Castor-PJ1

Machine Codes: Y057

Field Service Manual

August, 2014

Important Safety Notices

Safety Instructions

The service technician is required to read and follow the “Safety Precautions” and “Important Safety Notice” in this service manual.

⚠WARNING

- This service information is designed for experienced repair technicians only and is not designed for use by the general public. It dose not contain warnings or cautions to advise non-technical individuals of potential dangers in attempting to service a product. Products powered by electricity should be serviced or repaired only by experienced professional technicians. Any attempt to service or repair the product or products dealt with in this service information by anyone else could result in serious injury or death.
- Use UV Radiation eye and skin protection during servicing.

⚠CAUTION

- Precaution
- If using of this projector at high altitudes, “High Altitude” to “ON” for 1,000 to 3,000m.
  (Refer to “PROJECTOR SETUP menu” in Operating Instructions.)
  Failure to observe this may cause malfunctions. Never use this projector at an altitude of 3,000m or higher. Using this projector at high altitude, consult your dealer or Authorized Service Center about preparations.
- About lead free solder (PbF)
- This projector is using the P.C.Board which applies lead free solder.
  Use lead free solder in servicing from the standpoint of antipollution for the global environment.
  - Lead free solder: Sn-Ag-Cu (tin, silver and copper) has a higher melting point (approx. 217°C) than standard solder Typically the melting point is 30 to 40°C higher. When servicing, use a high temperature soldering iron with temperature limitation function and set it to 370 ± 10°C.
  - Be precautious about lead free solder. Sn-Ag-Cu (tin, silver and copper) will tend to splash when heated too high (approx. 600°C or higher).
  - Use lead free solder for the P.C.Board (specified on it as “PbF”) which uses lead free solder. (When you unavoidably use lead solder, use lead solder after removing lead free solder. Or be sure to heat the lead free solder until it melts completely, before applying lead solder.)
  - After solder to double layered P.C Boards, check the component side for excess solder which may flow onto the opposite side.

IMPORTANT SAFETY NOTICE

There are special parts used in the projector which are important for safety. These parts are shaded on the schematic diagram. It is essential that these critical parts should be replaced with manufacturer's specified parts to prevent shock, fire, or other hazards. Do not modify the original design without permission of Ricoh Company Ltd.

⚠WARNING

- This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation.
- This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions,
- may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation.
- If this equipment dose cause harmful interference to radio or television reception, which can be determined by turning the equipment
- off and on, The user is encouraged to try to correct the interference by one or more of the following measures.
- - Reorient or relocate the receiving antenna.
- - Increase the separation between the equipment and receiver.
- - Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- - Consult the dealer or an experienced radio/TV technician for help.

⚠CAUTION

- Any unauthorized changes or modifications to this equipment will void the user's authority to operate this device.

Safety and Ecological Notes for Disposal

Dispose of replaced parts in accordance with local regulations.

TABLE OF CONTENTS

4. Firmware Update

1. Product Information

Specifications

List of General Specifications

Item	Specification
Consumption Power	240W (ECO mode) / 295W (Full mode)
Weight	2.9kg
Dimensions (WxHxD)	220 x 288 x 100 mm (with protruding parts)
Environmental Considerations	Operational Temperatures : 41° to 95°F (5° to 35°C) 20% to 80% humidity (non-condensing) Storage Temperatures : -4° to 140°F (-20° to 60°C) 20% to 80% humidity (non-condensing)
Projection System	Single DLP® 0.55" chip
Resolution	1024 × 768 pixels (XGA)
Lens	F#2.8 f=7.26mm
Lamp	High-pressure mercury lamp (240W)
Lamp Life	3500hours typical (Full Mode) / 5000 hours typical (ECO1/ ECO2 Mode) / 10000hours typical (Auto Mode)
Projection screen size	40 - 200 inch
Projection distance	0.51 - 2.54m (Focus range)
Speaker	8W (Mono)
Connection terminal,	
Computer In terminal× 2	Mini D sub 15 pin RGB / Y/PB / PR (dual use)
Monitor Out terminal	Mini D sub 15 pin
HDMI terminal	HDMI
Video terminal	RCA Pin Jack

Item	Specification
PC Control terminal	D sub 9 pin Female (RS-232C compliant)
Audio In terminal × 2	3.5mm diameter mini-jack (1) Computer 1 or Computer 2 (2) Video
Audio Out terminal	3.5mm diameter mini-jack

Compatibility Modes

Computer/ Video/ HDMI/ Mac Compatibility

Signal	Resolution	Refresh Rate (Hz)	Video	Analog	HDMI	Mac
NTSC	720 x 480	60	O	-	-	-
PAL/SECAM	720 x 576	50	O	-	-	-
VGA	640 x 480	60	-	O	O	O
	640 x 480	67	-	O	-	-
	640 x 480	72.8	-	O	-	O
	640 x 480	85	-	O	-	O
SVGA	800 x 600	56.3	-	O	-	-
	800 x 600	60.3	-	O	O	O
	800 x 600	72.2	-	O	O	O
	800 x 600	85.1	-	O	O	O
	800 x 600	120	-	O	O	-
XGA	1024 x 768	60	-	O	O	O
	1024 x 768	70.1	-	O	O	O
	1024 x 768	75	-	O	O	O
	1024 x 768	85	-	O	O	O
	1024 x 768	120	-	O	O	-
WSVGA	1024 x 600	60	-	-	O	O

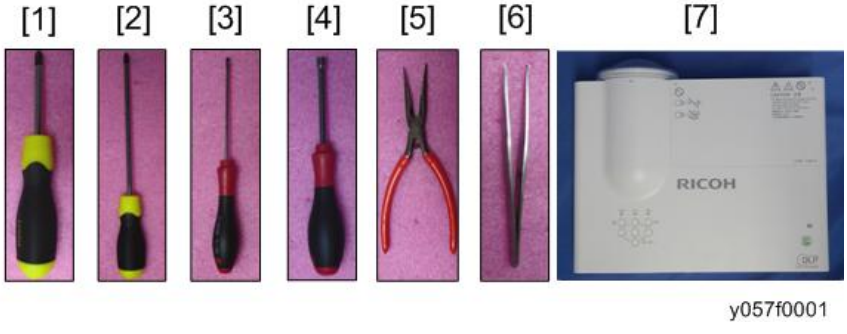
HDTV (720p)	1280 x 720	50	O	O	O	-
	1280 x 720	60	O	O	O	O
	1280 x 720	120	-	O	O	-
WXGA	1280 x 768	60	-	O	O	O
	1280 x 768	75	-	O	O	O
	1280 x 768	85	-	O	O	O
	1280 x 800	60	-	O	O	O
	1366 x 768	60	-	O	O	-
WXGA+	1440 x 900	60	-	O	O	-
SXGA	1280 x 1024	60	-	O	O	O
	1280 x 1024	75	-	O	O	O
	1280 x 1024	85	-	O	O	-
SXGA+	1400 x 1050	60	-	O	O	-
UXGA	1600 x1200	60	-	O	O	-
HDTV (1080p)	1920 x 1080	24	O	O	O	-
	1920 x 1080	30	-	-	O	-
	1920 x 1080	50	O	O	O	-
	1920 x 1080	60	O	O	O	O
HDTV (1080i)	1920 x 1080	50	O	-	O	-
	1920 x 1080	60	O	-	O	-
WUXGA	1920 x 1200	60 (*1)	-	O	O	O
SDTV (576i)	768 x 576	50	O	-	O	-
SDTV (576p)	768 x 576	50	O	-	O	-
SDTV (480i)	640 x 480	60	O	-	O	-
SDTV (480p)	640 x 480	60	O	-	O	-

- Please note that using resolutions other than native 1024 x 768 (native resolution of this model) may result in some loss of image clarity.
- (*1) 1920 x1200 @60Hz only support RB (reduced blanking).
- 120Hz input signals may be dependent on graphics cards support.

2. Replacement and Adjustment

Equipment Needed & Product Overview

1. Screw Bit (+): 105
2. Screw Bit (+): 107
3. Screw Bit (-): 107
4. Hex Sleeves 5 mm
5. Long Nose Nipper
6. Tweezers
7. Projector

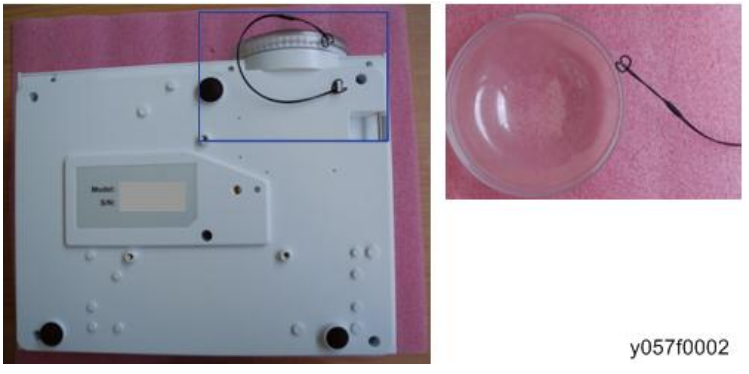


* Before you start: This process is protective level 2. Operators should wear electrostatic chains.

Disassembly & Assembly Process

Disassemble Filter and Focus Ring

1. Separate the Lens Cap and projector (as blue square).

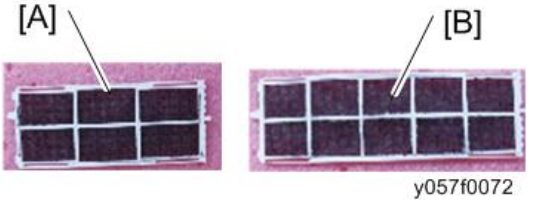


y057f0002

2. Pull down the tenon (as red square) to disassemble the Left Filter.
3. Pull down the tenon (as yellow square) to disassemble the Right Filter.

y057f0003

4. Disassembled the Left Filter [A] and the Right Filter [B].



y057f0072

5. **Please rotate the Focus Ring outward so as to take out the focus ring easily.**

y057f0004

6. **Pull out the Focus Ring.**

Note

- When you assemble the Focus Ring, ensure the 3 card slot (as green square) placed in the 3 double-screw bolt (as red circle) properly, and the Focus Ring can be well adjusted.

y057f0005

Disassemble Lamp Module

1. **Loosen 1 screw (as red circle) on the Lamp Cover.**

2. **Disassembled the Lamp Cover.**

y057f0006

3. **Loosen 2 screws (as yellow circle) on the Lamp Module.**

y057f0007

4. **Take off the Lamp Module.**

y057f0073

Disassemble Top Cover Module

1. Unscrew 2 screws (as red circle) from the Top Cover and unscrew 8 screws (as green circle) from the Bottom Cover.

y057f0008

2. Pull upward the Top Cover Module.
3. Unplug connector (as blue square), then remove the Top Cover Module.

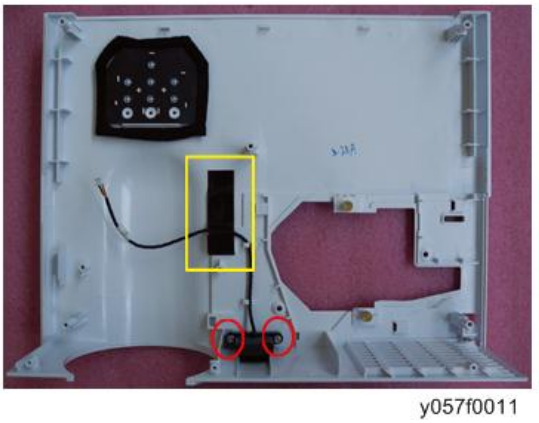
y057f0009

4. **Disassemble the Top Cover Module.**

y057f0010

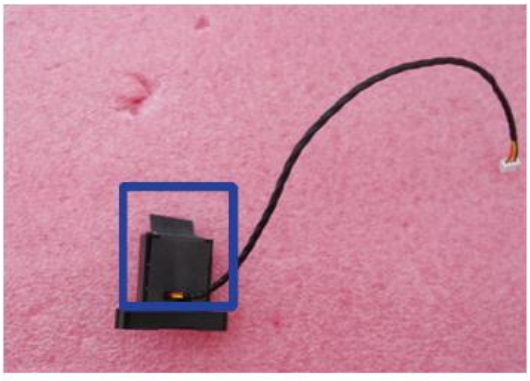
Disassemble IR Sensor and IR Sensor Board

1. **Unscrew 2 screws (as red circle) and tear off the Tape (as yellow square) to disassemble the IR Sensor Module.**



y057f0011

2. Tear off the Mylar (as blue square).

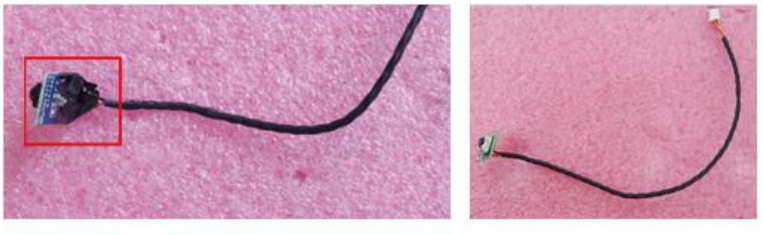


y057f0012

3. Separate the IR Holder and IR Sensor Board.

y057f0013

4. Tear off the Tape (as red square) to disassemble the IR Sensor Board.



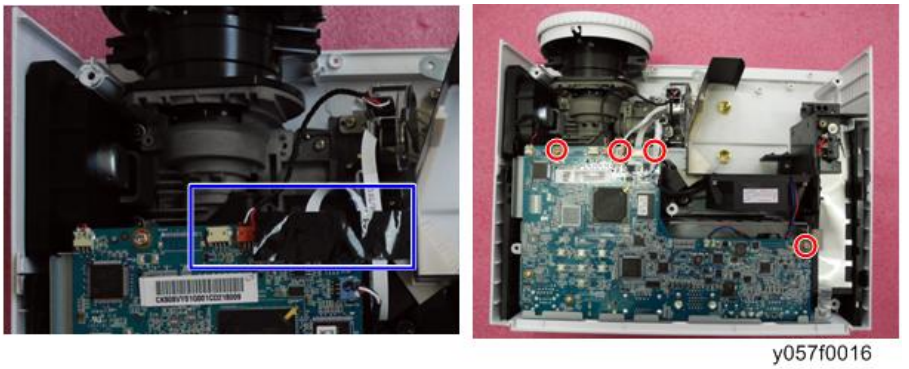
y057f0014

5. Tear off the Sponge and Mylar (as red square).

y057f0015

Disassemble Main Board Module and Shielding

1. Tear off the Tape (as blue square) and unscrew 4 screws (as red circle).

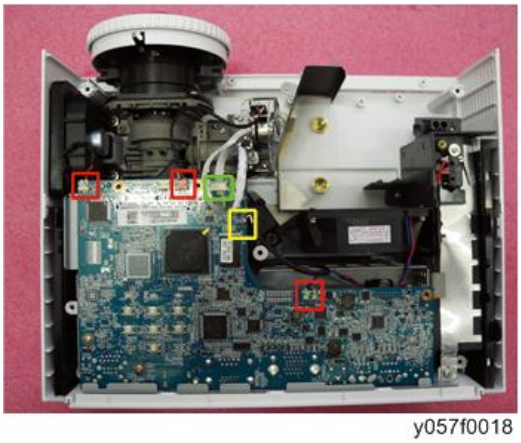


y057f0016

2. Unscrew 8 hex screws (as green circle) and screw (as yellow circle).

y057f0017

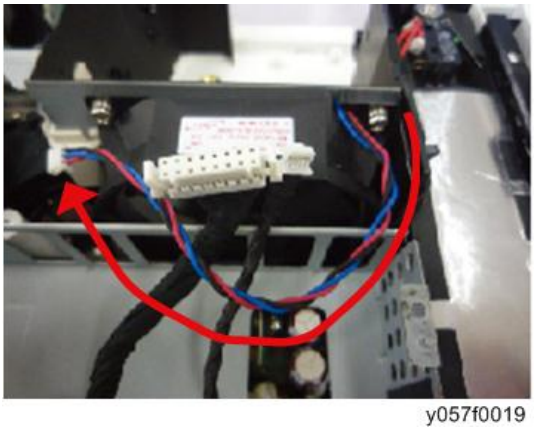
3. **Unplug 3 connectors (as red square) and 1 connector (as yellow square) of Blower.**
4. **Unplug connector (as green square) of Color Wheel.**



y057f0018

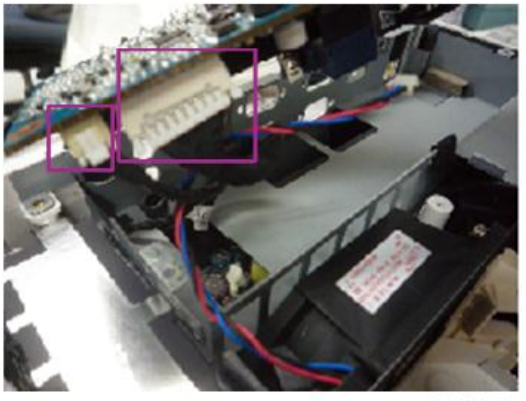
Note

- Correctly SYS FAN Cable as the below arrow.



y057f0019

5. Unplug 2 connectors (as purple square).



y057f0020

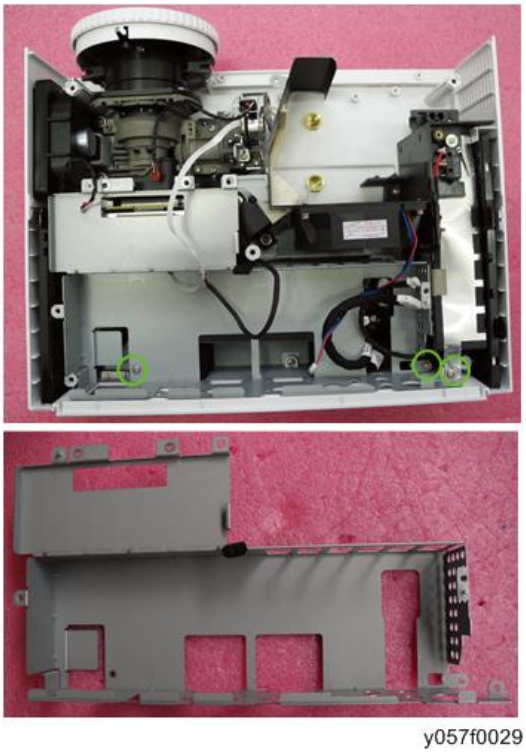
- Please refer to the table as below for details about each connector.

Item	Male Connector on Main Board	The key feature	Figure
A	System Fan	Compose of Red/Blue/Black wire (3 pin)	 y057f0021
B	Blower	Compose of Red/White/Black wire (3 pin)	 y057f0022
C	Photo Sensor	Compose of Red/ Black/White wire, Red Connector and Black wire tube (3 pin)	 y057f0023
D	Speaker	Compose of Black/Red wire and Black wire tube (2 pin)	 y057f0024

6. **Disassemble Main Board Module.**

y057f0025

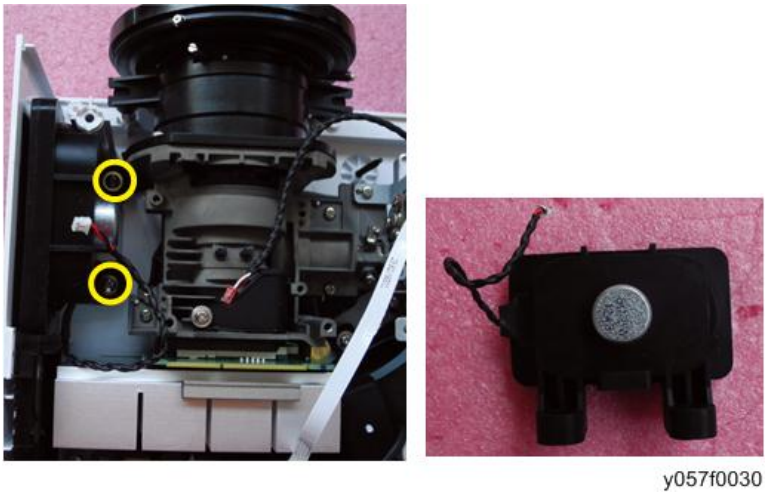
7. **Unscrew 3 screws (as green circle) to disassemble the Shielding.**



y057f0029

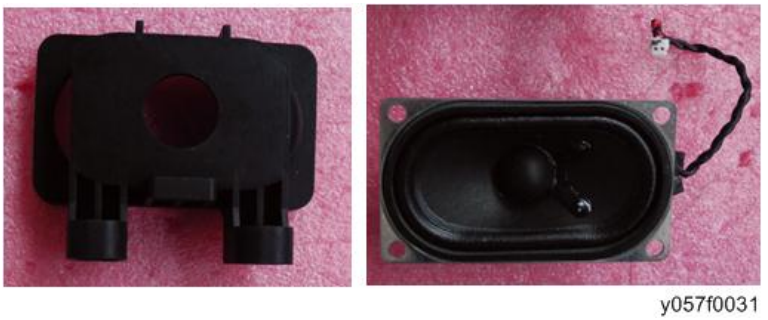
Disassemble Speaker Module and Filter Holder

1. Unscrew 2 screws (as yellow circle) to disassemble the Speaker Module.



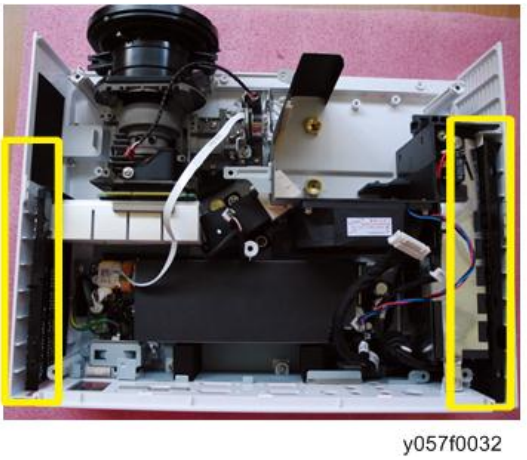
y057f0030

2. Separate the Speaker and Rubber.



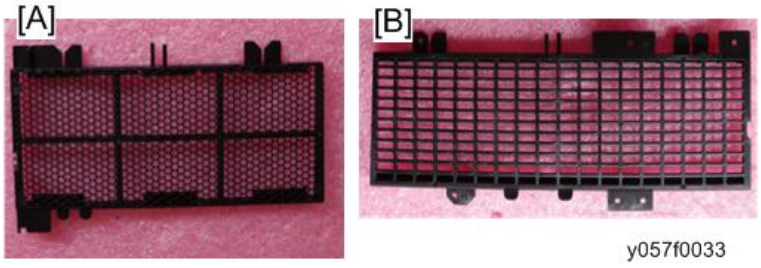
y057f0031

3. Separate the Filter Holder (as yellow square).



y057f0032

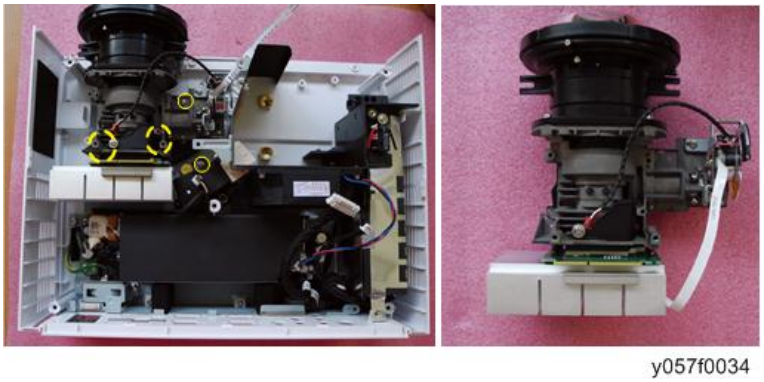
- Left filter [A] and right filter [B]



y057f0033

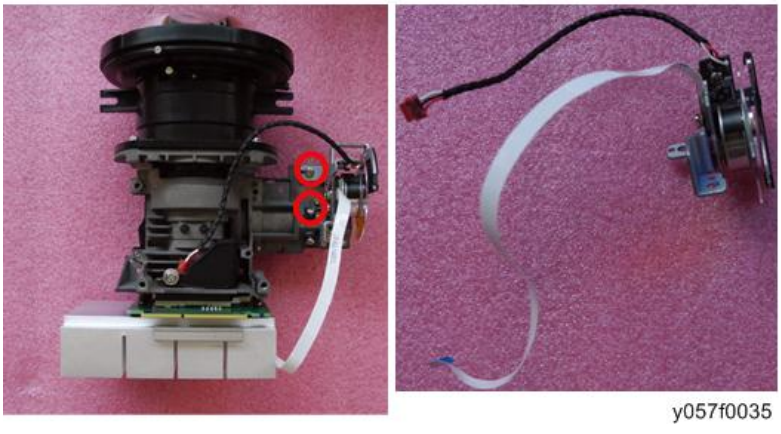
Disassemble Engine Module

1. **Unscrew 4 screws (as yellow circle) to disassemble the Engine Module.**



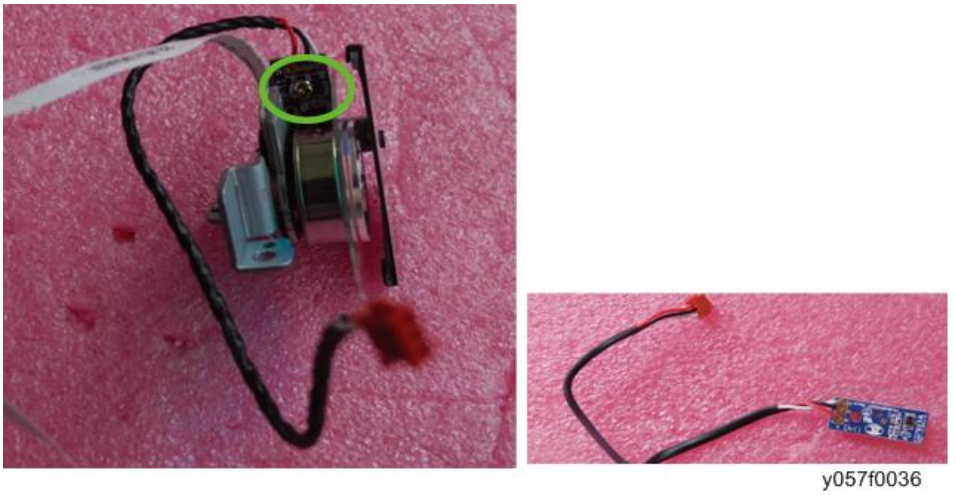
y057f0034

2. **Unscrew 2 screws (as red circle) to disassemble the Color Wheel Module.**



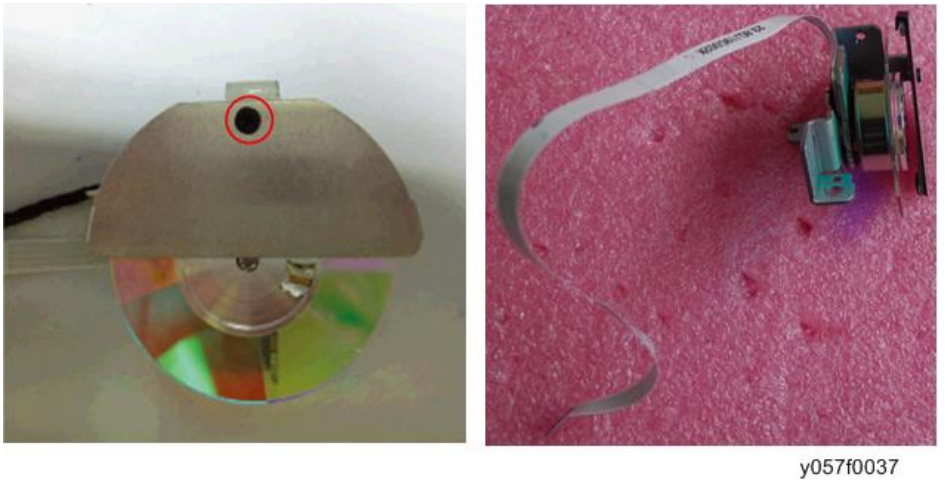
y057f0035

3. Unscrew 1 screw (as green circle) to disassemble the Photo Sensor Board.



y057f0036

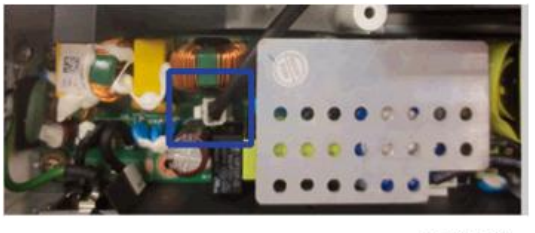
4. Unscrew screw (as red circle) to disassemble C/W Module and C/W Holder Plate.



y057f0037

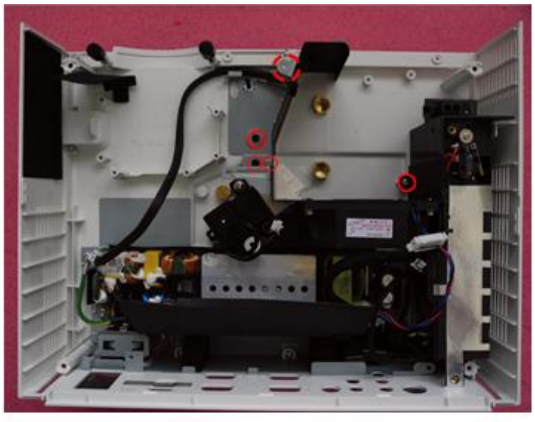
Disassemble System Fan Module

1. Unplug the Thermal Fuse connector (as blue square).

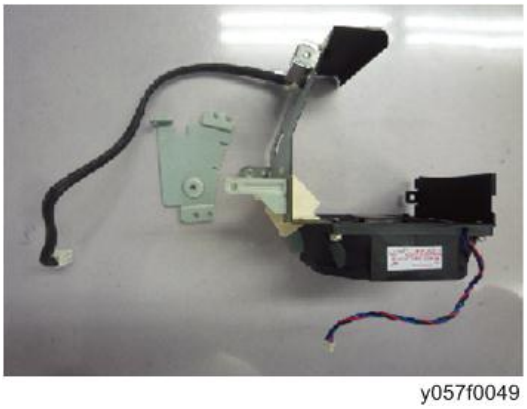


y057f0047

2. Unscrew 5 screws (as red circle) to disassemble System Fan Module.



y057f0048

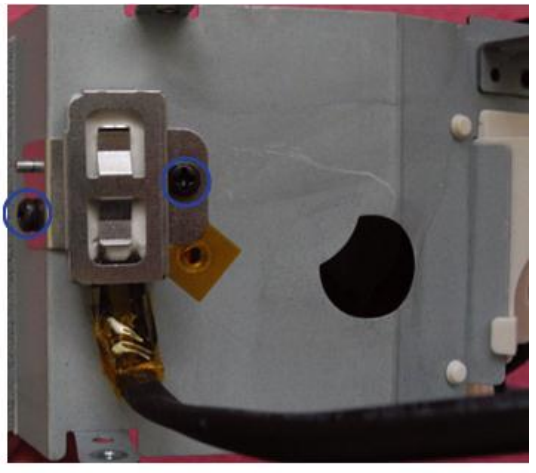


y057f0049

3. Unscrew 4 screws (as green circle) to separate System Fan and Fan Shielding.

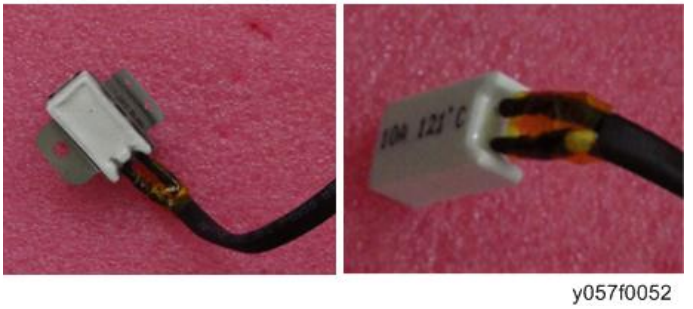
y057f0050

4. **Unscrew 2 screws (as blue circle) to disassemble Thermal Fuse.**



y057f0051

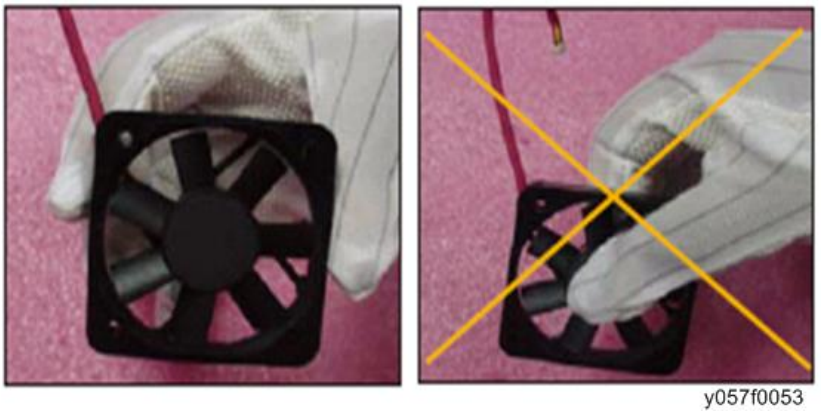
5. **Separate Thermal Fuse and Thermal Fuse Holder.**



y057f0052

Note

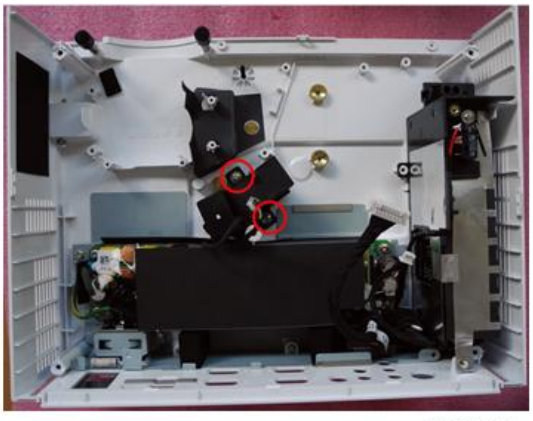
- Take the Fan Module as the right gesture.



y057f0053

Disassemble Blower

1. **Unscrew 2 screws (as red circle) to disassemble the Blower Module.**



y057f0055

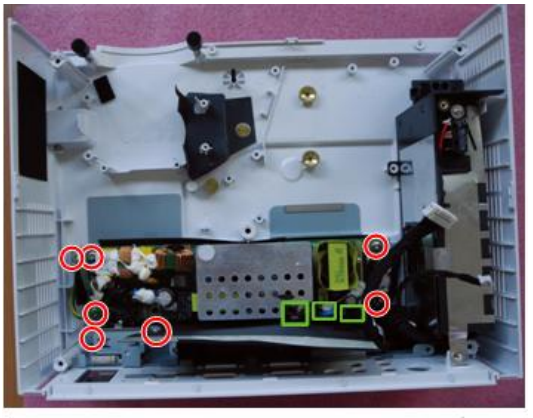
2. **Separate the Blower and Blower Rubber.**

y057f0056

Disassemble LVPS Module

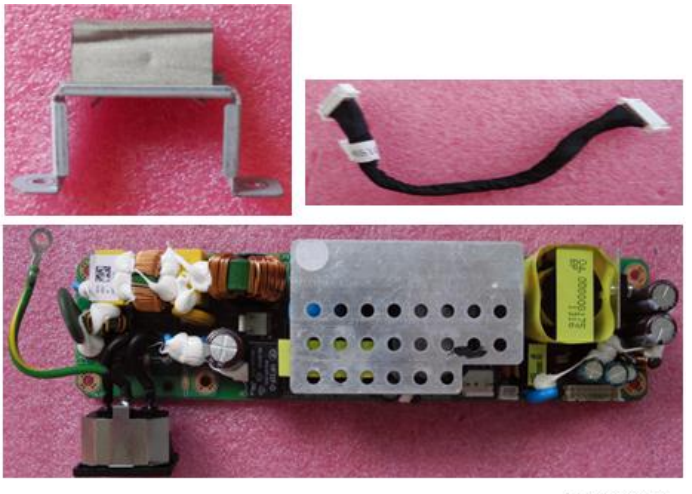
1. **Unscrew 7 screws (as red circle) to disassemble the LVPS Module.**
   - Two screws for AC inlet
   - One screw for ground cable
   - Four screws for LVPS

2. **Unplug 3 connectors (as green square).**



y057f0057

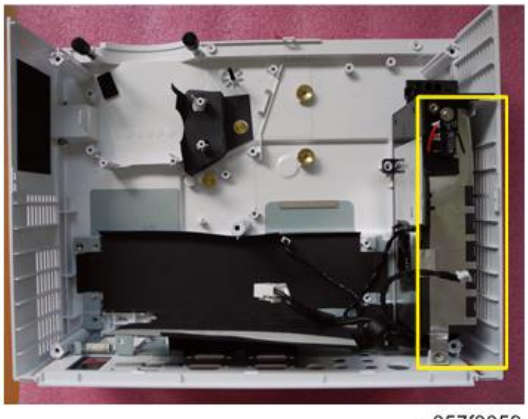
3. **Remove the Cable and the AC Inlet Bracket from LVPS Module.**



y057f0058

Disassemble Ballast Module and Interrupter Switch

1. Disassemble the Ballast Module (as yellow square).



y057f0059

2. Unscrew screw (as red circle) to disassemble the Interrupter Switch.

y057f0060

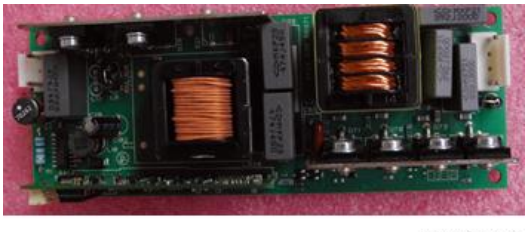
3. Take the Interrupter Switch (as green square).

y057f0061

4. Unplug 3 connectors (as red square).
5. Unscrew 4 screws (as green circle).

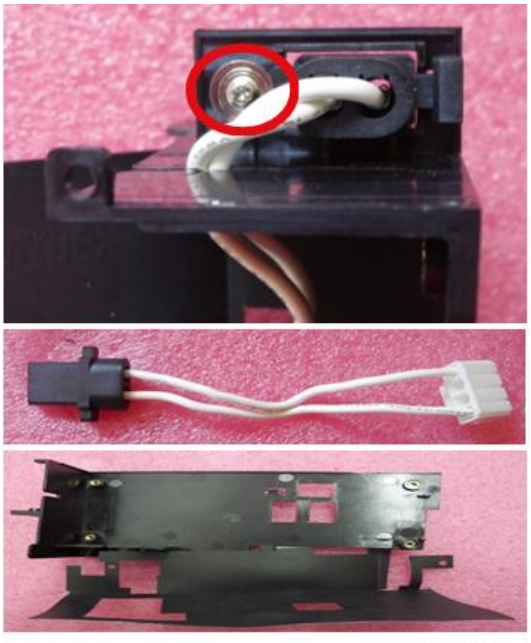
y057f0062

6. Separate Ballast and Ballast Holder.



y057f0063

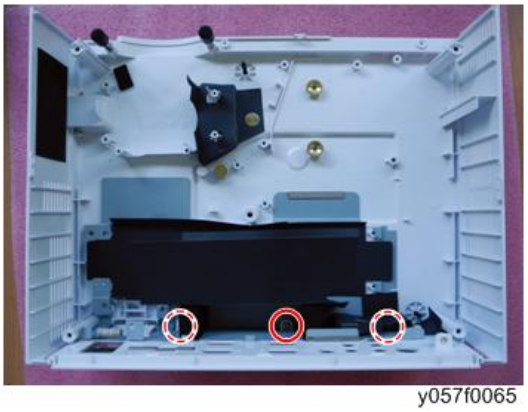
7. Unscrew 1 screw (as red circle), separate Ballast Holder and Ballast 2P Cable.



y057f0064

Disassemble Bottom Shielding and IO Cover Module

1. Take off the Bottom Shielding and Mylar and unscrew 3 screws (as red circle).



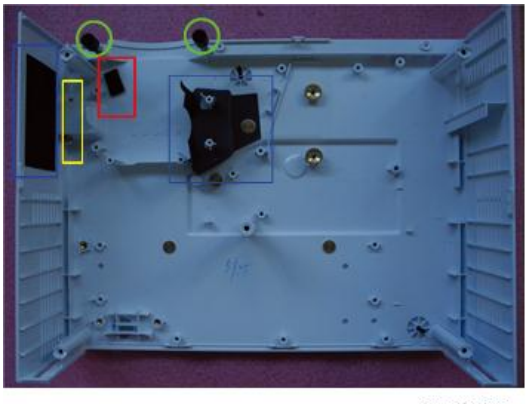
y057f0065

y057f0066

2. **Separate Bottom cover Module and IO Cover Module.**

y057f0067

3. **Tear off Mylar (as blue square) and Sponge (as red square).**
   - Pull out the Security Bar (as yellow square).
   - Unscrew 2 hex screws (as green circle).



y057f0068

4. **Disassemble is completed.**

y057f0069

Repair Action

Update	Change Parts					
	Main Board	Firmware	Lamp Module	Ballast	Blower	Color Wheel
Version Update	V	V				
Reset Lamp Hour			V			
OSD Reset	V	V				
Waveform Download and Fan Calibration	V	V		V	V	
Color Wheel Index Adjustment	V	V				V

- After changing parts, please execute the related items as table show above.

OSD Reset

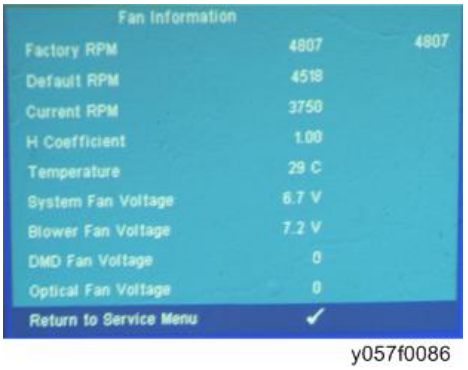
After final QC step, we have to erase all saved change again and restore the OSD default setting. The following actions will allow you to erase all end-users' settings and restore the default settings:

1. **Please enter OSD menu.**
2. **Choose "Settings" and then execute "Reset" function.**

Waveform Download and Fan Calibration

After replacing Ballast, main board, blower or upgrade firmware, please follow steps as below:

1. **Plug in power cord.**
2. **Press and hold the [Up] button and then press the [Power] button once.**
3. **Release the [Up] button after the [Temp] LED begins flashing.**
4. **After a moment, the projector will turn on automatically.**
5. **Wait a moment, enter the Service Mode by pressing the buttons sequentially as follows;**
   - Power > Left >Left > Menu
6. **Select "Factory Fan RPM" on the service menu and press "Menu" button. The picture as shown below will appear. Check that the value of "Factory RPM" is within the range.**



y057f0086

Color Wheel Index Adjustment

Note

- After replacing main board, optical engine or upgrading firmware, the Color Wheel Index Adjustment should be done.

y057f0094

Color wheel index adjustment procedure:

1. **Enter the Service Mode by pressing the buttons sequentially as follows:**
   - Power > Left > Left > Menu
2. **Select "Color Wheel Index" on the menu.**

3. **Press [Menu] button to enter the Color Wheel Index Adjustment mode.**
4. **Choose "Color Wheel Index", press [Menu] button to enter the Color Wheel Index Adjustment.**
5. **Adjust the color and gradation of the pattern correctly on the screen by pressing the [Left] or [Right] button.**

3. Troubleshooting

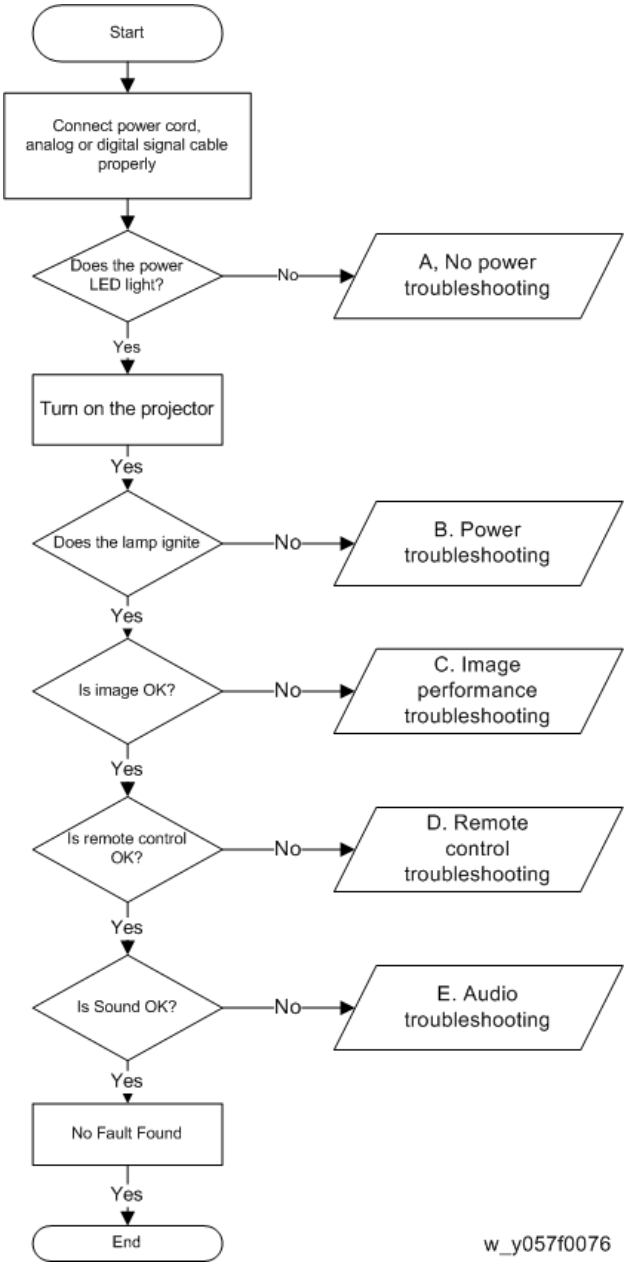
LED Lighting Message

Message	LAMP (Red)	TEMP (Red)	STANDBY LED	
			(Red)	(Green)
Standby	○	○		○
Normal (Power ON)	○	○	○	
Cooling state	○	○	Flashing (0.5 Sec)	○
Power up	○	○	○	Flashing (0.5 Sec)
Firmware Download	☼	☼	☼	○
Over Temp	○	☼	☼	○
Fan lock	○	Flashing (0.5 Sec)	☼	○
Lamp Fail	☼	○	☼	○
Color Wheel Fail	Flashing (0.5 Sec)	○	☼	○

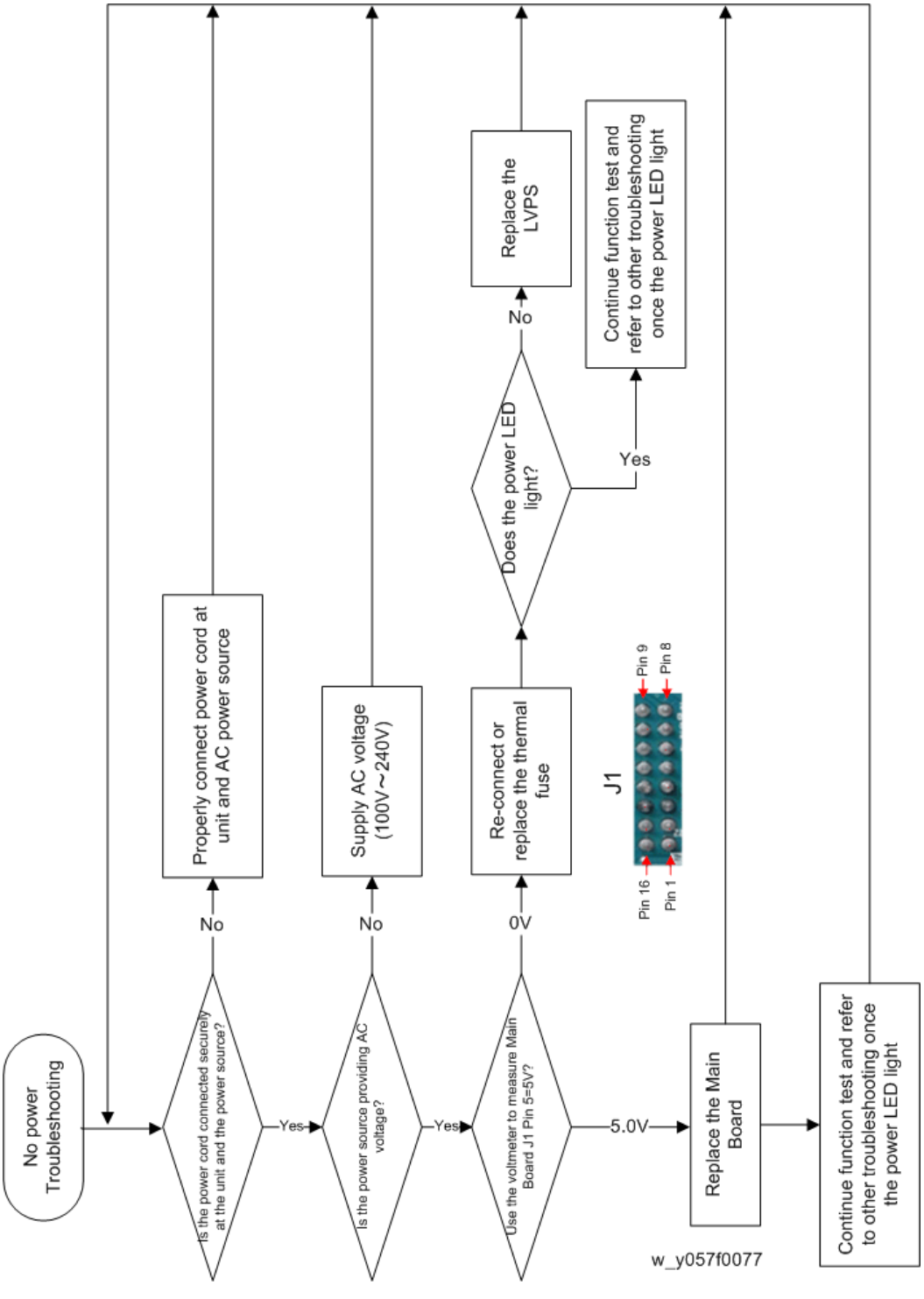
☼: Steady light/ ○: No light

Troubleshooting Guide

Main Procedure



NO Power Troubleshooting



Power Troubleshooting

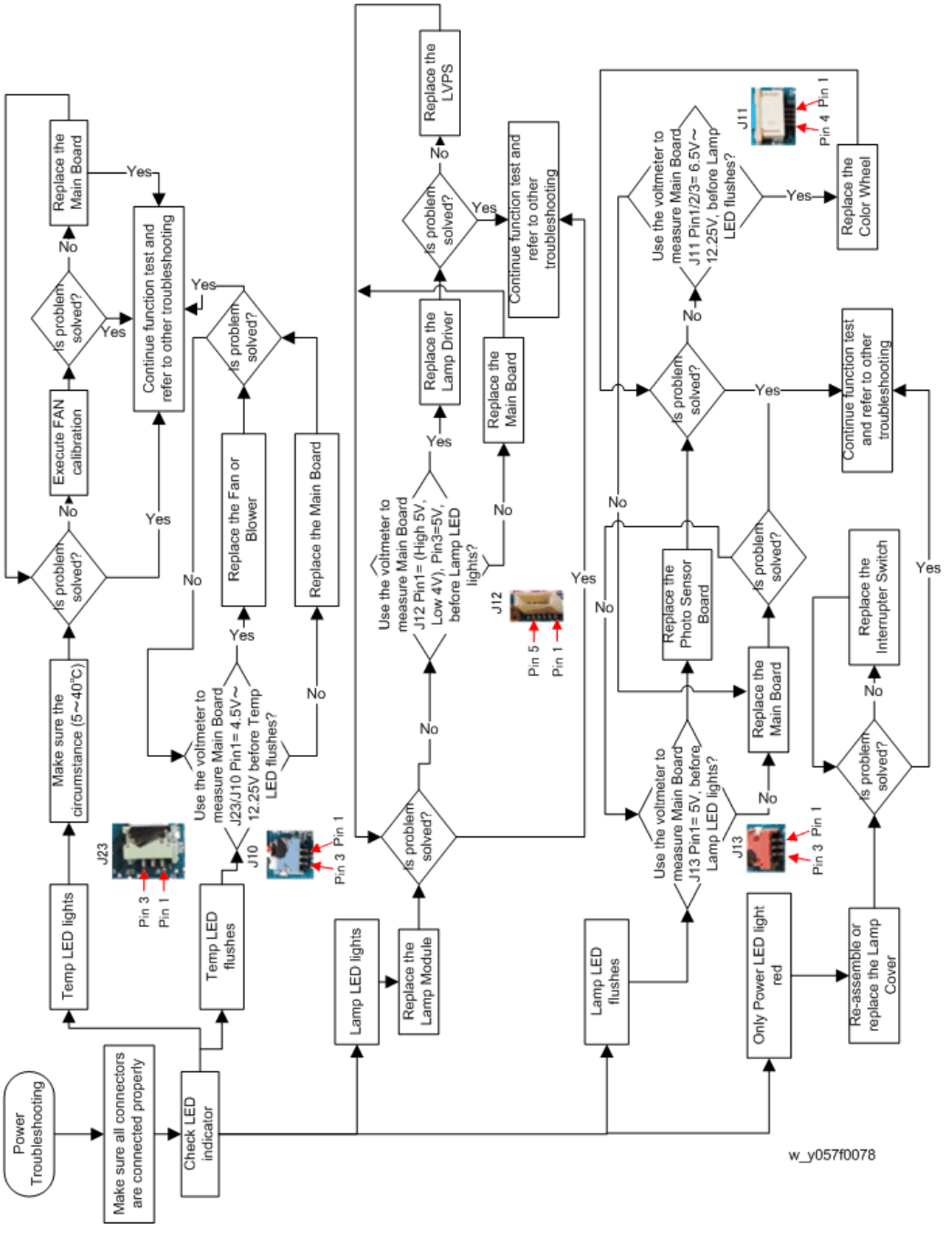


Image Troubleshooting 1

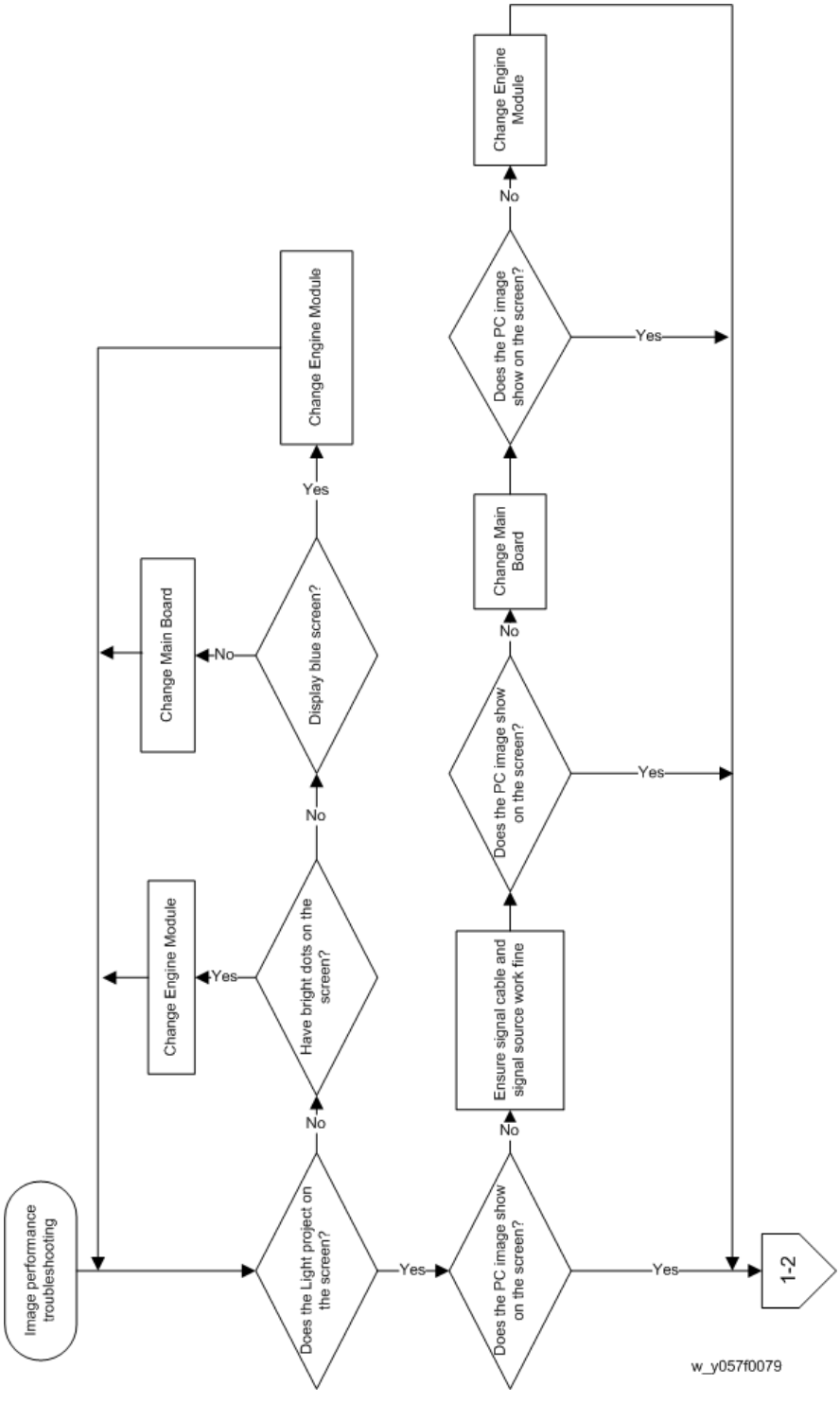


Image Troubleshooting 2

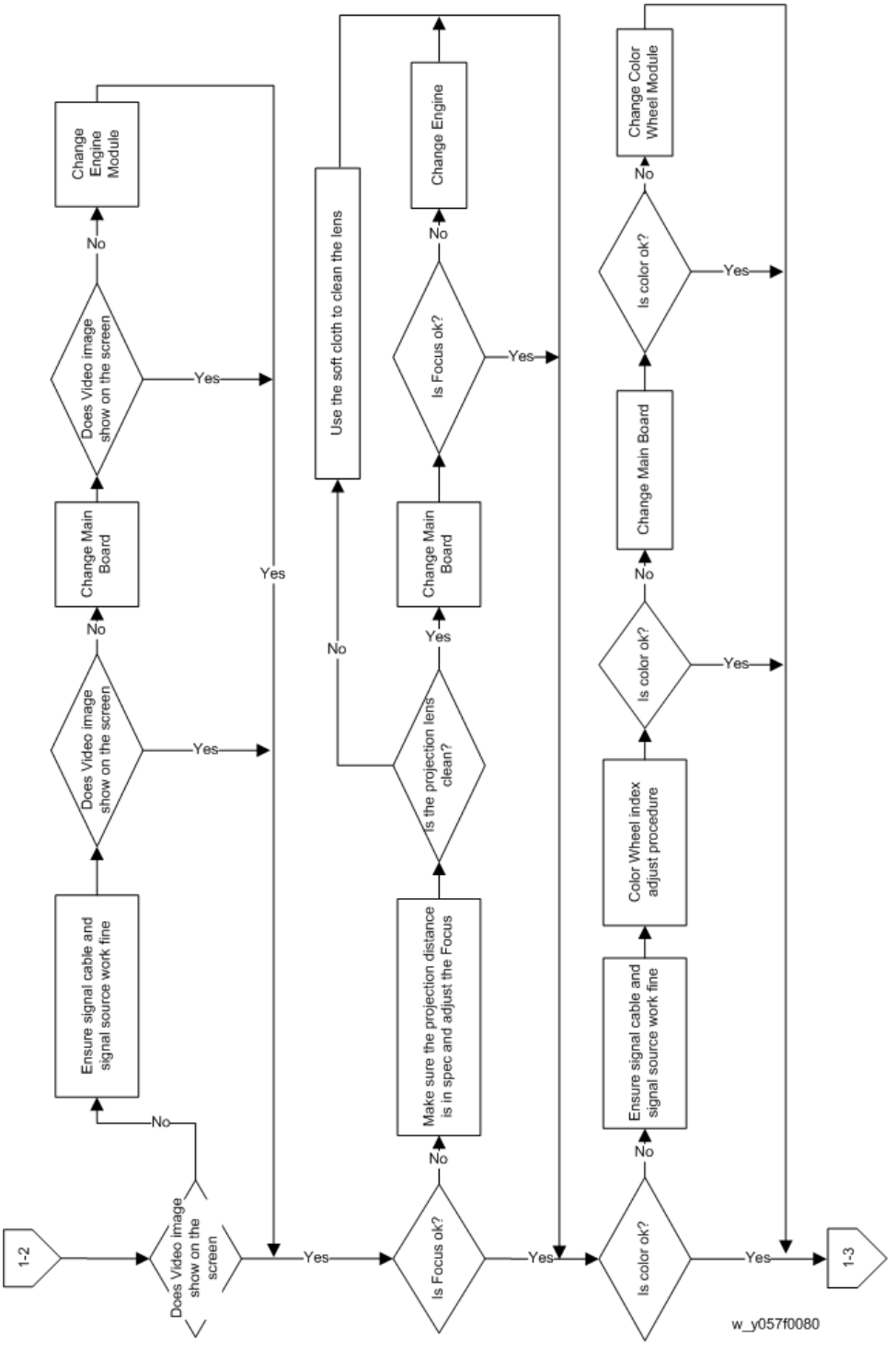


Image Troubleshooting 3

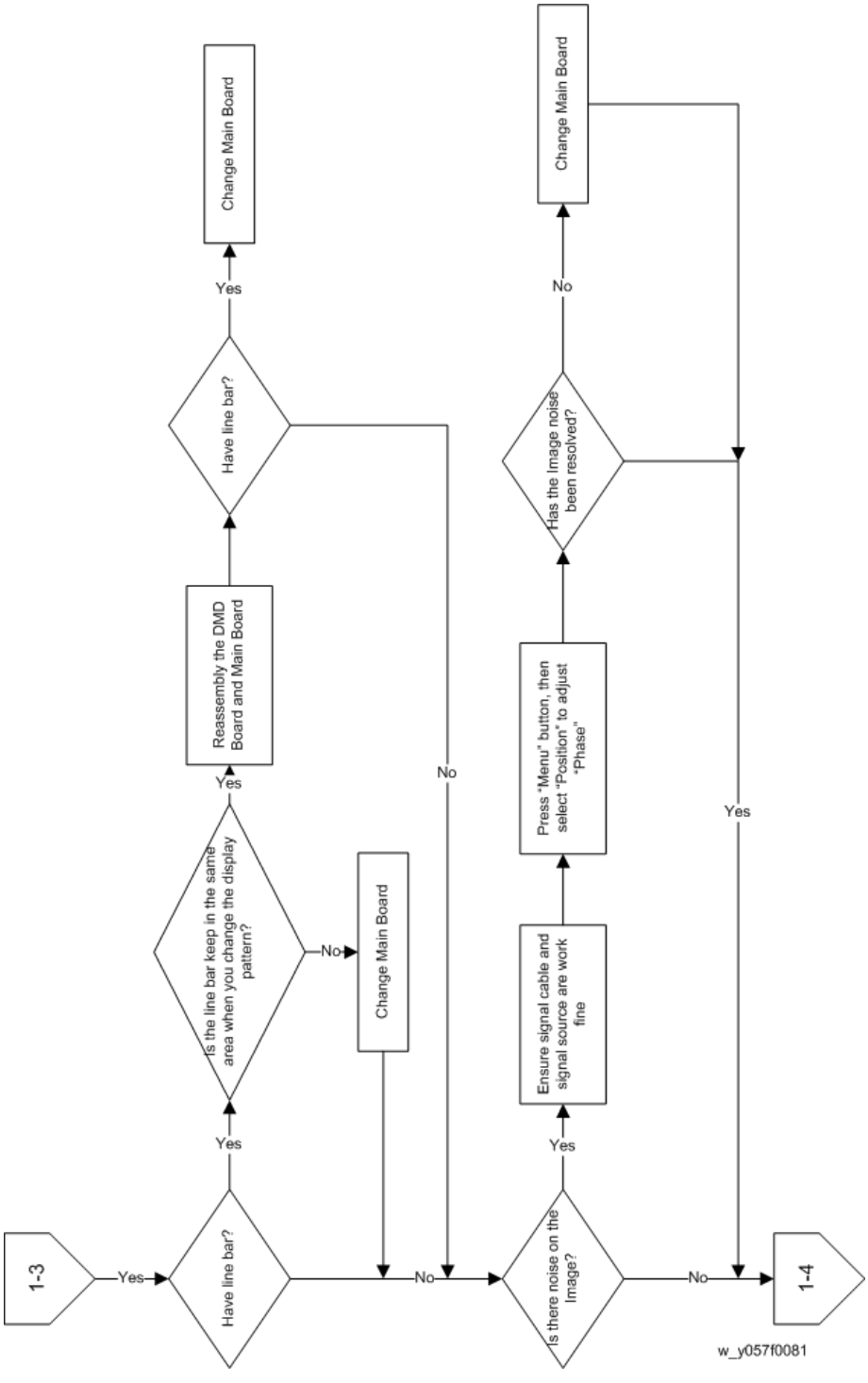
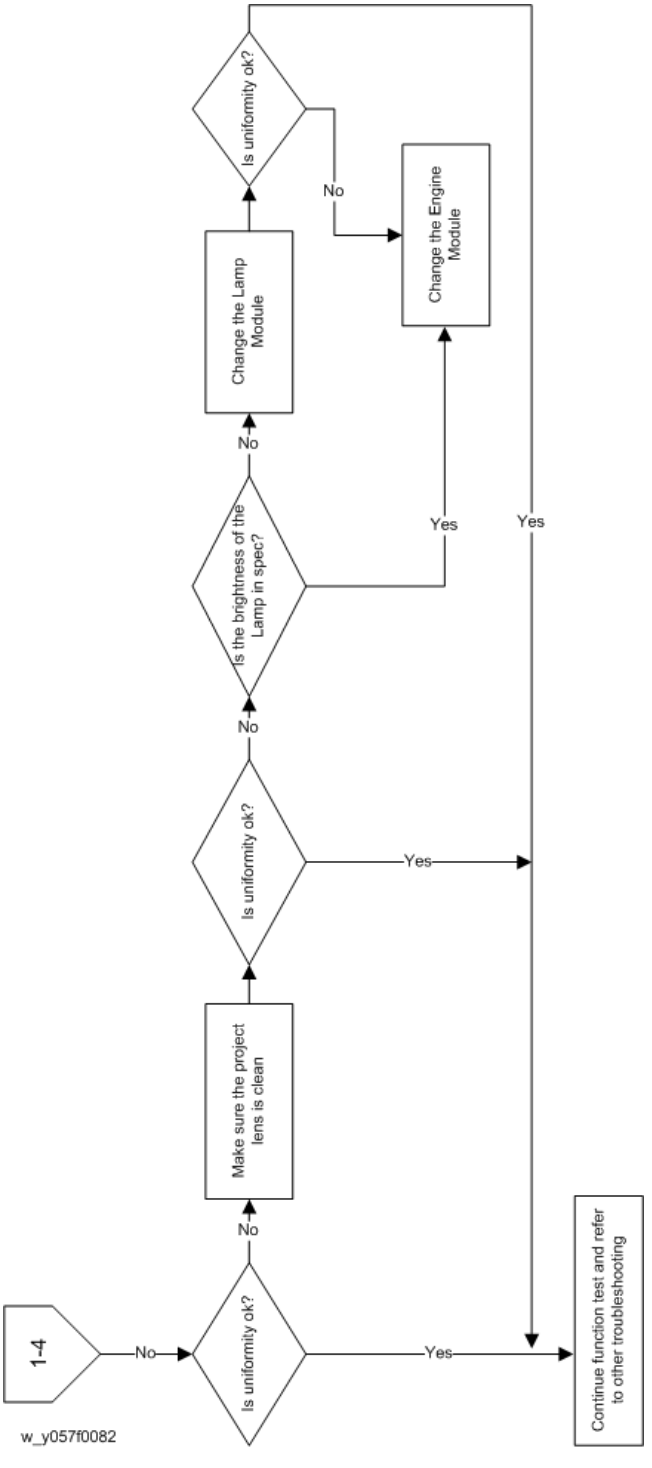
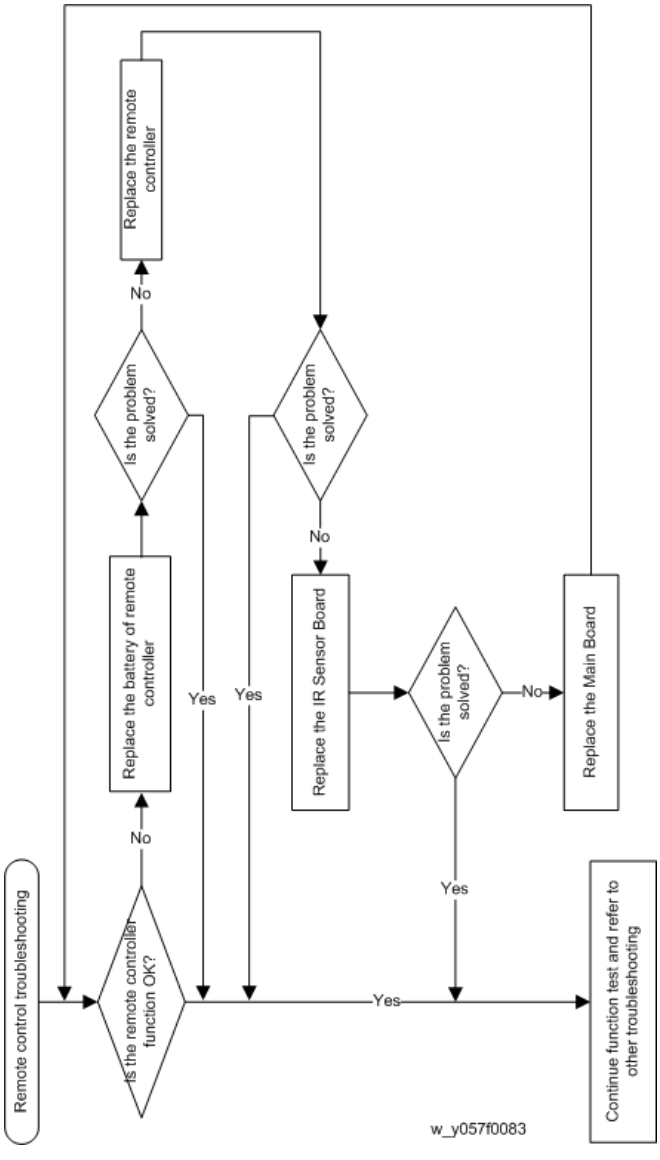


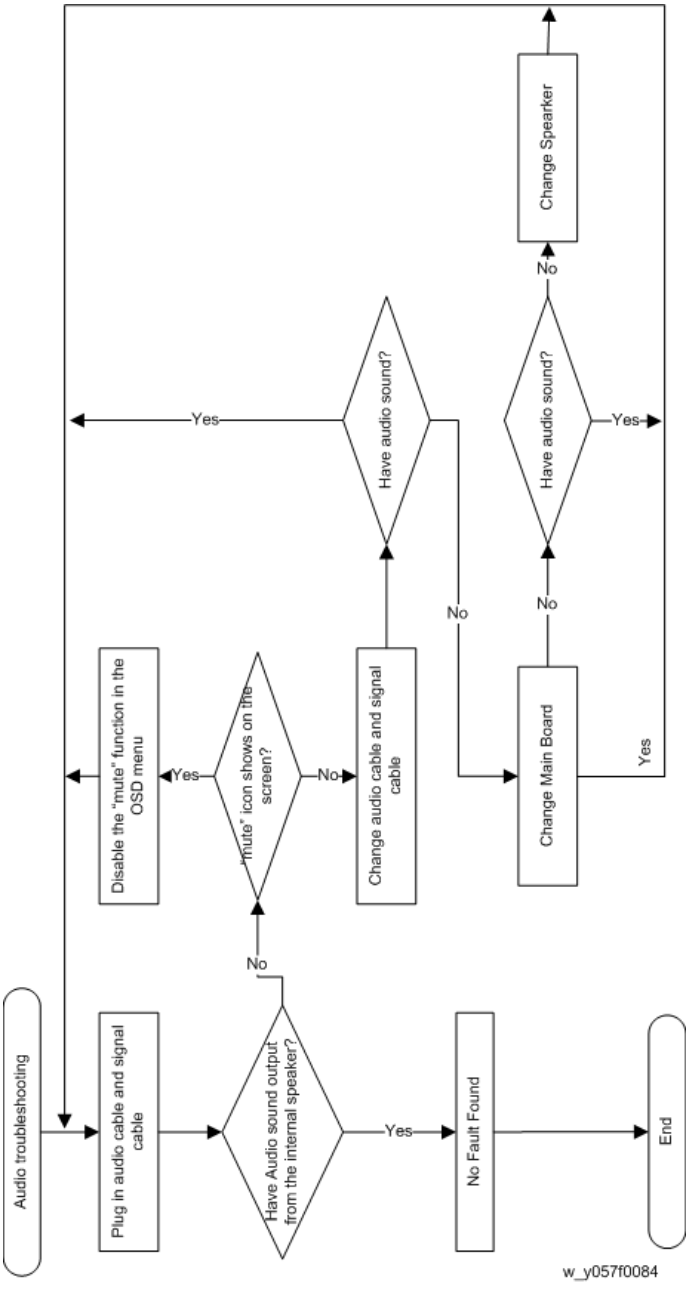
Image Troubleshooting 4



Remote Control Troubleshooting

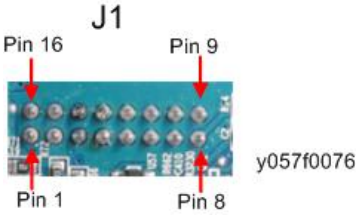


Audio Troubleshooting



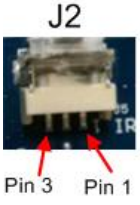
Pin Assignment

J1: 8Pin POWER From LVPS



PIN	Description	Voltage (V)
1	12 V	12.25 V ±5%
2	12 V	12.25 V ±5%
3	12 V	12.25 V ±5%
4	5 V	5 V ±5%
5	GND	0 V
6	GND	0 V
7	GND	0 V
8	PFC_ON	Signal (High 3.3 V/ Low 0 V)
9	GND	0 V
10	GND	0 V
11	GND	0 V
12	GND	0 V
13	GND	0 V
14	12 V	12.25 V ±5%
15	12 V	12.25 V ±5%
16	12 V	12.25 V ±5%

J2: Front IR



y057f0077

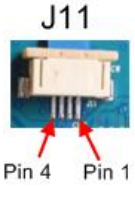
PIN	Description	Voltage (V)
1	+5 VSBY	5 V ±5%
2	GND	0 V
3	IR_8051_F_1	Signal (High 5 V/ Low 0 V)

J10: Blower

y057f0082

PIN	Description	Voltage (V)
1	FAN_V2	4.5 V to 12.25 V
2	FAN_LOCK	Signal (High 3.3 V/ Low 0 V)
3	GND	0 V

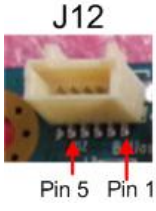
J11: CW to MB



y057f0079

PIN	Description	Voltage (V)
1	CWCTR	Signal (High 10 V/ Low 9 V)
2	CWY3	Signal (High 12.25 V/ Low 6.5 V)
3	CWY2	Signal (High 12.25 V/ Low 6.5 V)
4	CWY1	Signal (High 12.25 V/ Low 6.5 V)

J12: Ballast



y057f0083

PIN	Description	Voltage (V)
1	LAMPLIT_IN	Signal (High 5 V/ Low 4 V)
2	GND	0 V
3	5 V	5 V ±5%
4	LAMPEN_OUT	Signal (High 5 V/ Low 2.5 V)
5	LAMP_TXD4	Signal (High 5 V/ Low 2.5 V)

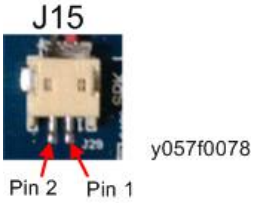
J13: Photo Sensor

y057f0080

PIN	Description	Voltage (V)
1	P5 V	5 V ±5%

PIN	Description	Voltage (V)
2	PHOTO_IN	Signal (3.15 V to 0 V)
3	GND	0 V

J15: Speaker



y057f0078

PIN	Description	Voltage (V)
1	RON_1	Signal (0 V to 12.5 V)
2	ROP_1	Signal (0 V to 12.55 V)

J23: System Fan

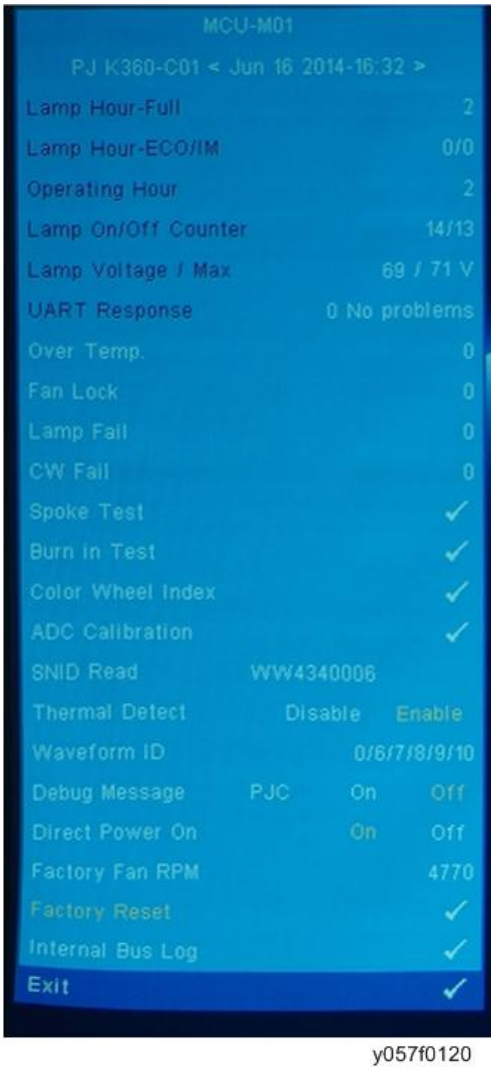
y057f0081

PIN	Description	Voltage (V)
1	FAN1_V1	4.5 V to 12.25 V
2	FAN1_LOCK	Signal (High 3.3 V/ Low 0 V)
3	GND	0 V

Service Menu Explanation

Get into Service Mode

Press Power > Left > Left > Menu buttons sequentially on remote controller or on the top panel to get into service mode.



y057f0120

Item	Description	Explanation	For Service
1	MCU M01	Shows the present MCU FW version.	V
2	PJ-K360	Indicate the model name.	V

Item	Description	Explanation	For Service
3	< Jun 16 2014-16:32>	Date and time of build code	
4	Lamp Hour-Full	Shows working hours of the projector in full mode.	V
5	Lamp Hour-ECO	Shows working hours of the projector in eco mode.	V
6	Operating Hour	Shows operating hours of the projector.	V
7	Lamp On/Off Counter	Shows the times of lamp on or lamp off.	
8	Lamp Voltage/ Max	Shows Lamp current voltage and the max voltage.	
9	UART Response	Counts the lamp driver failure times.	
10	Over Temp	Counts the over temperature times.	V
11	Fan Lock	Counts the fan lock times.	V
12	Lamp Fail	Counts the lamp ignite fail times.	V
13	CW Fail	Counts the color wheel times.	V
14	Spoke Test	To select some test pattern for simple test.	V
15	Burn in Test	Choose this option and press enter key getting into Burn in Test menu.	V
16	Color Wheel Index	Choose "CW index" to adjust color wheel index.	V
17	ADC Calibration	To adjust the white and black signal level.	V
18	SNID Read	This is not used in this model.	
19	Thermal Detect	Enables or disables thermal detect function.	
20	Waveform ID	Shows the waveform's ID.	
21	Debug Message	On or off debug message.	
22	Direct Power On	Select "on", the unit will power on automatically when it turns off abnormally. Select "off", the function will be disabled.	

Item	Description	Explanation	For Service
23	Factory Fan RPM	Shows the FAN rotate value.	V
24	Factory Reset	Resets the projector's value.	V
25	Internal Bus Log	Records the I2C bus error status.	
26	Exit	Leaves Service Menu.	V

4. Firmware Update

SYS Firmware Upgrade Procedure

Equipment Needed

Software:

- DLP Composer Lite 11.1.1
- Firmware (*.img)
- 11.1.1 FlashDeviceParameters

Hardware:

- Projector
- Power Cord
- RS232 Cable(9P(F) TO 9P(M))
- PC or Laptop

y057f0095

DLP Composer Lite Setup Procedure

1. **Choose "DLP Composer Lite V11.1.1 Setup" Program.**

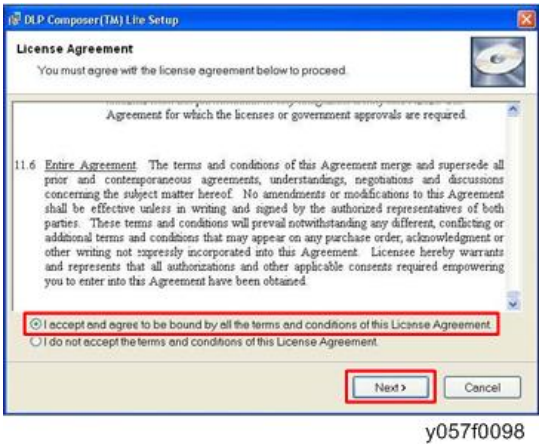
y057f0096

2. **Click "Next".**

y057f0097

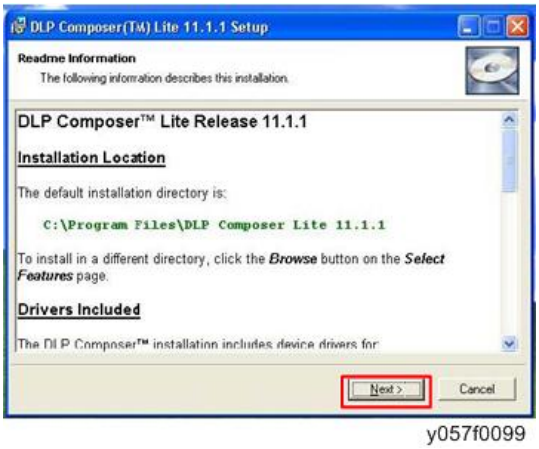
3. **Read "License Agreement".**

   - Choose "I accept and agree to be bound by all the terms and conditions of this License Agreement".
   - Click "Next".



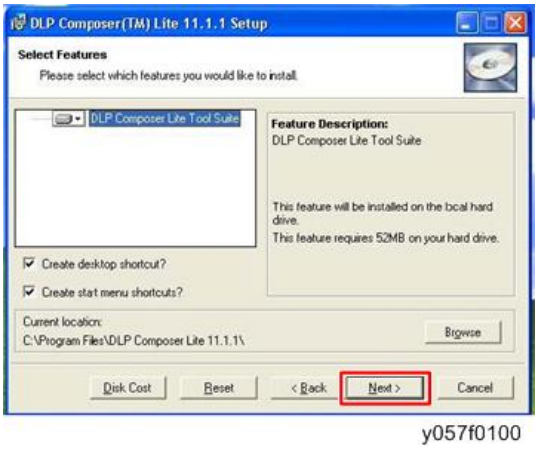
y057f0098

4. Click "Next".



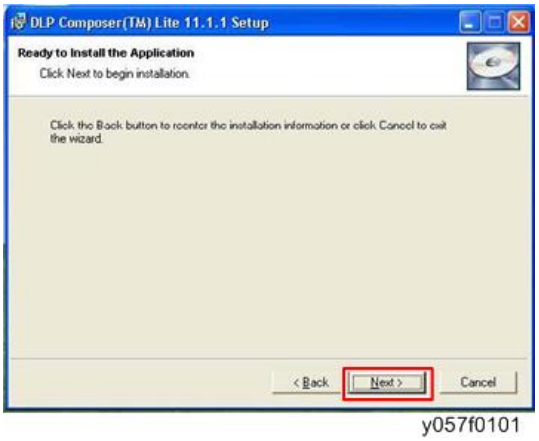
y057f0099

5. Click "Next".



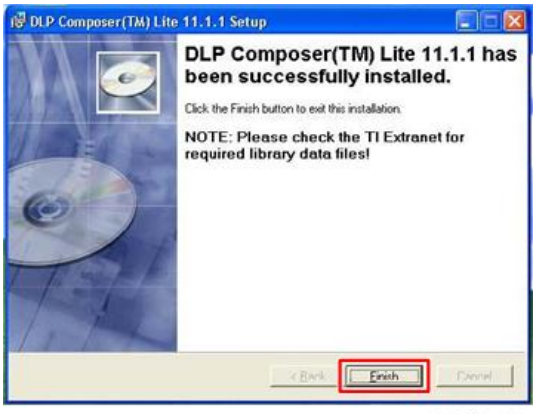
y057f0100

6. Click "Next".



y057f0101

7. **Click "Finish".**



y057f0102

Firmware Upgrade Procedure

1. **Set-up:**
   - Hold on "Power" button and plug in the power cord.
   - Until Power will light orange, Temp and Lamp LED will light red, loosen “Power” button.
   - Connect projector with RS232 cable to PC.

y057f0103

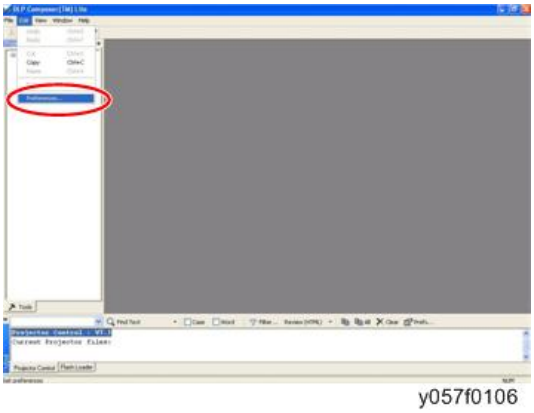
2. **Execute the "DLP ComposerTM Lite 11.1.1" file.**

y057f0104

3. **Setting "11.1.1 FlashDeviceParameters".**
   - Select the file "11.1.1 FlashDeviceParameters".
   - Put "FlashDeviceParameters" file into the folder where you setup "DLP Composer Lite 11.1.1".

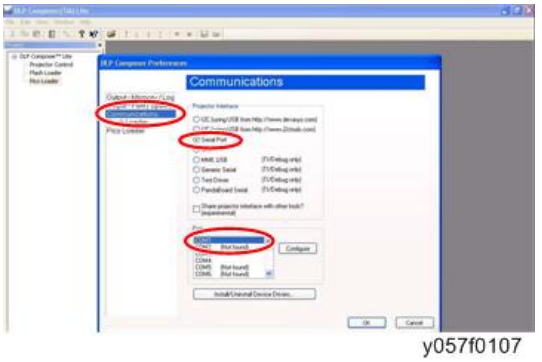
y057f0105

4. **Click "Edit" and "Preferences".**



y057f0106

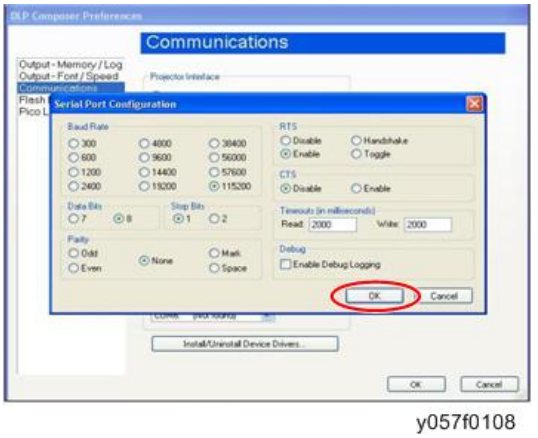
5. **Click "Communications".**
   - Select “Serial Port”, then click “Configure”.
   - Select the COM Port which you are using.



y057f0107

6. "Serial Port Configuration" picture will appear on the screen.

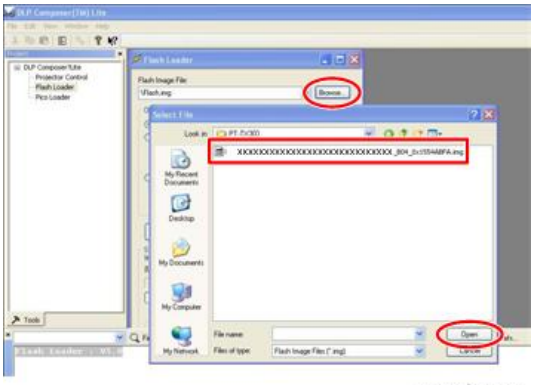
- Make sure the settings are as below:
  1. In "Baud Rate" item, select "115200".
  2. In "Data Bits" item, select "8".
  3. In "Stop Bits" item, select "1".
  4. In "Parity" item, select "None".
  5. In "RTS" item, select "Enable".
  6. In "CTS" item, select "Disable".
  7. Key in "2000" into "Read" and "Write" items of "Timeouts (in milliseconds)".
- Click "OK".



y057f0108

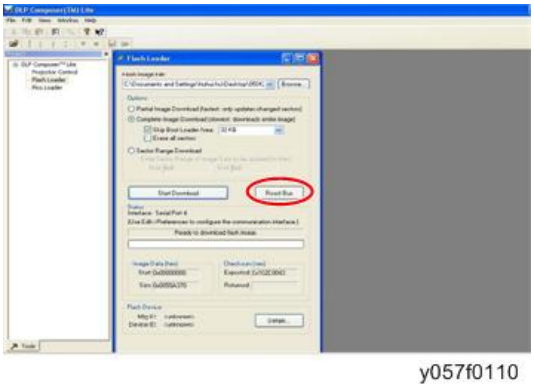
7. Choose "Flash Loader".

- Click "Browse" to search the firmware file (*.img).
- Click "Open".



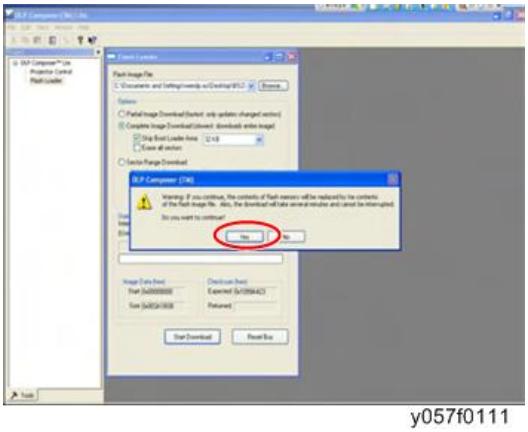
y057f0109

8. **Select the item skip Boot Loader Area**
   - Select “32KB”.
   - Click "Reset Bus" to erase the flash memory.



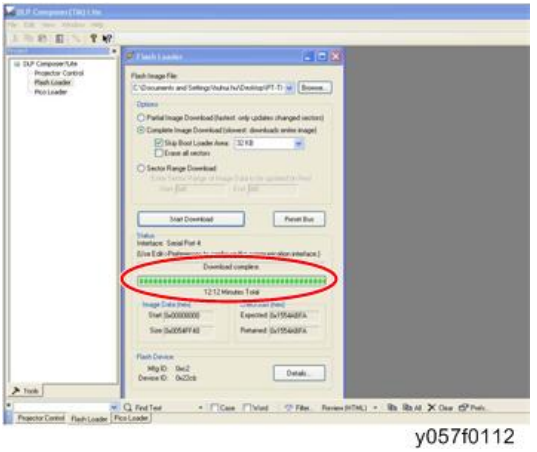
y057f0110

9. **If the FW is ready, click "Start Download" to execute the firmware upgrade.**
   - Click “Yes” to erase the flash memory.



y057f0111

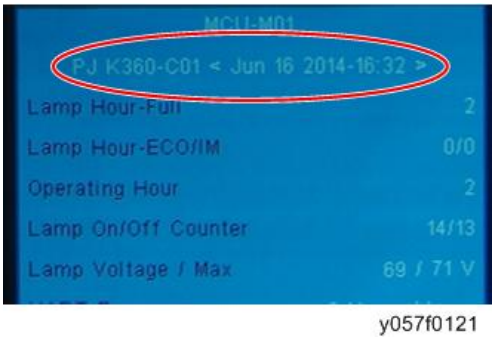
10. When firmware upgrade process is finished, “Download Complete” will appear.



y057f0112

11. Check SYS FW version.

- Re-plug in power cord and Power on the projector. Get into the service mode (Power--Left--Left--Menu) to check the system firmware version.



y057f0121