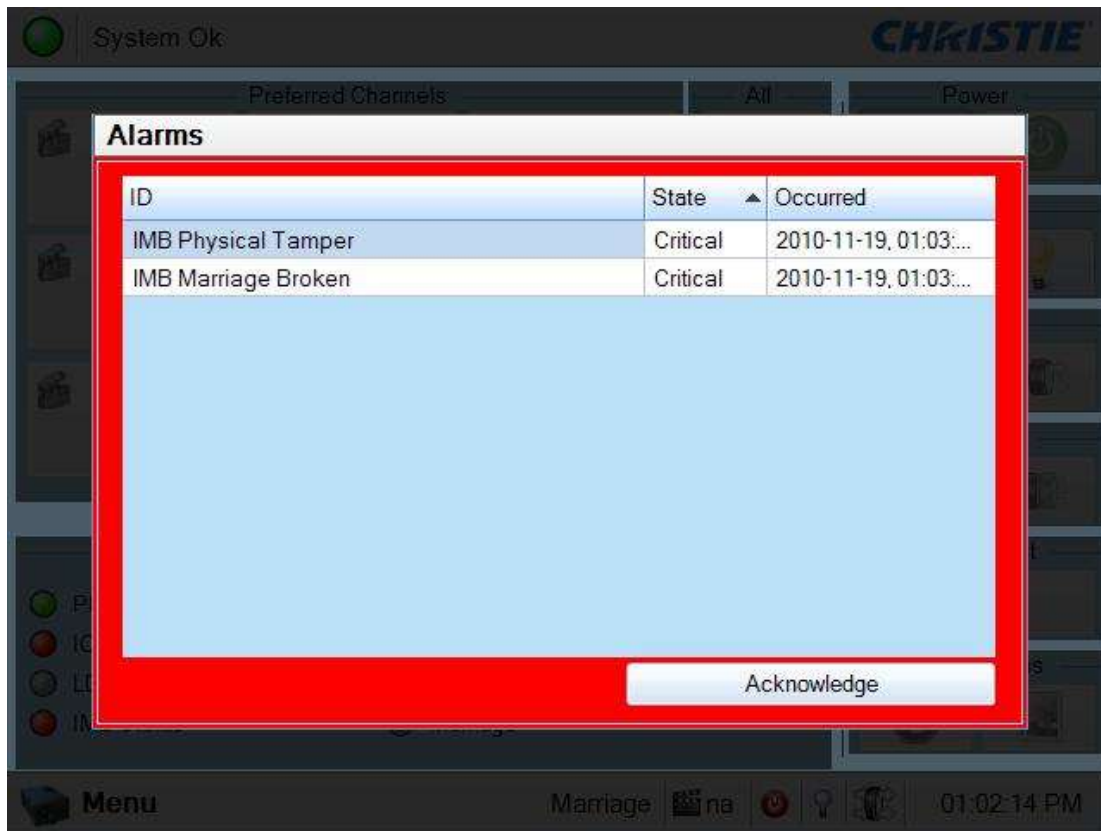


**Figure 17: Christie Series-2 Projector with IMB Installed**

## 5 IMB Marriage Procedure

### 5.1 Performing the Marriage on Christie Series-2 Projectors

- When the IMB has been replaced, or upon first installation the following error will be displayed on the projector touch panel (Figure 18).



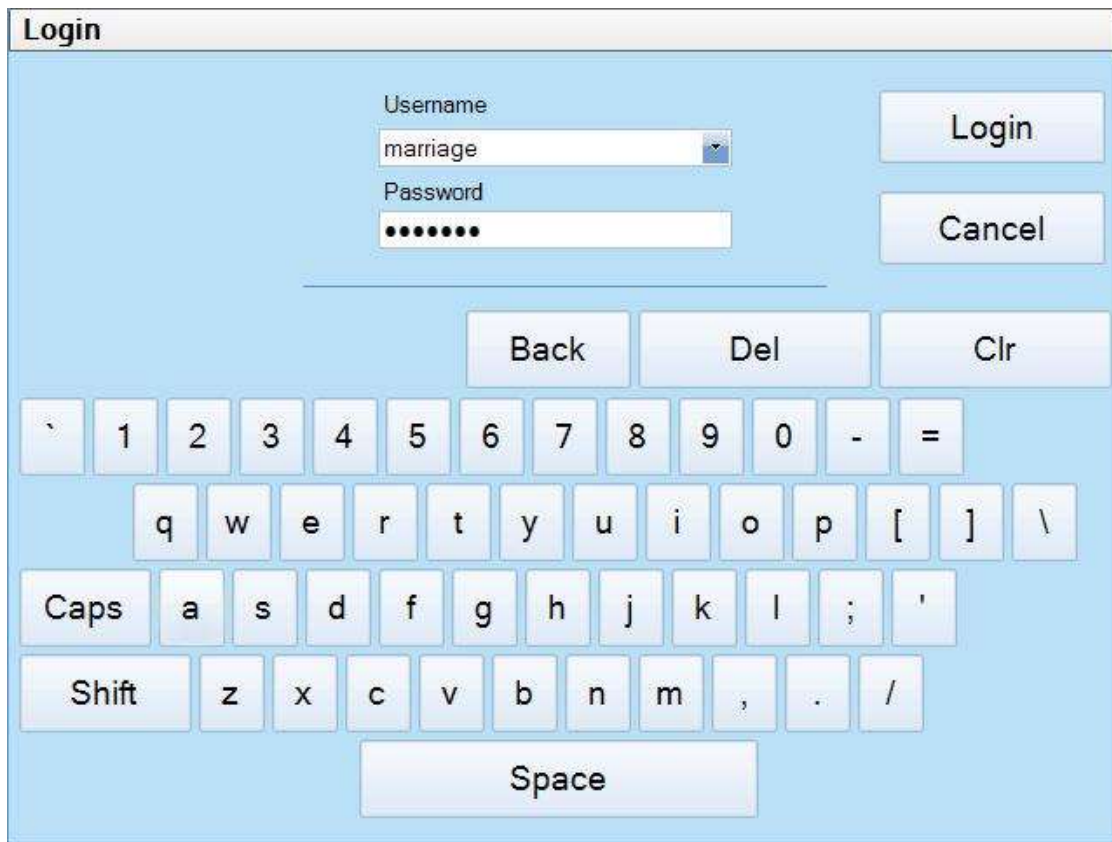
**Figure 18: Marriage Error Window**

- Before beginning the marriage, stop playback. Eject the SPL and close all windows and programs on the ShowVault.
- In order to perform the marriage, the projector needs to be powered on (touch and hold the area of the touch panel labeled "ON").
- The ShowVault and IMB need to be connected and powered on.
- The lamp should be turned off (touch and hold the left icon if necessary).
- Verify that the PCIe and Ethernet cables are connected.
- The home screen on the touch panel will show the following - see (note that the marriage status and critical alarm is red):



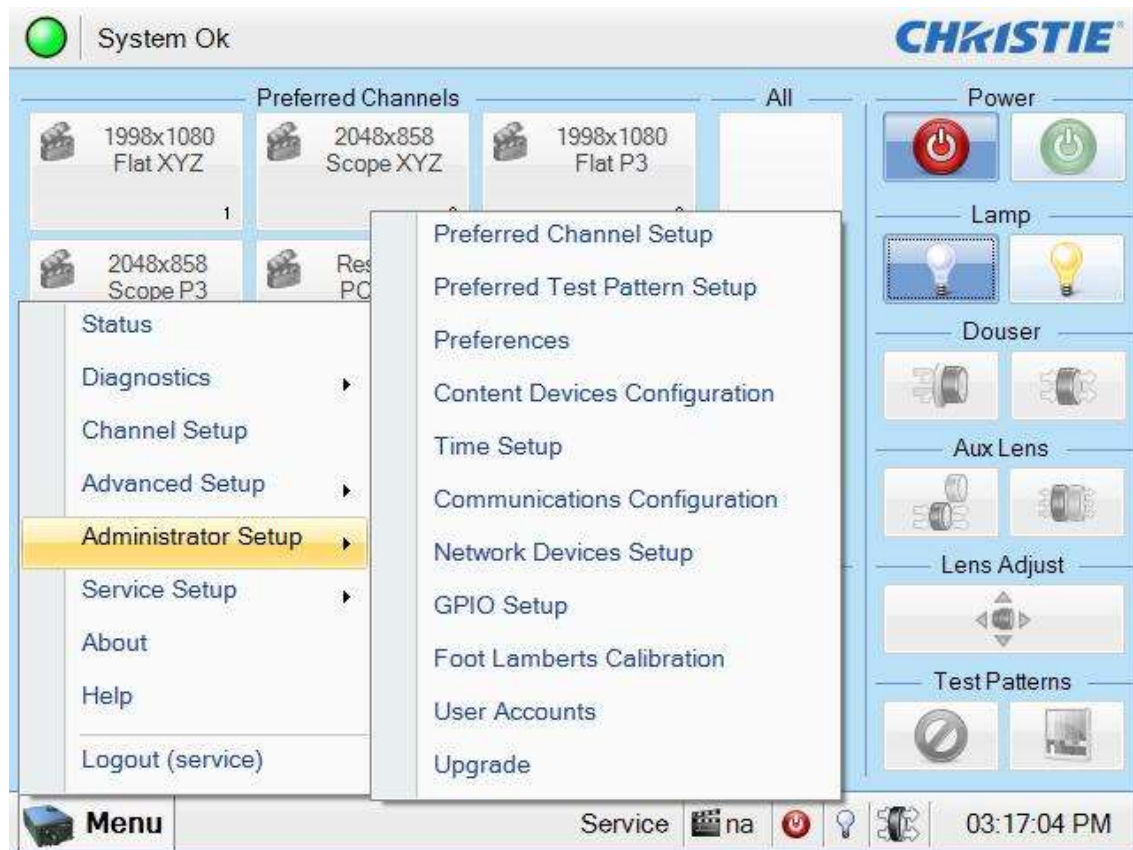
**Figure 19: Christie Home Menu - Red Critical Alarm and Marriage**

- In the bottom left corner of the Christie Touch Panel, touch "Menu" and select "Logout Service."
- Once logged out, touch "Menu" again and select "Login."
- When the user list window appears, select "marriage" (Figure 20).



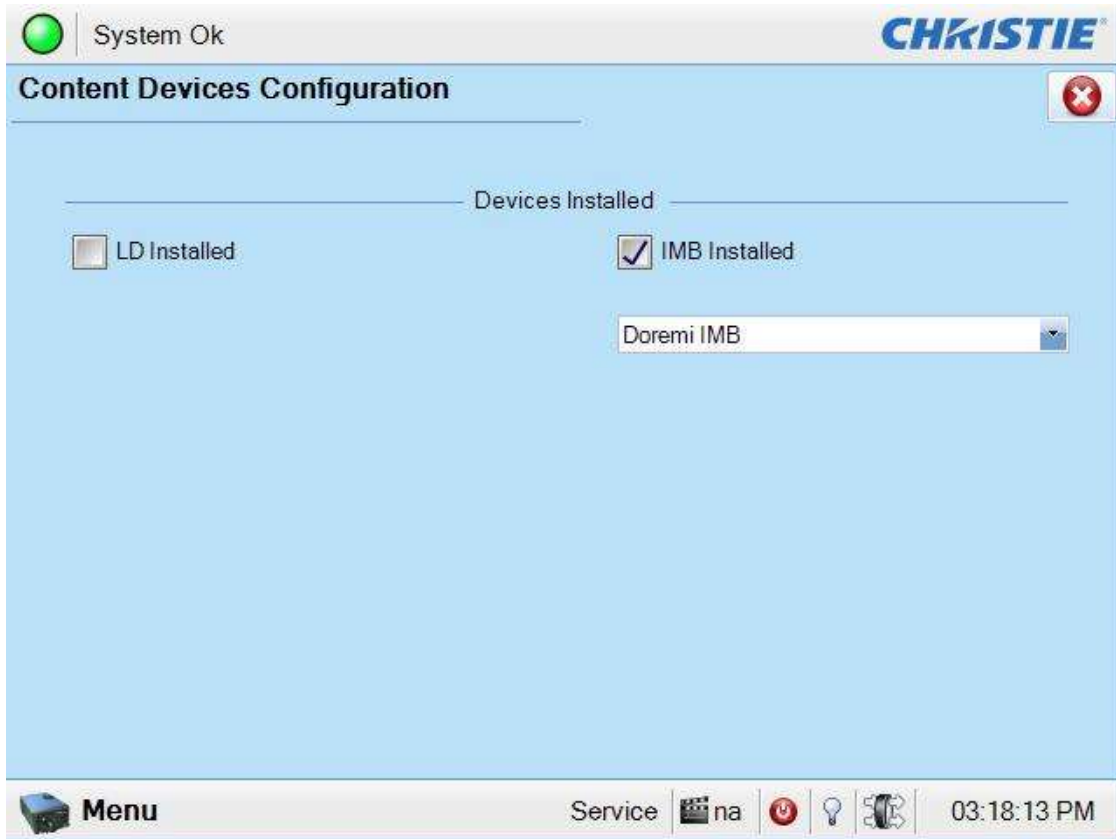
**Figure 20: Christie Touch Panel**

- When prompted, enter the marriage password. Contact Christie Digital for the marriage password.
- Once logged in, select “Menu” again.
- From the pop-up menu select "Administrator setup" (Figure 21).



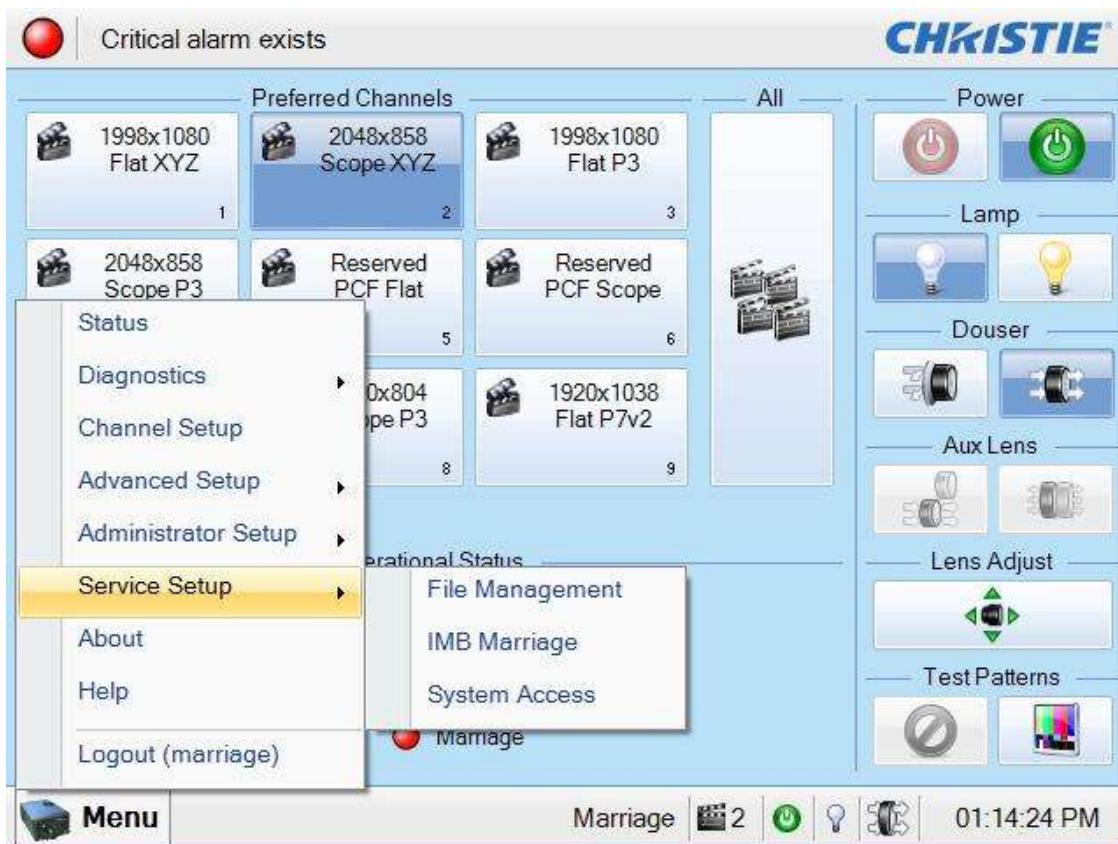
**Figure 21: Administrator Setup List Menu**

- From the pop-up menu select "Content Devices Configuration."
- If the "LD Installed" box is checked then un-check the box (Figure 22).
- Check the box for "IMB Installed" (Figure 22).
- From the drop-down list select "Doremi IMB" (Figure 22).



**Figure 22: Content Devices Configuration Window**

- Close the "Content Devices Configuration" window.
- Select "Menu" again from the Home screen.
- From the pop-up menu select "service setup," then select "IMB Marriage" from the next window that pops up (Figure 23).



**Figure 23: Christie Home Menu With Service Setup List**

- The Marriage window begins a series of panels that guides you through the process required to engage the projector's married condition. The left column of the Marriage window shows which state you're currently in during the marriage process. Click the Next/Prev buttons to navigate the series of steps.

**Note:** Only a Security Officer logged in as "marriage" can engage the projector's marriage.

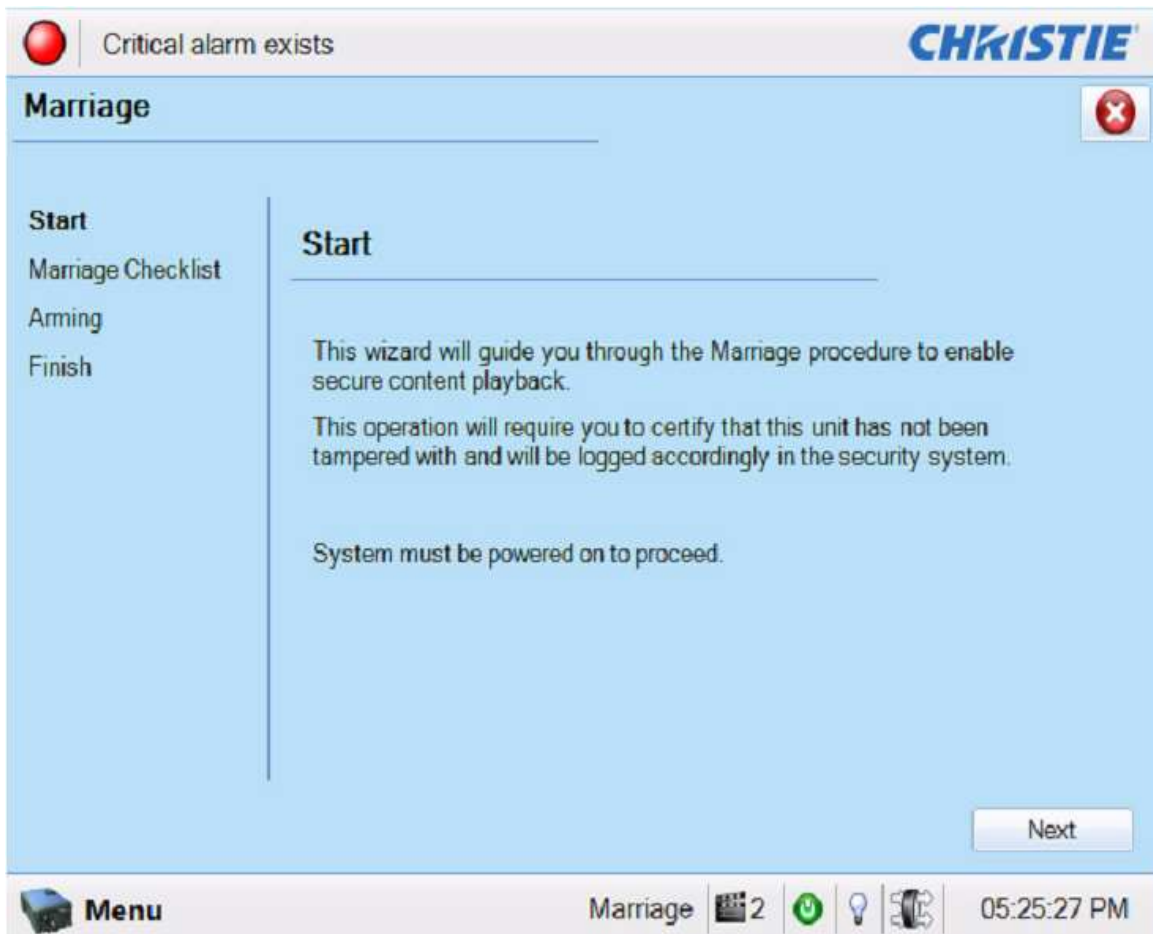
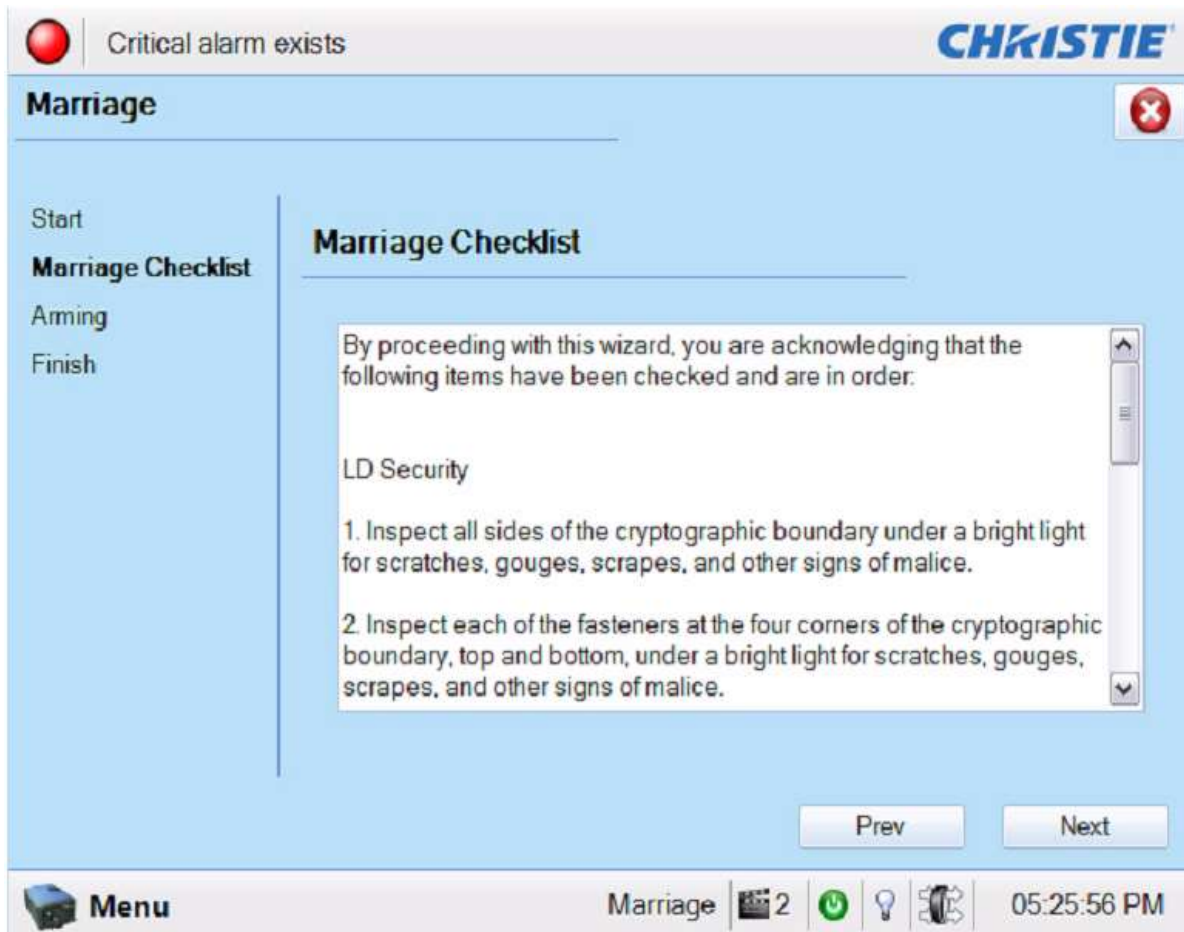


Figure 24: Marriage Set Up Start Window

- Ensure the system is in full power mode to proceed, i.e. Power is ON with the lamp OFF. Click the “Next” button to proceed to the Marriage Checklist window (Figure 24).

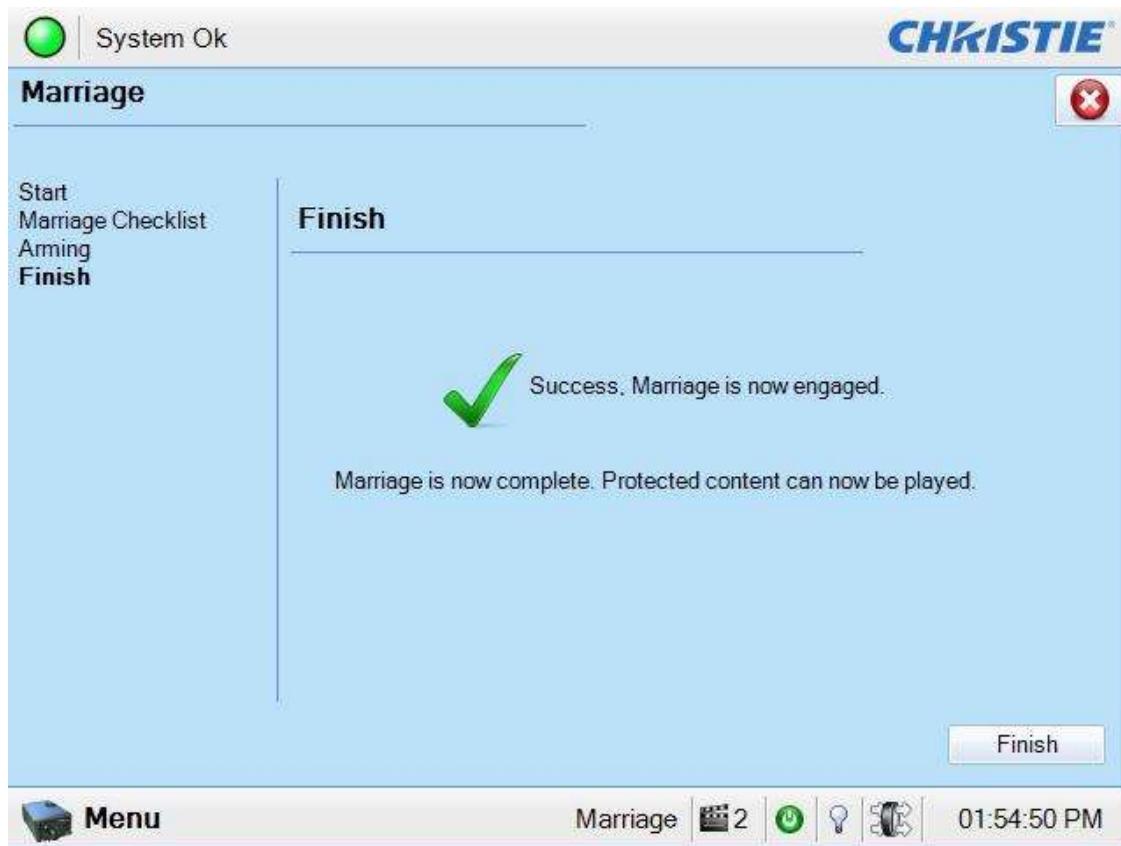


**Figure 25: Marriage Set Up Window**

- In the Marriage Checklist window, the system checks that all tamper switches are secure and lists the items that you must check to ensure the projector is secure before proceeding. Click the “Next” button to proceed to the Arming window (Figure 25).



- In the Arming window, click the Arm Marriage button (Figure 26). A 30 second count-down timer begins. The LED in the Marriage button on the PI Board will flash green for 3 seconds. You **MUST** press the Marriage button on the PI Board while it is flashing green in order for the marriage to take effect. The button must be pressed until the marriage is successful, which is indicated by a message stating that the "marriage is successful" and displaying a large green check-mark. When the Marriage is successful, the LED button will change to a solid green to indicate a successful marriage. If the button turns red again, you did not press the Marriage button in time and thus will need to perform the operation again. When the marriage succeeds you will have a green LED on the touch panel and a solid green Marriage button (Figure 27).



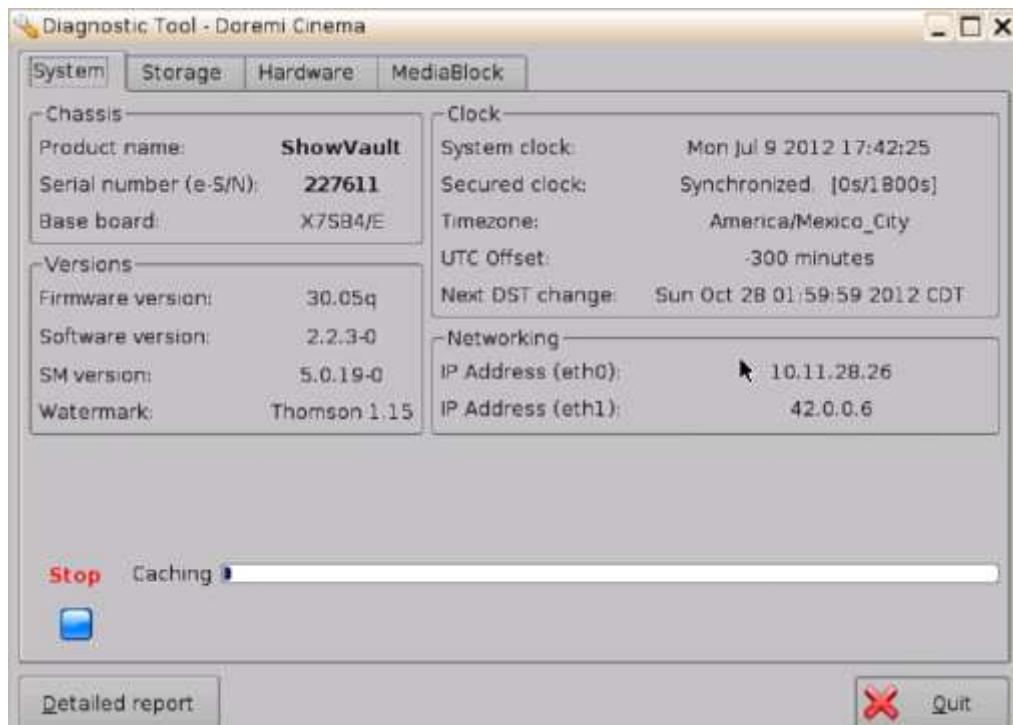
**Figure 27: Marriage Set Up Finish Window**

- Click the "Finish" button (Figure 27) to return to the Home screen (Figure 28).



**Figure 28: Marriage Successful Home Menu**

- Notice that the system status and marriage LED's are green indicating that the marriage was performed successfully.
- Once the marriage is completed, log out of the projector and log back in as "operator."  
**Do not leave the projector without logging out of the marriage account!**
- Go back to the ShowVault unit and click on "Diagnostic Tool" by clicking "Menu → Doremi Apps. → Diagnostic Tool." Verify that there are no errors present. It should look like the image illustrated below in Figure 29. If not, contact Doremi Technical Support for help in dealing with errors.



**Figure 29: Diagnostic Tool - System Tab**

- The ShowVault should now allow the playout of encrypted content. Test the marriage by playing 2D, 3D, encrypted, and non-encrypted content. Everything should function properly. If you are encountering problems then contact Doremi Technical Support.

## 6 IMB Troubleshooting Instructions

This section gives the steps to follow to support the troubleshooting that the installer (mainly Barco for Cinemark) has when installing IMB in the projector. It seems that a common issue is the failure for the ShowVault to connect to the SM, showing "missing" for the SM version. In any case, BEFORE replacing an IMB or trying another, the user(s) needs to get a Detailed Report from the Showvault and send it to Doremi Technical Support with the serial number of the Showvault (S/N sticker on the back of the unit).

### 6.1 Check the Projector Version

- This is to help determine if a new projector version is in use.

### 6.2 Check the Diagnostic Tool GUI for Errors

- Check the Serial Number, Software Version, Firmware Version, and SM Version.
- The color is to be asked too, as it has an important meaning:
  - **Black** means that the value was read from the IMB.
  - **Red** means that the value could not be read from the IMB and the last known value is displayed.

### 6.3 Check the PCI-Express Connection

- In a new Linux terminal, type: `/doremi/sbin/mcsetup.out --get-serial` (This command tests path 1).
- If the command returns a failure with "Mcore context", then it means the driver is not running. This is likely an issue with the PCIe either not connected or not seen.
- Have the PCIe cable unplugged and then replugged to see if it fixes the issue.
- If the PCIe unplug doesn't fix it, try to have the ShowVault and projector re-booted once. If this doesn't fix the problem, then go to Section 6.6 and get a Detailed Report.

**Note:** As long as this issue is not fixed, performing the following steps will lead to failure.

## 6.4 Check the Ethernet Setting

a) Check the Device Manager:

- Check the Ethernet port configuration:
- **/sbin/ifconfig**
- Note the IP of both eth0 and eth1. Make sure a projector is set with the proper IP address.
- If the Device Manager doesn't have a projector setup, have them set it up and wait 30 seconds after they enable and Save it.
- Make sure other devices (like Jnior) are set with the proper IP address.
- Make sure those devices in Device Manager don't have the same IP addresses as the Showvault.
- Try to ping this IP address to make sure Ethernet connection is "OK". This tests path 2.
- If the ping fails the Ethernet is not connected properly.
- Maybe eth0 and eth1 are not set properly above. Or maybe the connection is not to the correct eth0 or eth1.

b) Check that the IMB has the proper IP address:

- Run the command: **/doremi/sbin/mcsetup.out --get-ipconfig** (this should return IP 192.168.254.246).
- Run the command: **/doremi/sbin/mcsetup.out --get-ipconfig-ext** (it should return the IP set in the Device Manager for the projector).
- If both IPs here are the expected ones then the PCIe is connected properly and the IMB is configured with the proper IP.
- If the IP is not correct, make sure the Device Manager is configured properly.
- If the commands return a failure with "Mcore context" it means that the driver is not running.
- See Section 6.3 (if step 3 passes, I would assume there is not a "Mcore context" failure).

## 6.5 Check the Communication with the IMB

- Check the Ethernet:
- If the test in Section 6.4 passed, then run the command: **/doremi/sbin/sbcsetup.out -a -get-temperature** (this will exercise the communication with the IMB without the need of a proper synchronization of certificate). Also, this tests path 2 and path 3.
- If it succeeds it means that the hardware and network configuration are "OK."
- If it fails, it means that the IMB is not connected via Ethernet to the router internally of the projector.
- This is what typically would require a re-seating of the IMB (or modified front plate).
- Check the certificate configuration:
- Run the command: **/doremi/sbin/sbcsetup.out --get-version**
- If it succeeds, the Showvault and IMB are communication find and there is no problem.
- If the command reports a failure with "mismatch key", it means that the certificate in **/doremi/etc/certs/mine** is not the one corresponding to the IMB it is connected to.
- The easiest is to reboot the ShowVault. The synchronization of the certificate should be done during reboot.
- It might be necessary to remove all the pem files in **/doremi/etc/certs/mine** before the reboot.
- A more complicated (more complicated to have a technician on the phone to execute) but quicker way to fix is it: Run the command: **/doremi/sbin/sbcsetup.out -a -f --verify -force-repair**
- Again try the command **/doremi/sbin/sbcsetup.out --get-version**, if it succeeds the problem is fixed.

## 6.6 How to Generate a Detailed Report

If the issue is still not fixed generate a Detailed Report and send it to Doremi Technical Support (especially BEFORE replacing the current IMB). Along with the Detailed Report, send the following information: Site name and number, screen number, S/N of the ShowVault, and projector version.

## 6.7 IMB Configuration Script

You can execute the script **IMB\_Configuration\_check.sh** which will run the commands outlined in Section 6.5.

- The script will be available in **/doremi/bin**. If it's not, please copy it there.
- To run the script: Type: **> /doremi/bin/IMB\_Configuration\_check.sh**
- The script will run multiple commands. You have to press enter to proceed after each command.

Below are the details of the script as the technician will see it. In case of a failure, the script will prompt the technician on the steps needs to be taken and it will exit. The technician needs to follow the script instructions and run the script until it passes all of them.

*Checking the IMB is seen on the PClexpress*

*IMB was found on the PClexpress*

*Continue (y/n)?*

*y<enter>*

*Checking IMB IP configuration*

*IMB internal IP is OK*

*Continue (y/n)?*

*y <enter>*

*Checking the Projector IP configuration*

*Inet addr:10.10.1.120 Mask:255.255.255.248*

*Is this the correct IP addr for the projector (y/n)?*

*y<enter>*

*Checking the ethernet connection with projector*

*The projector ethernet is properly connected*

Continue (y/n)?

y<enter>

Checking ethernet connection with IMB

The IMB is properly connected

Continue (y/n)?

y<enter>

Checking synchronization configuration

The IMB and Showvault are properly synchronized.

## 6.8 Hardware Configuration Diagram

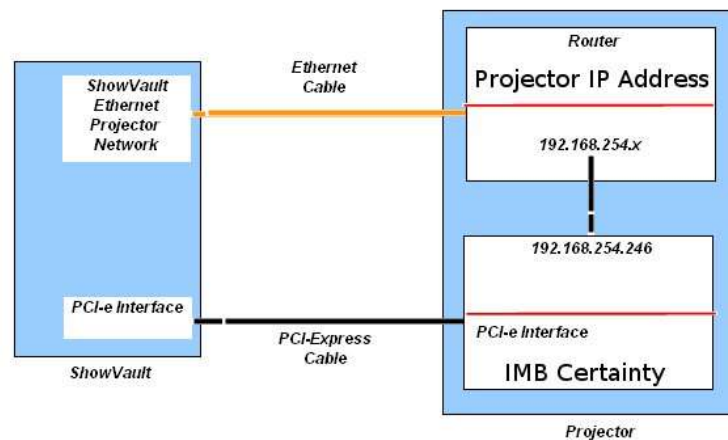


Figure 30: Hardware Configuration Diagram

## 7 Maintenance

### 7.1 Replacing the IMB Battery

Follow the procedure below to replace the IMB battery:

The battery must be replaced **every 5 years**. Battery information includes the following:

- Manufactured Part Number: **BR3032** from Panasonic

To replace the battery, apply the following procedure:

1. Make sure you have all the required parts and tools as stated below:
  - a) One screwdriver
  - b) One plastic (non-conductive) Probe / Prying Tool
  - c) Projector door key
  - d) New IMB battery
  - e) Specific projector's documentation explaining how to remove/insert the IMB from/into the projector.



**Figure 31: Required Tools**

2. Power ON the projector and its connected ShowVault. Make sure the IMB works fine by performing an encrypted content playback using a valid KDM.
3. Check that the IMB has a valid identity.
4. Unplug the Ethernet cable from the projector.
5. Unplug the PCI-e cable from the IMB.
6. Open any projector lid and door that covers the IMB without removing the IMB yet – check specific projector's documentation if needed.
7. Power OFF the projector – you have from this point **only 5 minutes** to complete the battery replacement. **Otherwise the board will have to be re-programmed by Doremi Labs**, meaning that all the existing KDMs will have to be re-generated for the new identity that will be assigned to the board.
8. Remove the IMB from the projector - check specific projector's documentation if needed.
9. Remove the existing battery using the plastic tool by pushing on one side of the battery. From this point, you **only have 2 minutes left** in order to insert the new battery. **Otherwise, the board will have to be re-programmed by Doremi Labs**, meaning that all the existing KDMs will have to be re-generated for the new identity that will be assigned to the board.



Figure 32: IMB Battery Removal

10. Insert the new battery inside the battery holder. From this point, no need to hurry anymore, the IMB has a battery to keep its identity and existing KDM.
11. Re-insert the IMB inside the projector - check specific projector's documentation if needed.
12. Put back and close any projector lid and/or door that was previously removed.
13. Plug the Ethernet cable back into the projector.
14. Plug the PCI-e cable back into the IMB.

**Important Note:** After replacing the RTC battery, you must create a maintenance log entry, to reset the pop up warning counter. If this step is not done, you will continue to get a warning message. Proceed to section 7.2.

## 7.2 Creating a Maintenance Log Entry

Follow the procedure below to create a maintenance log entry:

**Note:** Creating a maintenance log entry for the SECURE\_CLOCK\_BATTERY\_REPLACEMENT will reset the counter to 5 years, with a pop up warning at the 4 year point.

- Go to Menu > Control Panel > Log Operator Maintenance

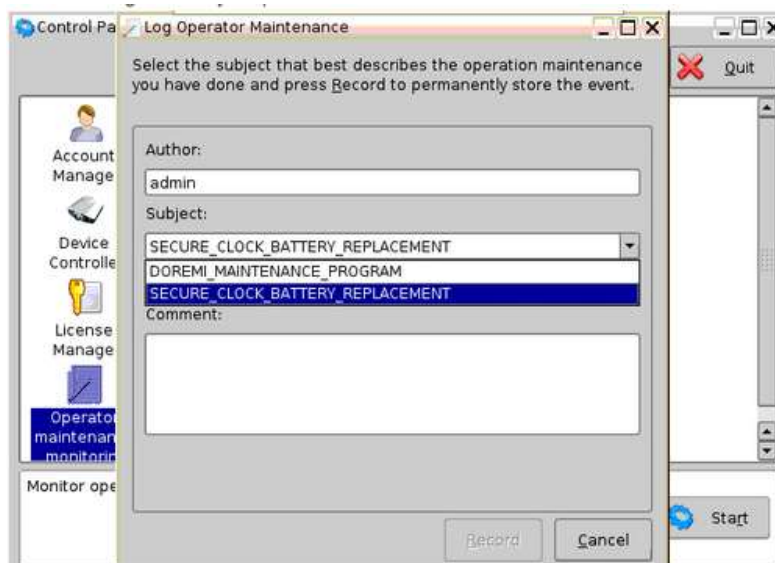


Figure 33: Log Operator Maintenance Window

The RTC battery is not an RMA item, due to the cost of the battery verse the cost of shipping. The Media Block battery needs to be sourced locally.

### Doremi IMB Battery Information

- Doremi P/N: BAT12.5MM-LI-COIN (Battery 12.5mm Lithium Coin)
- Vendor P/N: P033-ND
- Manufactured P/N: CR1220

If the RTC clock is lost on any Media Block, due to a flat battery or failure, the Media Block will need to be returned (RMA) to Doremi, please contact your local Doremi support office.

#### 7.2.1 IMB Battery Voltage Information

The battery voltage for the IMB RTC battery can be seen in the Detailed Report, *drmreport.txt*. Search for, "Battery Voltage" (example below).

- Example: **Battery\_voltage: 3158 mV**

Or via **SNMP**, the **SNMP** trap (if configured) is set at 2.7v.

**Note:** The minimum battery voltage is approximately 2.4v. The system will show a warning at the first of every month for one year, and then every day after that.

## 8 Acronyms

Term	Definition
<b>IMB</b>	Integrated Media Block
<b>LED</b>	Light-emitting Diode
<b>DCC</b>	Digital Cinema Communicator
<b>S/N</b>	Serial Number
<b>RFID</b>	Radio Frequency Identification

## 9 Document Revision History

Date	Version	Description
11/23/2010	1.0	First draft written and performed on software version 2.0.10.
01/07/2011	1.1	All sections revised. New pictures added.
09/14/2011	1.2	All sections revised.
01/24/2012	1.3	Contact information revised.
07/17/2012	1.4	Section 3.1.1 HD-SDI input information added.
02/11/2013	1.5	Minor revisions made to Section 3.
01/22/2014	1.6	Addition of Section 7