

doremi

Technology Leadership
for Digital Cinema



IMB and NEC Series-2

Field Installer Manual

Version 1.7

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Software License Agreement

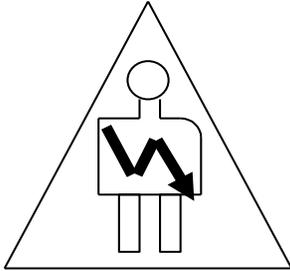
The software license agreement can be found at the following location:
<http://www.doremilabs.com/support/cinema-support/cinema-warranties/>

Hardware Warranty

The hardware warranty can be found at the following location:
<http://www.doremilabs.com/support/cinema-support/cinema-warranties/>

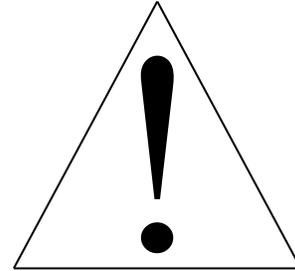
WARNING!!

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

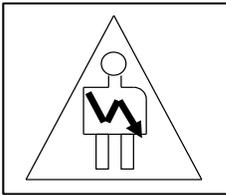


CAUTION

**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 Purpose

This document explains how to install the IMB into an NEC Series-2 projector. This document also describes the steps required to perform the “marriage” between the IMB SM and the projector electronics. The IMB requires a Doremi ShowVault server in order to work. Marriage is the process of engaging the DCI physical and software interlocks that enable the display of secured materials. 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.

1.2 Software Version

- This manual references DCP software version 2.0.10 and higher.
- 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 5.0.12 and higher.
- It is also to be used on NEC projector software version 3.00 or higher with TI (ICP) firmware 3.0 or higher.

1.3 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

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

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

Technical Services Email: supportasia@doremilabs.com

2 Required Components for Installation

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



Figure 1: AC Power Cable



Figure 2: Ethernet Cable

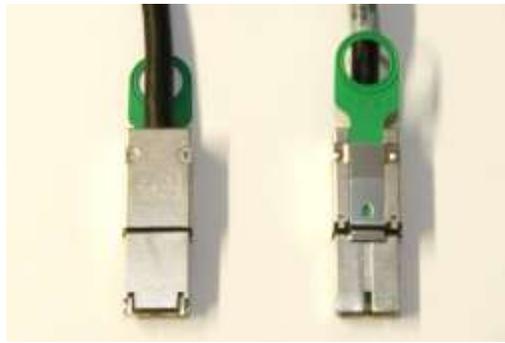


Figure 3: PCI-Express Cable

3 IMB Board Installation



Figure 4: IMB



Figure 5: Front Panel

3.1 IMB Technical Specification

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 Revision E Board Installation

Follow the steps below in order to install the IMB board inside the Series 2 projector:

CAUTION: Make sure to unplug the power cable from the projector before installing the IMB board.

- In order to gain access to the board housing, loosen all 5 screws from the side panel and unlock the panel with the security key.



Figure 6: NEC Side Panel

- In order to remove the Enigma board the bottom plate must be removed first (Figure 7).



Figure 7: Enigma Removal

- Align the IMB board with the guiding rails located on each side of the slot (Figure 8).



Figure 8: Guiding Rails

- Insert the IMB board gently inside the projector.



Figure 9: IMB Installation

- Lock the IMB board by using the two locking screws, one on each side of the board (Figure 10).
- Re-insert the bottom plate (Figure 10).



Figure 10: IMB Installation

- Re-install the side panel.



Figure 11: Side Panel

4 ShowVault Server Set Up

Follow the steps below in order to setup the ShowVault server:

- Connect one end of the Ethernet cable into the Show-Vault and the other end to the Series 2 Projector.



Figure 12: Ethernet Cables

- Connect one end of the PCI-Express cable into the ShowVault and the other end to the IMB board on the Series 2 Projector as presented below:



Figure 13: PCI-Express Cables

- Connect both power cords into the ShowVault as illustrated below:



Figure 14: ShowVault Power Cables

- Plug the power cable of the Series 2 projector into a reliable power source.
- Power ON the Series 2 Projector by pressing on its power/Lamp switches.



Figure 15: NEC Projector Power/Lamp Switches

4.1 Audio and GPIO Installation

4.1.1 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.

4.1.2 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.

4.1.3 Audio and GPIO Pin-Out Information

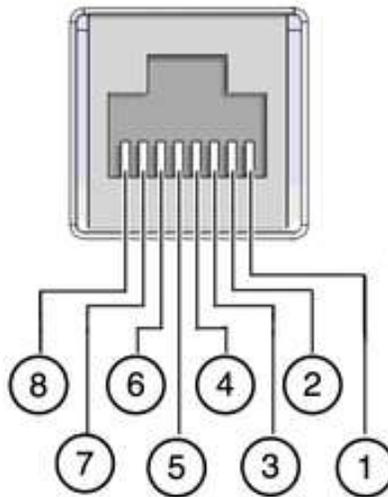


Figure 16: RJ45 Socket Pinout Example

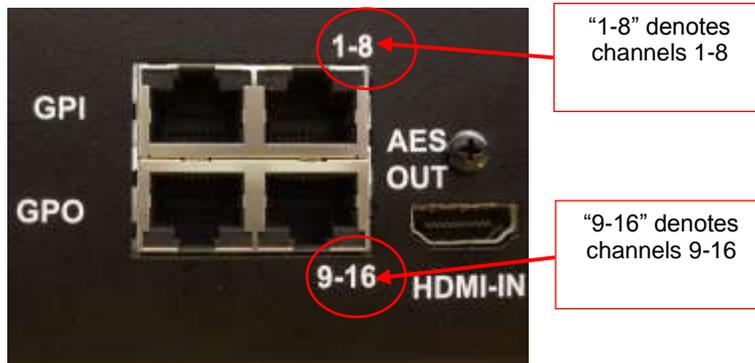


Figure 17: Audio and GPIO Connectors

- 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

- 7 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

- Power ON the ShowVault by pressing the power button.



Figure 18: 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 NEC Series-2 Projector.
- Click on "Menu" → "Doremi Apps." → "Device Manager."
- The following window will appear:

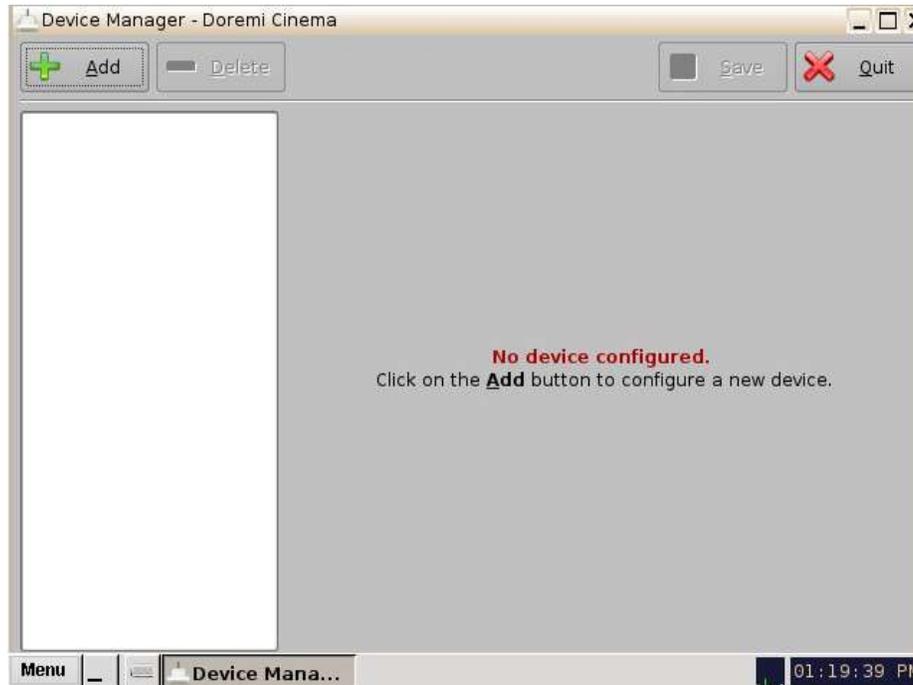


Figure 19: Device Manager GUI

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



Figure 20: Device Manager GUI - Add Device Window

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

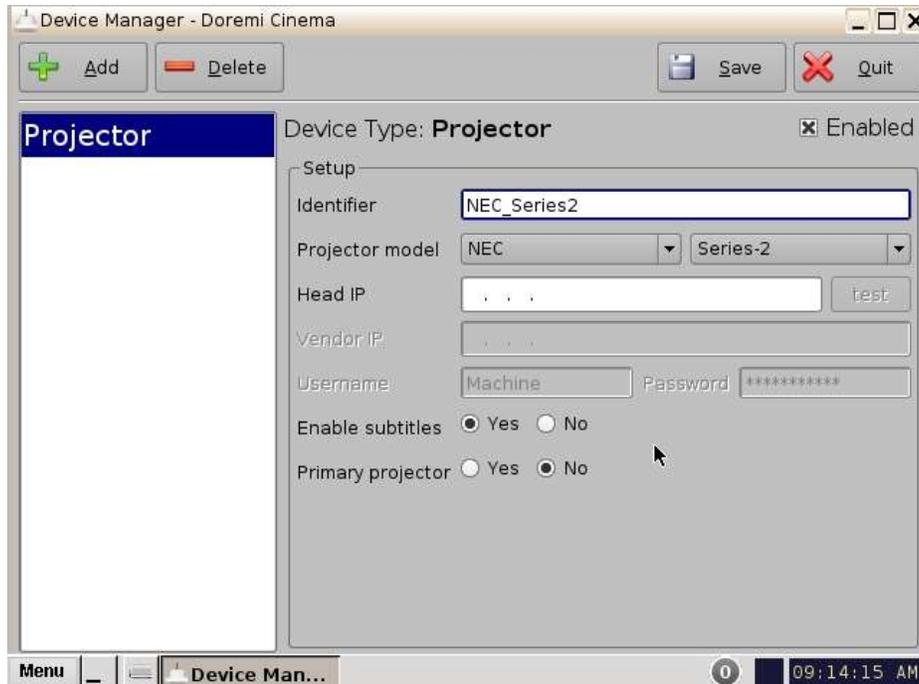


Figure 21: Device Manager Menu with NEC Projector Added

- Select the "Projector model" and select "NEC" from the drop-down list 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:

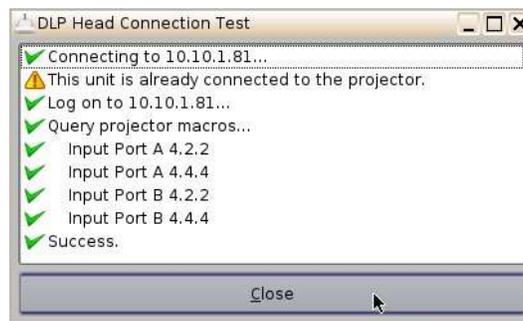


Figure 22: Test Screen

5 IMB Marriage Procedure

At this stage, the NEC Series-2 projector has to be configured with the IMB board. In order to accomplish this step a Windows PC is required to be in the same network with the Digital Cinema Communicator (DCC) software installed.

Important: The projector has to remain in Standby mode in order to change the configuration.



Figure 23: NEC Projector Panel

- Open the Digital Cinema Communicator (DCCs2) Software.

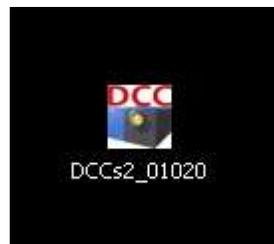


Figure 24: DCC Software Icon

- The DCC Software will prompt you with the Communication Settings. Fill in the IP address section with the projector's IP.



Figure 25: DCC Software



Figure 26: DCC Software

- Once you are connected to the projector. You are required to log in as Service user. Go to **Mode** → **Service** → **Password = 3151**



Figure 27: DCC Software - Mode Button



Figure 28: DCC Software Service Tab

- When you are logged in as "Service" user, the option slot settings requires configuration for Slot B = IMB and Slot A = MMS. This can only be changed when the projector is in standby mode.
- Go to **Right Arrow** → **Setup**→ **Option Slot**

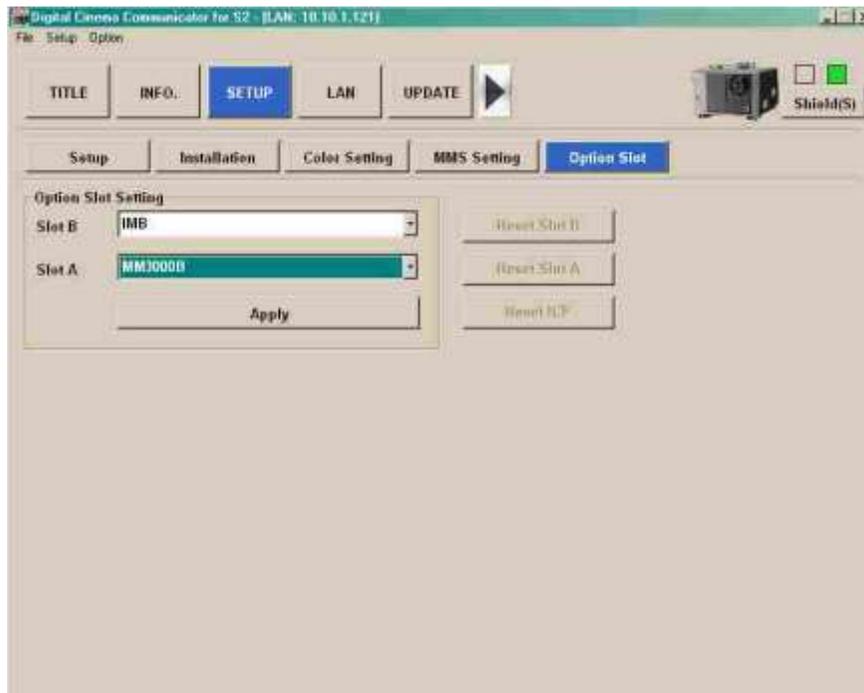


Figure 29: DCC Software - Setup Tab with Option Slot

- Click the Apply button.

- Power ON the Series 2 projector.
- Go to **Start** → **Power ON** → **Lamp ON**



Figure 30: DCC Software - Projector Power-On

- Go to the Setup tab and click on the Installation sub-tab.

- Before proceeding further, you must clear the tamper warning, which is caused by having the side panel removed.
 - Go to the Menu panel on the NEC Projector and hold the "Menu" button.
 - Wait for the text to read Password and then input 3151 using the number keys on left.
 - Press Enter. This will have cleared the tamper warning.



Figure 31: NEC Projector Panel

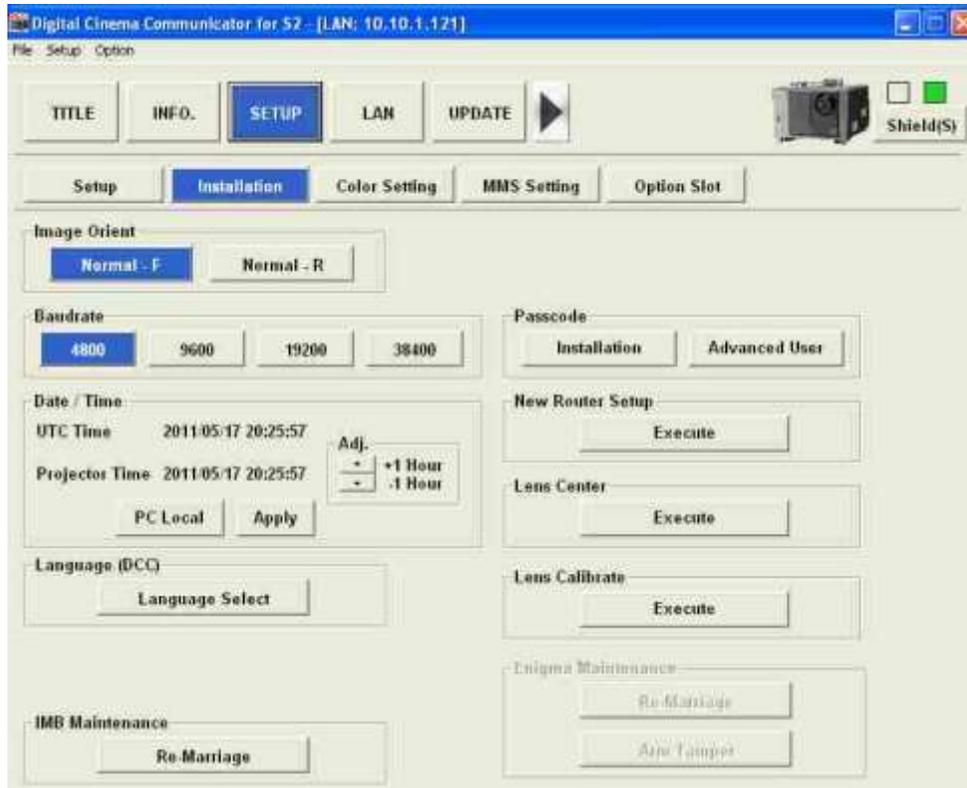


Figure 32: SetUp Tab - Installation Sub-Tab

- Click the "Re-Marriage" button to perform the marriage.
- The "IMB Re-Marriage" pop-up window will appear.



Figure 33: IMB Re-Marriage Pop-Up Window

- Input the login ID and password. Then click the "Re-Marriage" button.
- An "Operation Successful" window will appear. Click OK.



Figure 34: IMB Re-Marriage Success Window

6 IMB Troubleshooting Instructions

This section illustrates the steps needed to support troubleshooting. 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

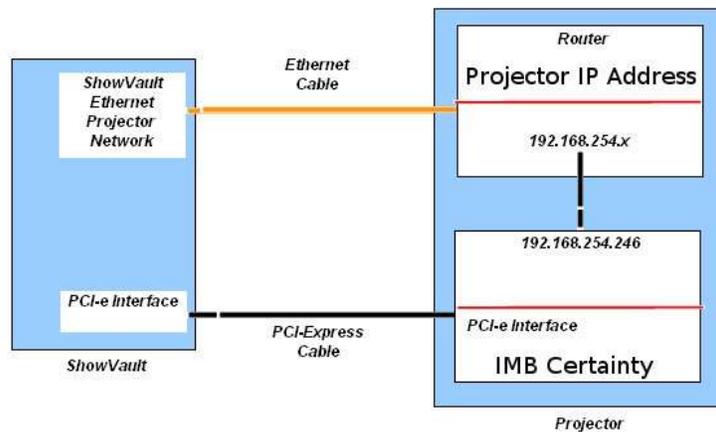


Figure 35: Hardware Configuration Diagram

7 Video Source Set Up

- Open a new terminal window and log in as ROOT
 - Type: `> /doremi/sbin/sbcsetup.out --set-video-source {Source} <enter>`

7.1 Video Source

- In order to change the video source to HDMI video input type the following command.
 - Type: `> /doremi/sbin/sbcsetup.out --set-video-source hdmi`



Figure 36: HDMI-In Connector

- In order to change the video source to SDI Video Input type the following command.
 - Type: `> /doremi/sbin/sbcsetup.out --set-video-source sdi`



Figure 37: SDI Video Input

- In order to change the video source back to the ShowVault type the following command
 - Type: `> /doremi/sbin/sbcsetup.out --set-video-source internal`

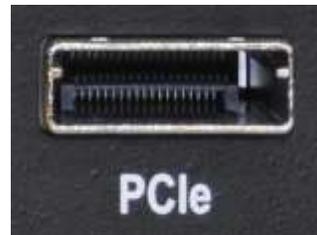


Figure 38: PCI-Express Cable Connector

8 Maintenance

8.1 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 39: 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 40: 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 8.2.

8.2 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

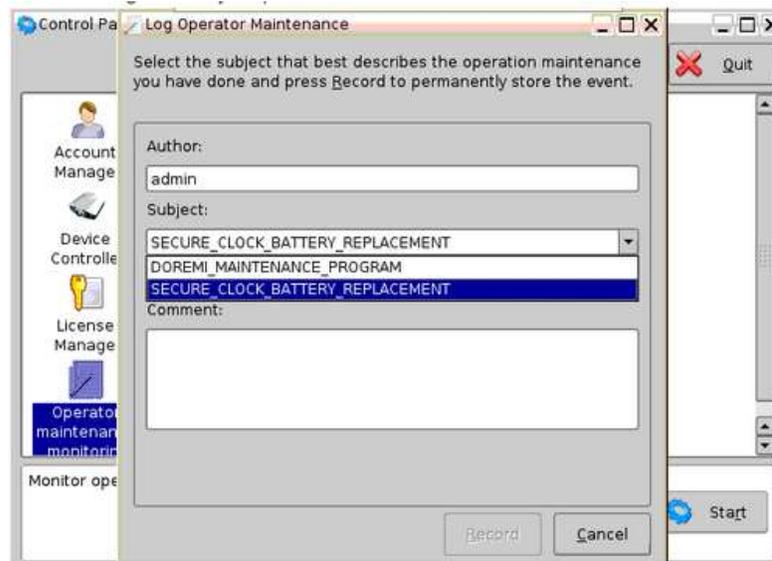


Figure 41: Log Operator Maintenance Window

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.

8.2.1 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.

9 Acronyms

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

10 Document Revision History

Date	Version	Description
04/02/2010	1.0	First version.
05/19/2011	1.1	All sections revised. Marriage procedure updated to reflect current software settings.
06/13/2011	1.2	Section 1.2 was modified to reflect the current software and firmware configuration.
09/14/2011	1.3	All sections modified.
01/24/2012	1.4	Contact information revised.
07/17/2012	1.5	Section 3.1.1 HD-SDI input information added.
02/11/2013	1.6	Minor revisions made to Section 3.
01/22/2014	1.7	Addition of Section 8.