RICOH

Y013/Y014
Service Training

Sirius-PJ1

Slide 1

Version 1.01

This training course provides service technician training for the Sirius-PJ1 series.

This course will cover information related to service. To understand the features of the machine, the correct ways to turn the projector on or off, about power saving modes, and other matters that are related to operation, please study the user guide.

Version 1.01: The file sizes of some inserted photos were reduced.

This section provides an overview of the machine, and the options that can be installed.

What Models are there in the Series?

- **Sirius-PJ1 nx (Y013): PJ X6180N**
  - 6000 lumens, XGA resolution
- **Sirius-PJ1 nw (Y014): PJ WX6170N**
  - 5500 lumens, WXGA resolution
- **These are high power, high image quality projectors for auditoriums and large lecture halls (30- 100 persons).**
- **These models can be used over a network.**
  - Advanced networking features can connect quickly to a LAN
  - Can project from a PC with wired or wireless network
  - Management and control using PJLink software

Slide 3

No additional notes

Main Specifications

	Sirius-PJ1 nx	Sirius-PJ1 nw
Type of Projector	LCD	
Brightness	6000 lm	5500 lm
Lamp type	330W mercury lamp	
Resolution	XGA	WXGA
Keystone	Vertical and horizontal, manual	
Projection Screen Size	30" - 500" (76.2 – 1270 cm)	
Projection Distance (with standard lens)	Sirius-PJ1 nx: 1.2 to 30.8 m (3.93 to 101 ft) Sirius-PJ1 nw: 1.3 to 32.4 m (4.26 to 106.3 ft)	
Dimensions (W × D × H)	499 × 359 × 144	
Weight	8.54 kg (18.8 lbs)	
Power Consumption	464W	
Speaker	10W x 1	
Wireless LAN	Option (USB)	
Wired LAN	Yes	
USB	Yes	
HDMI	Yes	

Slide 4

- See the specifications table in the service manual for more details.

Features

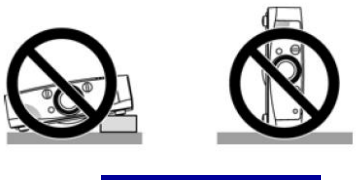
- This product can be installed by users, except when mounted on a ceiling.
- This product is designed for user maintenance. Regular on-site maintenance is not needed.
- LEDs show the symptoms for troubleshooting (blinking/lit, number of times the LEDs blink, etc).
- A service mode is available.

Slide 5

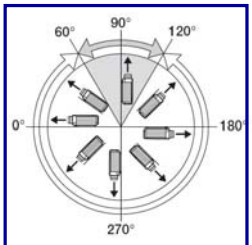
No additional notes

Flexible Installation and Projection

- **Can project onto screens of size 30” to 500” with five optional lenses.**
- **Increased flexibility of installation place with vertical/ horizontal lens shift**
  - Can change the location of the projected image without moving the projector
- **Geometric correction feature allows projection of images onto spheres, cylinders, corner angles and many more non-standard surfaces.**
- **Do not tilt the projector to the left to right. However, there is no limit on the upward/downward tilt angle (images can projected on the ceiling or on the floor).**
  - If the tilt angle is between 60 and 120 degrees, [FAN MODE] – [SETTING] must be set to Vertical Tilt Up.



Left/Right Tilt



Up/Down Tilt

Slide 6

No additional notes

Low Energy Consumption

- **4,000 hour lamp life and lower power consumption in Eco mode**
  - The life of 4,000 hours is only achieved if the lamp is always used in Eco mode.
  - Lamp power in Eco mode is 80% of full power.
- **Power consumption values:**
  - Eco Mode Off (Normal): 358 W (100-130 V), 343 W (200-240 V)
  - Eco Mode: 271 W (100-130 V), 264 W (200-240 V)
  - Standby (Normal): 9 W (100-130 V/200-240 V)
  - Standby (Power saving): 0.2 W (100-130 V), 0.4 W (200-240 V)

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- Note that in the service mode menu, Eco Mode is referred to as ‘Low Mode’.

Consumables and Options

- **Replacement lamp (Y203)**
  - 330W mercury lamp (Replacement Lamp Type 7)
  - Life: 3000 hours (normal mode), 4000 hours (Eco mode)
    - » There may be a 50% decrease in brightness at the end of the lamp's life.
- **Lenses**
  - Standard Lens Type 1 (Y101)
  - Replacement Lens Types 1 to 4 (Y102/Y103/Y104/Y105)
- **Wireless LAN unit (Y106)**
  - IEEE 802.11b/g/n are supported

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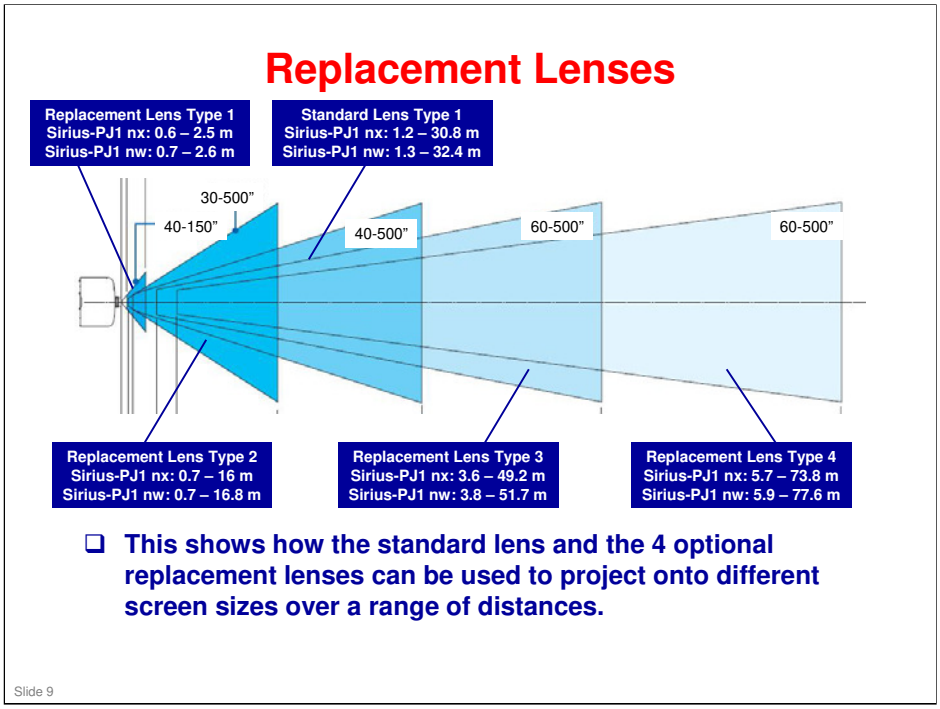
- Wireless LAN Unit M1: For USA, Canada, Mexico, Brazil. Colombia, and Taiwan
- Wireless LAN Unit M2: For CE Countries (27 EU countries, and Iceland, Liechtenstein, Norway, and Switzerland), UAE, Saudi Arabia, Oman, South Africa, Turkey, Egypt, Israel, Australia, NZ, Thailand, HK, Singapore, Malaysia, Sri Lanka, Pakistan, Vietnam, India, Philippines, Peru, Chile, Argentina, Ecuador
- Wireless LAN Unit M3: For Russia



Replacement Lenses

- This shows how the standard lens and the 4 optional replacement lenses can be used to project onto different screen sizes over a range of distances.

Slide 9

No additional notes

Utilities

- **Projection Utility**
  - A utility for projecting from a computer over a network
- **Advanced Network Utility**
  - This allows you to send images from a PC to more than one projector at the same time.
- **JPEG Conversion Tool**
- **Stacking Correction Tool (the name is subject to change)**
  - This software is for technicians.
  - Up to four projectors can be used to simultaneously project an image in the same location. This is done to increase brightness. This tool needs to be installed by an expert who has skills to mount projectors on the ceiling.
  - When this tool is in use, one or more of the machines might be accidentally put out of alignment in terms of the projecting area. In that case, visiting maintenance will be required to set up the projectors again.
- **@Remote**
  - @Remote is not available on this model.

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No additional notes

Reliability Information

- **Average monthly projection time: 154 hrs/month**
  - 7.00 hrs/day x 22 working days/month
- **Failure Rate**
  - 1st year: 0.0013 cases/unit/month
  - 2nd year: 0.0014 cases/unit/month
  - 3rd year: 0.0017 cases/unit/month
  - The failure rate of a projector increases with its total power-up time. This is due in part to the failure characteristics of optical engines in projectors.
- **Lamp Life**
  - Normal Mode: 3,000 hrs
  - Eco Mode: 4,000 hrs

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No additional notes

Lamp Near-end/End Alerts

- **There is no near-end alert.**
  - The lamp end alert occurs when the machine calculates that the life time has expired.
  - If used in Normal Mode only, the alert appears after 3,000 hrs projection time
  - If used in Eco Mode only, the alert appears after 4,000 hrs projection time
  - If the user switches between modes, the machine calculates when to display the alert based on how long the lamp was used in each mode.
- **If the projector is used for 100 hours after the lamp has reached the end of its life, the projector will turn off and go into standby mode.**
  - In this condition, the lamp hours cannot be reset using the menu.
  - The user must replace the lamp, then press the Help button on the remote control for 10 seconds to reset the lamp clock back to zero (do this only after replacing the lamp).

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No additional notes

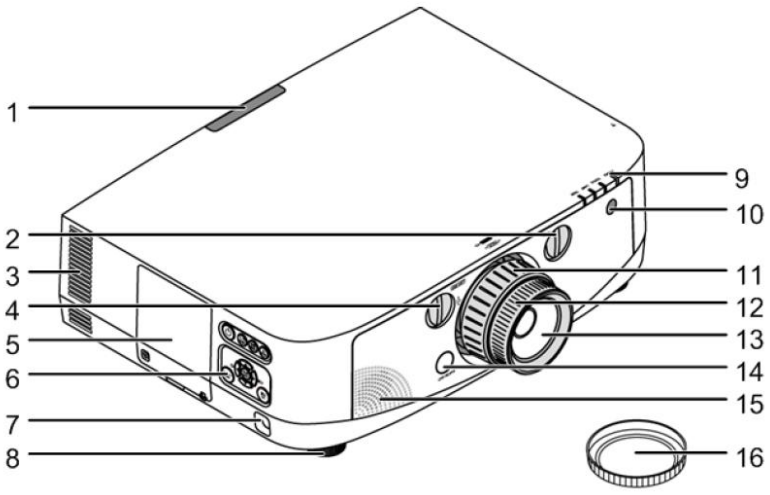
Disposal of Broken Lamps

- **Projector lamps normally contain mercury vapour.**
- **These lamps can rupture due to impact or being used longer than their life expectancy.**
  - The time that the breakage will occur differs widely for each lamp and its circumstances of use.
- **These lamps must be disposed of in accordance with local environmental regulations.**

Slide 13

No additional notes

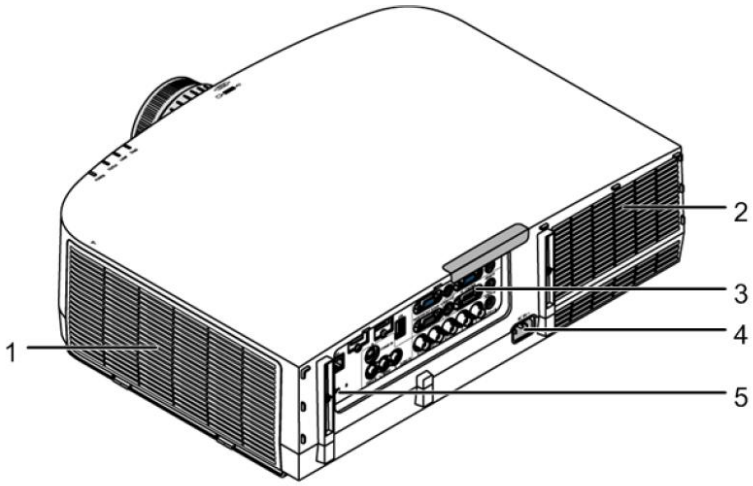
External View - Front



Slide 14 14

1. Remote Sensor (rear)
2. Lens Shift Dial (horizontal): This moves the projected image left/right
3. Ventilation (outlet)
4. Lens Shift Dial (vertical): This moves the projected image up/down
5. Lamp Cover
6. Control Panel
7. Security Bar: Users can attach an anti-theft device here
8. Adjustable Tilt Foot
9. Indicator Section
10. Remote Sensor (front)
11. Zoom Lever/Zoom Ring
12. Focus Ring
13. Lens
14. Lens Release Button
15. Mono Speaker
16. Lens Cap

External View - Rear



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1. Ventilation (inlet) / Filter Cover: The wireless LAN unit's USB (LAN) port is located inside here.

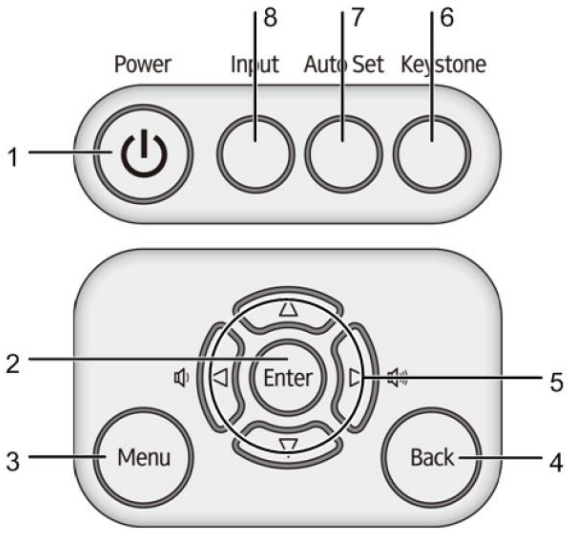
2. Ventilation (outlet)

3. Terminal Panel

4. AC Input

5. Built-in Security Slot

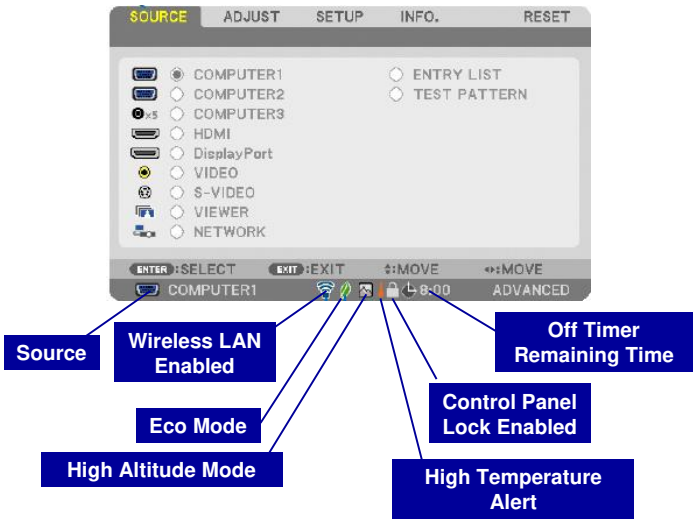
Operation Panel



Slide 16

- For details: Service manual > 1. Product Information > Overview
- 5. The left and right arrow buttons can be used to adjust the speaker volume.

Menus



Slide 17

- This slide shows the Source Menu, and explains the symbols that appear on the menu screen.
- For details of all functions, see the user's manual.
- High Altitude Mode: The fans operate at a higher speed in this mode. Use this when the projector's location is more than 1500 m (5500 ft) above sea level (otherwise, the projector could overheat and shut down automatically). If you use Eco Mode, also use High Altitude Mode if the projector's location is more than 1000 m (3200 ft) above sea level.
  - Also, if you use high altitude mode at less than 1500 m (5500 ft) above sea level, the projector could become too cool, causing images to flicker. Switch [FAN MODE] to [AUTO].
- High Temperature Alert: High temperature detected inside the projector, Eco Mode is enforced
  - If the projector overheats, it shuts down automatically. Wait a few moments then turn back on again.

Menus

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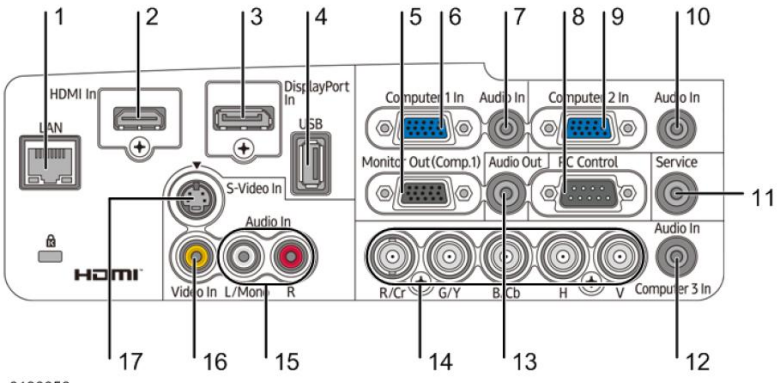
- This slide shows the other four menu tabs.
- Note that in the Adjust, Setup, and Info tabs, there is more than one page.
  - For example, in the Adjust tab, there are three pages: Picture, Image Options, and Video.

Connection Ports



Slide 19

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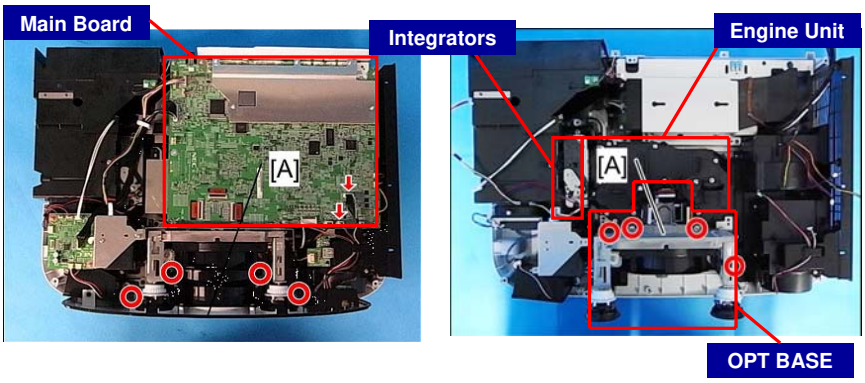
1. LAN Port (RJ-45)
2. HDMI IN Connector (Type A)
3. DisplayPort IN Connector
4. USB Port (Type A)
5. MONITOR OUT (COMP. 1) Connector (Mini D-Sub 15 Pin)
6. COMPUTER 1 IN/ Component Input Connector (Mini D-Sub 15 Pin)
7. COMPUTER 1 AUDIO IN Mini Jack (Stereo Mini)
8. PC CONTROL Port (D-Sub 9 Pin): Use this port to connect a PC or control system. This enables the user to control the projector using serial communication protocol. Be sure to use a cross cable.
9. COMPUTER 2 IN / Component Input Connector (Mini D-Sub 15 Pin)
10. COMPUTER 2 AUDIO IN Mini Jack (Stereo Mini)
11. Service Connector (Stereo Mini)
12. COMPUTER 3 AUDIO IN Mini Jack (Stereo Mini)
13. AUDIO OUT Mini Jack (Stereo Mini)
14. COMPUTER 3 IN/Component (R/Cr, G/Y, B/Cb, H, V) Connectors (BNC × 5)
15. VIDEO/S-VIDEO AUDIO IN L/MONO, R (RCA)
16. VIDEO IN Connector (RCA)
17. S-VIDEO IN Connector (Mini DIN 4 Pin)

Locations of Main Units - 1

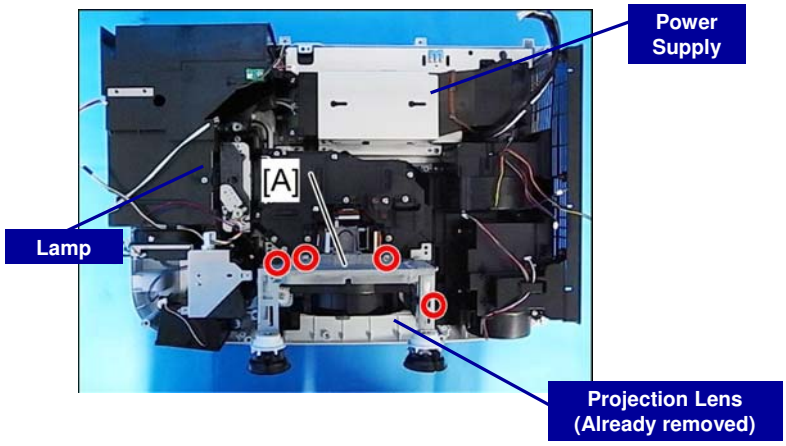


- After removing the top cover, you see the main board (called the MAIN IO or MAIN PWB).
- This board must be removed to access the adjustments.
- After you remove the main board, you can see these major subassemblies:
  - OPT BASE: Contains the LCD panels, cross prism, and projection lens housing
  - Engine unit: Contains the relay lens, field lens, polarizers and the dichroic mirrors
  - Integrators: These are the PBS units

Slide 20

Please ignore the callouts [A] and red circles in the diagram.

Locations of Main Units - 2



Slide 21

Please ignore the callouts [A] and red circles in the diagram.

Iris Unit

- **The Iris unit physically blocks the light path from the projector to the screen when the projector is on but nothing is being projected.**
- **At these times during a presentation, a blank white screen is often not desirable. So, there are three ways to get around this.**
  - 1. Turn off the projector. If you do that, you have to think about cool-down and warm-up times. Also, if you keep turning the lamp off/on, the lamp's life can be reduced.
  - 2. Send an all-black video signal. This can cause delicate optical components to overheat, reducing the projector's life
  - 3. Physically block the light path inside the projector. The projector keeps working as normal but nothing comes out of the projector lens. This is how the Iris unit works.
- **This is the first Ricoh projector to contain an Iris unit.**

Slide 22

No additional notes

This section explains the basic points about servicing the machine.

Antistatic Clothing

- To protect the components from damage, wear anti-static clothing when you disassemble the machine.

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No additional notes

Special Tools

- There are a lot of special tools for working on this machine.
- See the list in the service manual for details.

Slide 25

- Service manual: 3. Replacement and Adjustment > Special Tools

Software Required for Service
Overview

- **Software for the following purposes must be installed on the computer that you will use to service this machine:**
  - For writing data to the machine
    - » Used after replacing the Main PWB
  - For writing the EDID to the machine
    - » Used after replacing the Main PWB
  - For writing the serial number and model number to the machine.
    - » Used after replacing the Main PWB
  - For service adjustments
    - » Used after replacing either of these components: Main PWB, Opt Base

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- The next few slides explain what software must be installed, and how to install it. Using the software will be explained later, in the 'Adjustments after Replacing Components' section.

Software Required for Service For Writing Data to the Machine

- **There are two software packages to install on your PC, and some files (two for each model).**
  - For writing the model-specific VerUpField data
    - » Writing software: PJUpgrader2vupf.exe
    - » File names: modelname_vupf_V000001.bin
  - For writing the model-specific product data
    - » Writing software: PJUpgrader2.exe
    - » File names: modelname_Data_V102025.bin
- **These programs and files can go anywhere on the PC.**
- **If you install new versions, uninstall the old versions first.**
- **When you use the software, do the VerUpField data first, then the product data.**
- **Always take care to use the correct files for the model you are working on. If you install the wrong files on the projector, you cannot replace them with the correct ones, so you must replace the Main PWB.**

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No additional notes

Software Required for Service
For Writing the EDID to the Machine

- **There are two software packages to install on your PC, and some files (three for each model).**
  - EDID rewriting software
    - » EDIDWrite.exe
  - EDID data (HDMI)
    - » modelname_EDID_HDMI_V***.bin
  - EDID data (Analog)
    - » modelname_EDID_DSUB_V***.bin
  - EDID data (Display Port)
    - » modelname_EDID_DP_V***.bin
- **The PC must have Windows XP or 2000, with a serial cable and RGB (analog) video connection with the projector.**

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- In the data file names, '***' denotes the version.

No additional notes

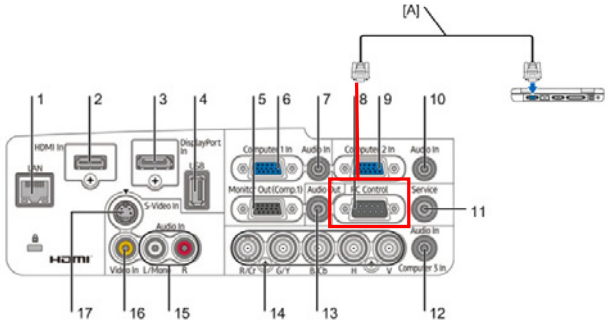
Software Required for Service
For Service Adjustments

- **Service adjustment software must be installed: TBA.exe**
- **The PC must use Windows XP or 2000, and either of serial ports COM1 - COM9 must be D-SUB9-pin**
- **To install the software, copy the following files to any folder on the PC.**
  - TBA.exe
  - ser_comm.ini

Slide 30

- The name of the service adjustment software (TBA.exe) was not decided when this TTP was made.

Software Required for Service
Connecting the Machine to the Projector



- **Before you use any of this software, connect the projector to the PC with a serial cable [A]:**
  - D-SUB9pin - D-SUB9pin, cross (reverse) cable
  - Connect the cable to the PC CONTROL socket [8] on the projector.

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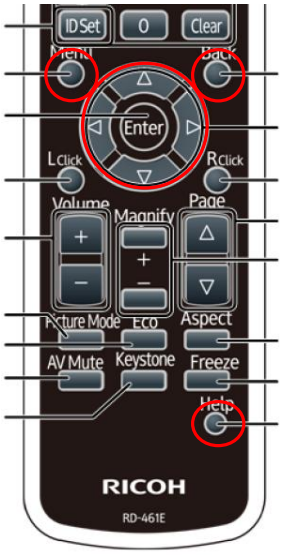
No additional notes

Entering Service Mode

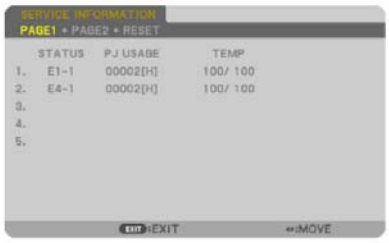


- **There are two service modes.**
  - Expert Mode
  - Service Mode
- **You need to use the remote controller to access these modes.**
  - Expert mode:
    - » Help > Top > Left > Help.
    - » Then press the Menu button to display the menu.
  - Service mode:
    - » Help > Enter > Help > Enter > Help > Enter. Then press Menu for 3 seconds.
    - » When the Password menu is displayed, press Top > Right > Left > Right > Right > Right > Top > Top > Enter
    - » Then press the Menu button to display the menu.
- **There are two ways to leave Expert or Service mode**
  - Press the Back button when no menu is displayed.
  - Otherwise, press the Power button. The machine will go to standby mode.

Slide 32

- Service manual > Troubleshooting > Service Mode > Mode change

Page 1 – Error Log



Expert Mode

Service Mode

- The Error Log is seen on Page 1 of Expert Mode or Page 1 of Service Mode.
- The service mode screen has more detail.

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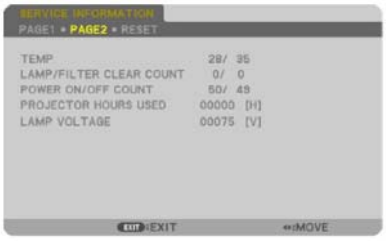
No additional notes

Page 2 – Various Data

Expert Mode



Service Mode

- The service mode screen has lamp voltage data.

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No additional notes

Factory Reset

- **When [Reset] – [All Data (Including Entry List)] is executed, the settings that are returned to the factory settings depend on which mode is used (User, Expert or Service Mode).**
  - See the user manual and service manual for lists of items that are reset.

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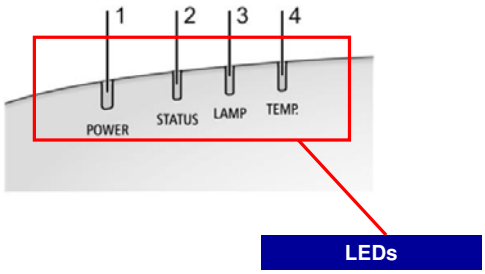
- Service manual: Troubleshooting > Service Mode

Troubleshooting - LED Display

- **The status of the LEDs indicate the machine's condition.**
  - See the table 'LED Display' in the Troubleshooting section of the service manual.



LEDs

Slide 36

No additional notes

Cleaning

- Filters, lens and cabinet are cleaned by the user.
- Do not use alcohol or glass lens cleaner for the lens. A plastic lens is used.
- Other optics parts can be cleaned with pure alcohol.

Slide 37

No additional notes

Replacing the Lamp

- To replace the lamp, unplug the power cord and then wait for the lamp to become cool. This may take as long as 60 minutes.

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No additional notes

This section explains the most important points about replacing components.

Removing the Top Cover

- Be careful when lifting off this cover. The EX PWB and KEY PWB boards are attached to the top cover and connected through a flat cable.

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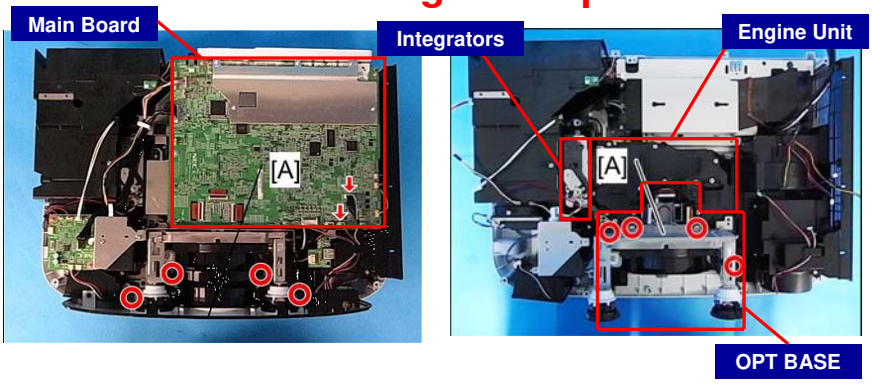
No additional notes

After Removing the Top Cover



- After removing the top cover, you see the main board (called the MAIN IO or MAIN PWB).
- This board must be removed to access the adjustments.
- After you remove the main board, you can see these major subassemblies:
  - OPT BASE: Contains the LCD panels, cross prism, and projection lens housing
  - Engine unit: Contains the relay lens, field lens, polarizers and the dichroic mirrors
  - Integrators: These are the PBS units

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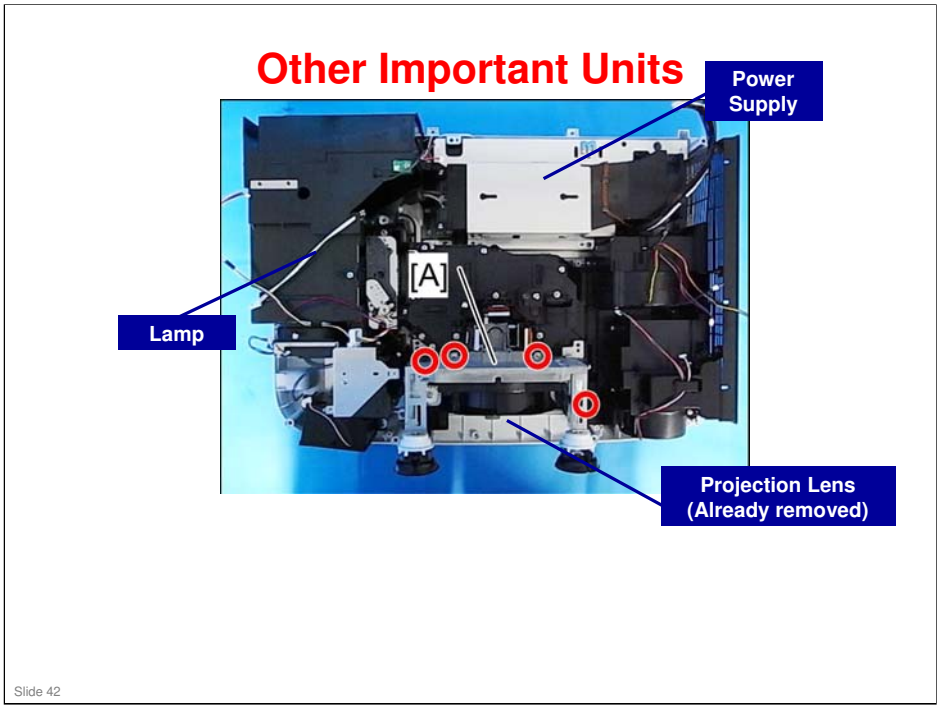
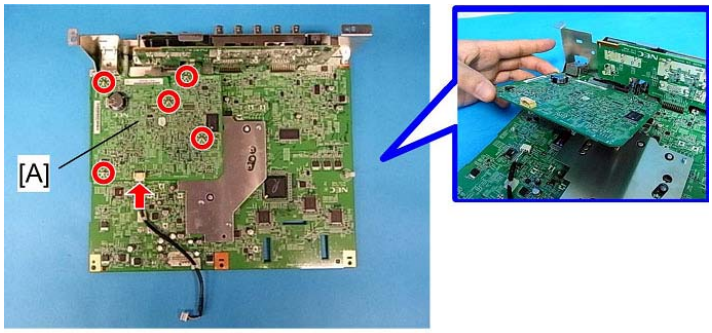
Please ignore the callouts [A] and red circles in the diagram.



Please ignore the callouts [A] and red circles in the diagram.

MM PWB



- When handling this board [A], keep it away from conductive materials such as metals.

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No additional notes

Replacing the Main PWB

- **Before replacing the main board, copy all data from the current Main PWB to your PC (service adjustment software is required: TBA.exe – see Software Required for Service earlier in the presentation).**
  - If this process failed, then some steps of the data writing process have to be skipped, as shown below.
- **Do the following after replacing the Main PWB (software is required – see Software Required for Service earlier in the presentation):**
  - Data writing
    - » Data for each model
    - » EDID Data
    - » Serial number and Model number
  - Data Read/Write (skip this part if the data could not be copied from the old Main Board)
    - » Flicker Data
    - » VT Data
    - » Uniformity Data
    - » Color Correction Data
    - » Multi Data
    - » Usage Time Data
  - Flicker adjustment (do this if the data could not be copied from the old Main Board)
  - Usage Time setup (do this if the data could not be copied from the old Main Board)

Slide 44

- Adjustment Procedures: Service manual > Electrical Adjustment
- We will look at these adjustments and how to use the software later.
- Service adjustment software: TBA.exe – the name of this software is not decided yet.

Replacing the OPT BASE

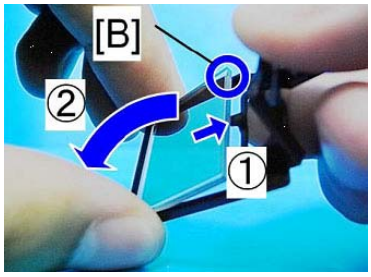
- **The service parts are all produced so that the configuration of the LCD panels is LRL.**
  - There is no need to worry about whether the LCD panels are L-type or R-type when installing new parts.
- **Do the following after replacing the OPT BASE:**
  - Optical Axis Adjustments (check, and adjust only if necessary)
  - Flicker adjustment
  - Usage Time setup

Slide 45

- Adjustment Procedure: Service manual > 3. Replacement and Adjustment > Replacement of Optical Parts > Optical Parts Adjustment > Adjustment of the optical axis (Shadow adjustment)
- We will look at these adjustments later.

Polarizers

Polarizer-B



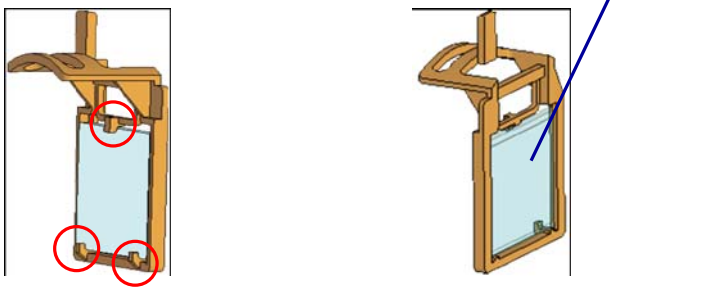
Polarizer-G, -R

- **Polarizer-B cannot be removed from its frame.**
- **The other polarizers (Polarizer-G, Polarizer-R) can be removed from their frames.**
  - Make sure that the edge with the red or green dot [B] faces upwards.
- **After you replace one or more polarizers, do the polarization plate adjustment.**

Slide 46

- Replacement Procedure: Service manual > 3. Replacement and Adjustment > Replacement of Optical Parts
- Adjustment Procedure: Service manual > 3. Replacement and Adjustment > Replacement of Optical Parts > Optical Parts Adjustment > Adjustment of the polarization plate (Contrast adjustment)
- We will look at these adjustments later.

Polarizers



- When you replace a polarizing plate inside its holder, make sure that the three claws are holding the plate as shown on the left.
- Also, make sure that the surface with vapor deposition is facing outwards as shown on the right.

Slide 47

No additional notes

This section explains the most important points about adjustments that are needed after replacing components.

When are Adjustments Needed?

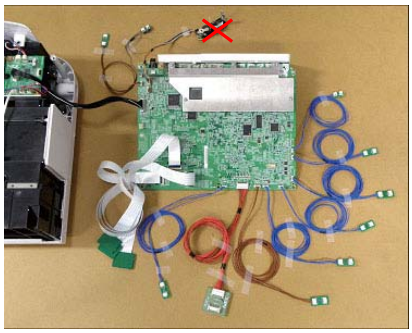
- **Adjustments are needed after replacing these parts:**
  - Main board
  - OPT BASE
  - Polarizers
- **After replacing the main board, data must be written to the new board, and adjustments must be made at the operation panel.**
  - After replacing the OPT BASE, some of this data must also be input (flicker adjustment, usage time)
- **However, after replacing the OPT BASE or polarizers, you must access the optical axis and polarizer adjustment points. These are hidden under the main board. So the main board must be removed.**
  - The procedure for accessing the adjustment points is the same in each case (optical axis or polarizers).

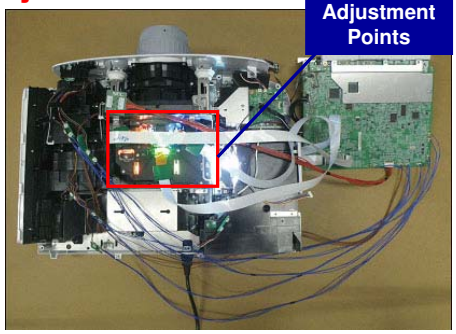
Slide 49

- We discussed the software needed for inputting data earlier in the course. In this section, we shall see how to use it.
- Optical axis adjustment: After replacing the OPT BASE, check and only do the adjustments if required.

Optical Axis and Polarizer Adjustments

Accessing the Adjustment Points



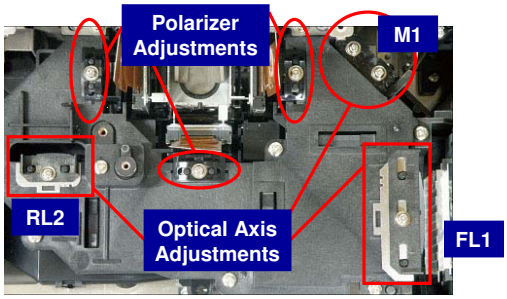


- The main board must be removed (as shown on the left).
- Then, it must be connected again to the internal components of the projector (as shown on the right), because we have to switch the power on to make the adjustments.
- To do this, special connectors are required. These are service parts.
  - See Replacement and Adjustment – Special Tools for details on these connectors, and important notes on how to use them.
- The diagram on the left shows the main board removed from the projector, with the special connectors already connected to the main board.
- The diagram on the right shows the main board connected to the projector's components, and we are ready to turn the main power on.

Slide 50

- The component marked with a red cross in the diagram on the left (Iris unit) actually has a longer cable than shown, and does not need to be pulled out of the machine.

Optical Axis and Polarizer Adjustments
Accessing the Adjustment Points



- **Here is a close up of the adjustment points.**
  - The front of the projector is at the top of the diagram.
  - The three optical axis adjustments are called FL1, RL2, and M1

Slide 51

- FL1, RL2, and M1 refer to various components in the machine, which you will move during the adjustment.
  - FL1: Field lens 1
  - RL2: Relay lens 2
  - M1: Mirror 1

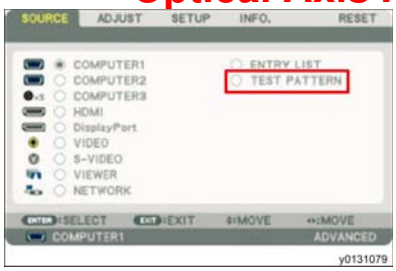
Optical Axis and Polarizer Adjustments
When to do These Adjustments?

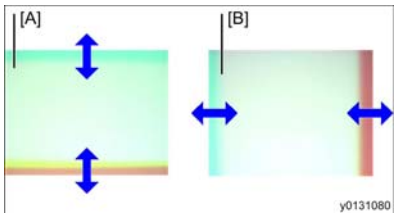
- Optical axis adjustment: After replacing the OPT BASE
- Polarizer adjustments: After replacing the polarizers

Slide 52

No additional notes

Optical Axis Adjustment - 1



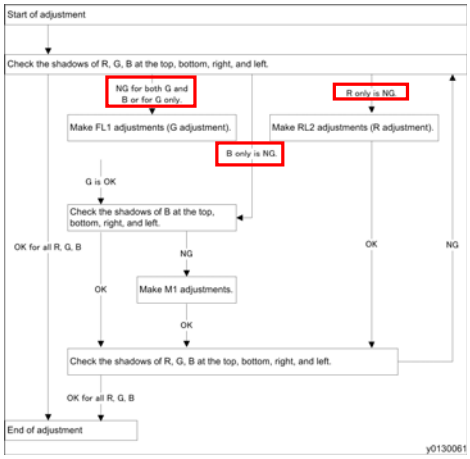


- **It is best to do this procedure in a dark room.**
- **Turn on the projector.**
- **In the SOURCE menu, display a white test pattern.**
- **Check for shadows at the edges of the display. During the adjustment, we must try to get rid of the shadows as much as possible.**
  - If shadows appear at the top and bottom edges [A], adjustment is needed in the vertical direction.
  - If shadows appear at the left and right edges [B], adjustment is needed in the horizontal direction.
- **The color of the shadows at the edges tells you which colors must be adjusted.**
  - Cyan-like shade: R is missing at the edges and must be adjusted
  - Yellowish: B is missing at the edges and must be adjusted
  - Magenta-like shade: G is missing at the edges and must be adjusted
  - Reddish: G and B are missing at the edges and must be adjusted

Slide 53

- Adjustment Procedure: Service manual > 3. Replacement and Adjustment > Replacement of Optical Parts > Optical Parts Adjustment > Adjustment of the optical axis (Shadow adjustment)

Optical Axis Adjustment - 2



- **After you have looked at the shadows on the screen, then look at this flow chart to see which adjustments must be made.**
  - The red squares on the flow chart show the four possible decisions, as described on the previous slide.
- **There are three adjustments to choose from:**
  - FL1
  - RL2
  - M1

Slide 54

- FL1, RL2, and M1 refer to various components in the machine, which you will move during the adjustment.
  - FL1: Field lens 1
  - RL2: Relay lens 2
  - M1: Mirror 1

Optical Axis Adjustment - 3

Spacer for the FL1 Adjustment

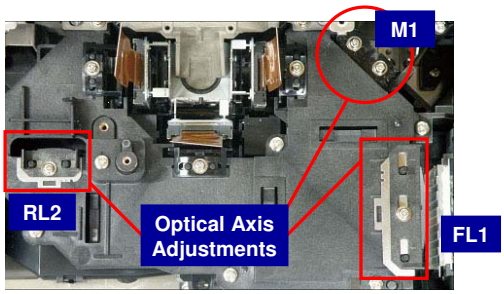
Spacer for the RL2 Adjustment

- These spacers are used for the adjustments.
- They are available as service parts.
- They are not shipped with the projector.

Slide 55

No additional notes

Optical Axis Adjustment - 4



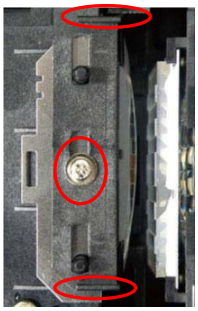
- Just to remind you where the three adjustment points are.

Slide 56

No additional notes

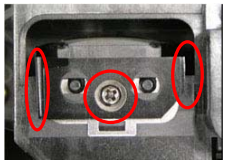
Optical Axis Adjustment - 5

FL1 Adjustment



- **First, adjust in the vertical direction with spacers.**
  - Loosen the screw and insert spacers until the amount of shadow is as small as possible.
  - Maximum amount of spacers: 5 mm (FL1), 2 mm (RL2)
- **Then, adjust in the horizontal direction.**
  - Move the holder left and right until the amount of shadow is as small as possible.
  - Use the handles at the ends of each holder (marked in red).
- **Then tighten the screw.**

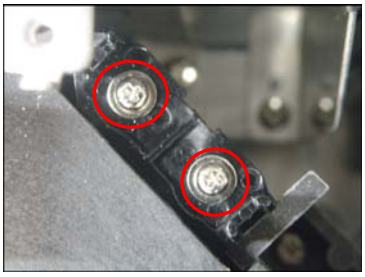
RL2 Adjustment



Slide 57

- Adjustment Procedure: Service manual > 3. Replacement and Adjustment > Replacement of Optical Parts > Optical Parts Adjustment > Adjustment of the optical axis (Shadow adjustment)

Optical Axis Adjustment - 6

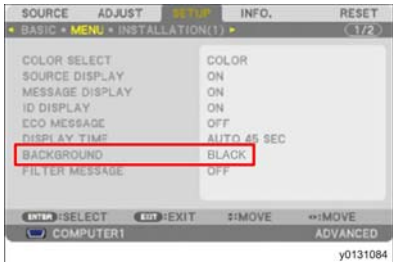


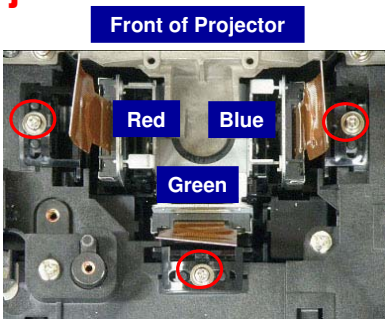
- **Loosen the two screws.**
- **Move the holder until the amount of shadow is as small as possible.**
  - Use the handles at the ends of the holder (marked in red).
- **Then tighten the screws.**
- **There are no spacers for this adjustment.**

Slide 58

No additional notes

Polarizer Adjustment





- Turn on the projector.
- In the SETUP menu, set BACKGROUND to BLACK.
- Loosen the screw for the green polarizer.
- Move the plate from side to side. Stop at the location where the screen is darkest, and tighten the screw.
- Do the same for red, then blue.

Slide 59

No additional notes

Writing Data to New Boards

Before Removing the Main Board: Overview

- **Copy all data from the current Main PWB to your PC.**
  - If this process failed, then some steps of the data writing process have to be skipped.
  - This will be explained on the next slide.

Slide 60

- We will look at this procedure in more detail later.

Writing Data to New Boards

After Removing the Main Board: Overview

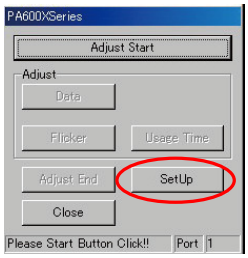
- **Data writing: After replacing the Main PWB**
  - Data for each model
  - EDID Data
  - Serial number and Model number
- **Data Read/Write: After replacing the Main PWB (skip this part if the data could not be copied from the old Main Board)**
  - Flicker Data
  - VT Data
  - Uniformity Data
  - Color Correction Data
  - Multi Data
  - Usage Time Data
- **Flicker adjustment: After replacing the OPT BASE**
  - Also after replacing the Main PWB, if the data could not be copied from the old Main Board
- **Usage Time setup: After replacing the OPT BASE**
  - Also after replacing the Main PWB, if the data could not be copied from the old Main Board

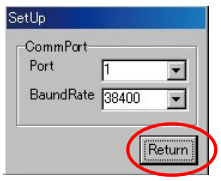
Slide 61

- Adjustment Procedures: Service manual > Electrical Adjustment
- We will look at these procedures in more detail later.

Writing Data to New Boards

Copying Data from the Old Main Board to a PC - 1





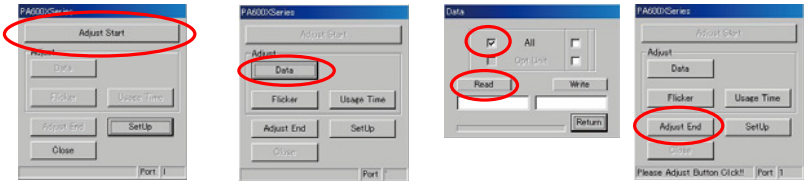
- Do this procedure before you remove the main board.
- Connect the projector to your PC with a serial cable (D-SUB9pin - D-SUB9pin, Cross (reverse) cable)
- Start the service adjustment software (TBA.exe)
- Click 'SetUp'.
- For Port, select the port that you are using.
- Then set the Baud rate as shown above.

Slide 62

- The name of the service adjustment software (TBA.exe) was not decided when this TTP was made.

Writing Data to New Boards

Copying Data from the Old Main Board to a PC - 2



- Click 'Adjust Start'.
- Click 'Data'.
- Select 'All', then click 'Read'.
  - You will be asked to input a file name. The data from the old main board will be stored here.
- Click 'OK' when 'It completed' appears.
- Click 'Adjust End'.
- Note: If you now wish to do the same work on another projector, you must still click 'Adjust End', or there will be an error.

Slide 63

No additional notes

Writing Data to New Boards

Data Writing After Replacing the Main Board - 1

- **After we install a new main board, we use the following software:**
  - For writing the model-specific VerUpField data
    - » Writing software: PJUpgrader2vupf.exe
    - » File names: modelname_vupf_V000001.bin
  - For writing the model-specific product data
    - » Writing software: PJUpgrader2.exe
    - » File names: modelname_Data_V102025.bin
- **This software does not write the data you just copied from the old board. It copies firmware and other model-specific data to the new board.**

Slide 64

This software does not write the data you just copied from the old board. This software copies firmware and other model-specific data to the new board.

Writing Data to New Boards

Data Writing After Replacing the Main Board - 2

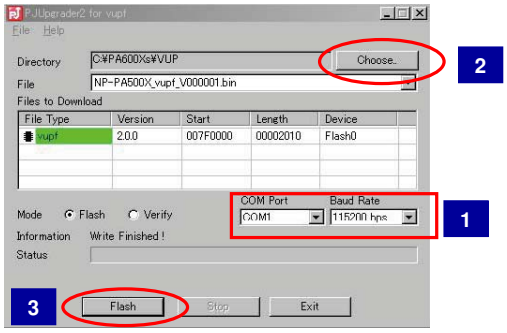
- **After you have connected the computer to the projector, hold down the Enter and Back buttons on the projector, and turn on the projector's power.**
  - Release the the Enter and Back buttons when the Power lamp goes green.
  - This procedure puts the projector in write-only mode.
- **Then, start PJUpgrader2vupf.exe.**

Slide 65

No additional notes

Writing Data to New Boards

Data Writing After Replacing the Main Board - 3



- **First, select the COM port, and set the Baud rate to 115200 bps.**
- **Click 'Choose'.**
- **Then, browse to the file where the data for your model is.**
  - The file name is modelname_vupf_V000001.bin
- **CAUTION: If you write the wrong file, you must replace the Main Board.**
- **Then click 'Flash', and follow the instructions. The data is written to the main board.**

Slide 66

No additional notes

Writing Data to New Boards

Data Writing After Replacing the Main Board - 4

- **Then switch the projector off.**
- **Hold down the Back and Menu buttons on the projector, and turn on the projector's power.**
  - Release the the Back and Menu buttons when the Power lamp goes green.
- **Then, start PJUpgrader2.exe.**
- **Repeat the procedure on the previous slide.**
  - The file name is modelname_Data_V102025.bin

Slide 67

No additional notes

Writing Data to New Boards

Data Writing After Replacing the Main Board - 5

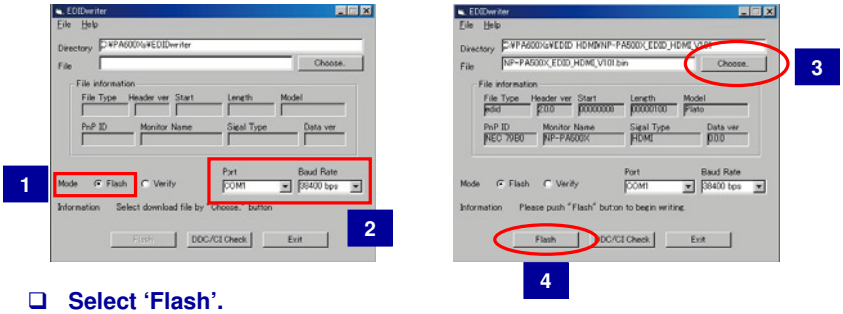
- **Now we must write EDID data to the main board.**
  - EDID rewriting software
    - » EDIDWrite.exe
  - EDID data (HDMI)
    - » modelname_EDID_HDMI_V***.bin
  - EDID data (Analog)
    - » modelname_EDID_DSUB_V***.bin
  - EDID data (Display Port)
    - » modelname_EDID_DP_V***.bin

Slide 68

- Extended display identification data (EDID) is data which describes the capabilities of a video output device, such as a projector, to a source of video data, such as a computer.

Writing Data to New Boards

Data Writing After Replacing the Main Board - 6



- Select ‘Flash’.
- Set up the Port and baud rate as shown.
- Click ‘Choose’ and browse for the file.
- Click ‘Flash’.
- The data will be written. Click ‘OK’ when ‘Finished’ appears.
- Do this procedure for all three files.

Slide 69

No additional notes

Writing Data to New Boards

Data Writing After Replacing the Main Board - 7

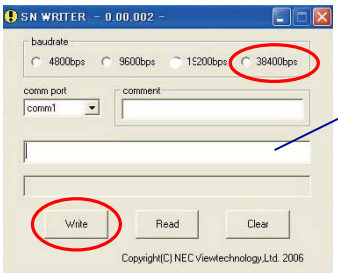
- Now we must write the serial number and model number to the new main board.
- Start snwriter000002.zip

Slide 70

No additional notes

Writing Data to New Boards

Data Writing After Replacing the Main Board - 8



Input serial number and model name here

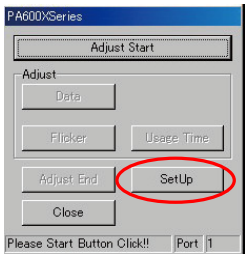
- Set the Baud rate as shown above.
- Input the serial number and model name in the following format, using asterisks and spaces as shown.
  * modelname serialnumber*
- Click 'Write'
- No verification is performed, so click 'Read' after writing is finished, to make sure that the projector got the data correctly.

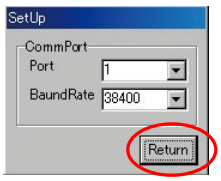
Slide 71

No additional notes

Writing Data to New Boards

Data Writing After Replacing the Main Board - 9





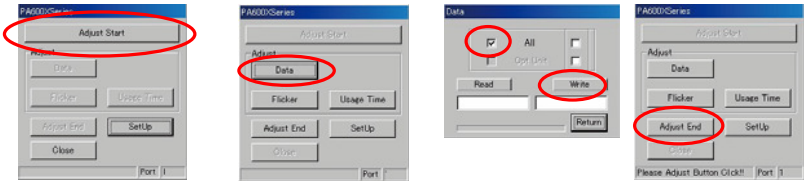
- **Start the service adjustment software (TBA.exe)**
- **Click 'SetUp'.**
- **For Port, select the port that you are using.**
- **Then set the Baud rate as shown above.**

Slide 72

- The name of the service adjustment software (TBA.exe) was not decided when this TTP was made.

Writing Data to New Boards

Data Writing After Replacing the Main Board - 10



- Click 'Adjust Start'. Then click 'Data'.
- If data reading from the old main board failed, then skip the rest of this slide. Go to the next slide.
- Select 'All', then click 'Write'.
  - You will be asked to input a file name. Select the file that has the data from the old main board.
- When "Please Power Off (Standby state)." appears on the computer, make sure that the projector power is in the standby state, then click OK.
- Click 'OK' when 'It completed' appears.
- Turn the projector power on for at least one minute.
- Click 'Adjust End'.
- Note: If you now wish to do the same work on another projector, you must still click 'Adjust End', or there will be an error.

Slide 73

- In normal standby mode, the Power indicator is orange and the Status indicator is green.
- In power-saving standby mode, the Power indicator is red and the Status indicator is off.
- If the projector is not in standby mode, press the Power button one time.

Writing Data to New Boards

Data Writing After Replacing the Main Board - 11

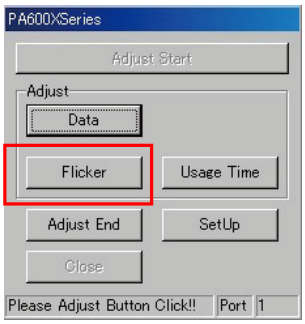
- **The procedure on the previous slide copies the following data (which is from the old board) to the new board:**
  - Flicker Data
  - VT Data
  - Uniformity Data
  - Color Correction Data
  - Multi Data
  - Usage Time Data
- **If data reading from the old board failed, you are only able to input the flicker data and the usage time data.**
- **The next few slides explain how to input the flicker data and usage time data in this situation.**
  - These two items must also be input after you replace the OPT BASE.

Slide 74

- VT Data, Uniformity Data, Color Correction Data, Multi Data were input automatically when you used PJupgrader2 (see Data Writing After Replacing the Main Board – 4).

Writing Data to New Boards

Data Writing After Replacing the Main Board – 12



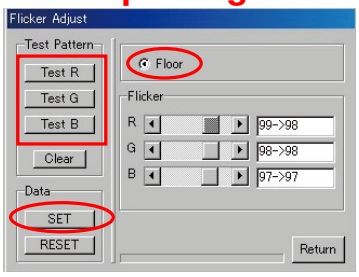
- **To input flicker data and usage time data, we use the service adjustment software (TBA.exe).**
- **Set up the software as shown on 'Data Writing After Replacing the Main Board, slide 9'.**
- **Then click 'Flicker'.**
- **Before you do any more adjustment, make sure that the projector power has been on for 5 minutes, with the lamp on.**

Slide 75

- The name of the service adjustment software (TBA.exe) was not decided when this TTP was made.

Writing Data to New Boards

Data Writing After Replacing the Main Board – 13



- **Select 'Floor'.**
- **Display the Red raster signal by clicking 'Test R' in the Test Pattern box. Adjust the R-scroll bar so that the flicker in the middle of the window becomes as small as possible.**
- **Do the same for Test G, then Test B.**
- **When the adjustment is done, click 'Set' to write the new value to the projector**
  - If you need to restore the data to the state before the adjustment, click the 'Reset' button.

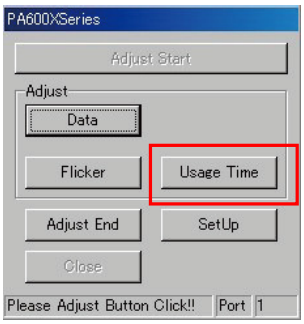
Slide 76

- The values displayed by the side of each scroll bar show the original value to the left of the arrow, and the current value to the right of the arrow.

Writing Data to New Boards

Data Writing After Replacing the Main Board – 14

- Now we write the usage time data.
- Click 'Usage Time'.

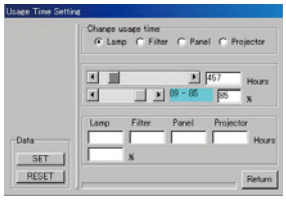


Slide 77

No additional notes

Writing Data to New Boards

Data Writing After Replacing the Main Board – 15



- Select the type of usage time that you wish to input (lamp, filter, panel, or projector).
- Adjust the time with the scroll bar.
- Click 'Set'.
- When "Please Power Off (Standby state)." appears on the computer, make sure that the projector power is in the standby state, then click OK.
- After writing the data, turn the projector power on for at least one minute.

Slide 78

- In normal standby mode, the Power indicator is orange and the Status indicator is green.
- In power-saving standby mode, the Power indicator is red and the Status indicator is off.
- If the projector is not in standby mode, press the Power button one time.

This section explains the basic points about updating the firmware.

- Service Manual Procedure: 4. System Maintenance > Firmware Update

Updating the System Firmware

- **Check the IP address of the projector.**
  - In the following example, the IP address is xxx.xxx.xxx.xxx
- **Open a browser, and input the following:**
  - http://xxx.xxx.xxx.xxx/upload.html
- **Click [Refer].**
- **Select the file to be overwritten, then click [Update], then [OK].**
  - 'File written successfully' will be displayed after the update is finished.
- **Check the history information that appears on the screen.**
- **If you have more firmware files to update, select another file and click [Update].**
- **Click [Reboot] when you have finished.**
  - Do not turn the power off or disconnect the LAN cable before rebooting.

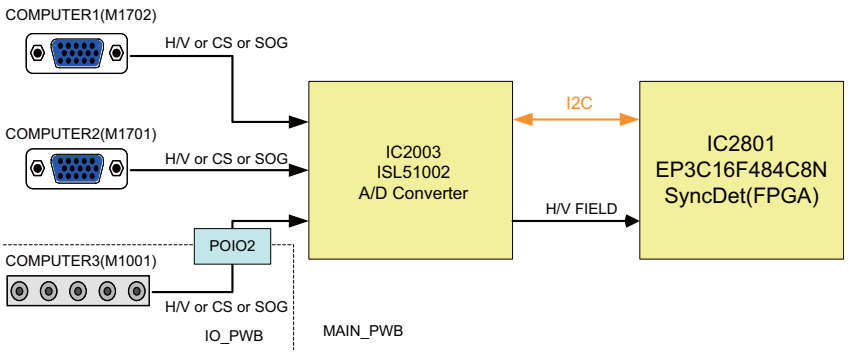
Slide 80

- The detailed procedure is in the System Maintenance - Firmware Update section of the service manual.

This section contains technical information on how the electronics in this model work.

- In the following slides, the main part of the slide shows a circuit diagram, and the notes page contains the description.

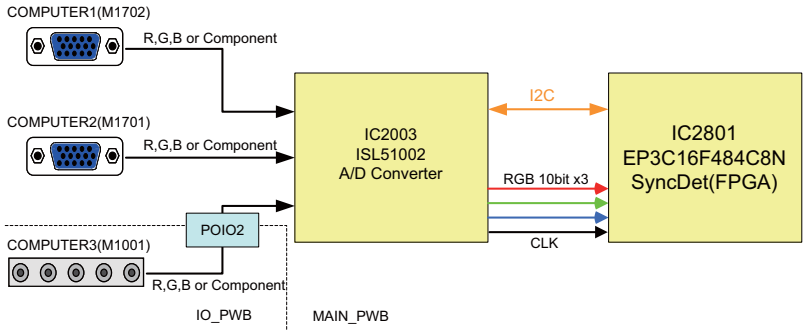
Synchronization Signal Processing



Slide 82

- The sync signal (H/V or CS) which is input from COMPUTER 1 (D-SUB15pin M1702), and COMPUTER 2 (D-SUB15pin M1701) is input to A/D Converter (IC2003), respectively. The COMPUTER 3 (BNC x5 M1001) signal is also input to the A/D Converter via POIO2 connector from the IO_PWB. The SOG (Sync on Green) signal is branched and also input to the SOG-exclusive input port of the A/D Converter.
- With this A/D Converter, the following synchronization signals are processed.
  - Horizontal/vertical synchronizing separation
  - Sync separation of composite synchronization, Sync on Green.
  - Existence of horizontal/vertical sync signal and polarity discrimination
  - Clamp pulse generation and processing
- The information obtained here is read into SyncDet (IC2801) via the I2C-BUS, and is stored into a register which is readable by the CPU. Also, the sync signal of the terminal selected with the projector MENU is sync-separated and becomes the horizontal/vertical sync signal and FIELD signal.

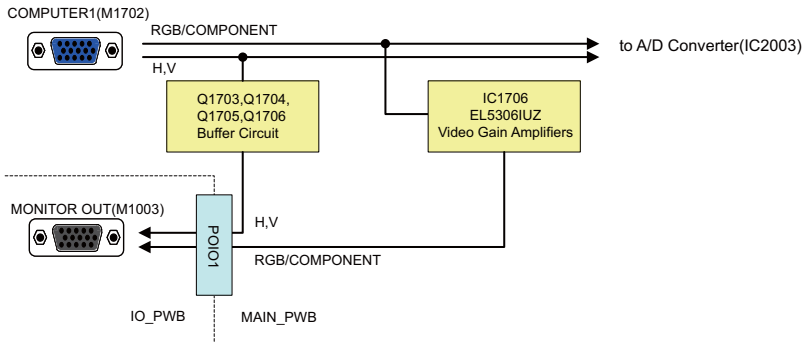
Analog Signal Input Processing



Slide 83

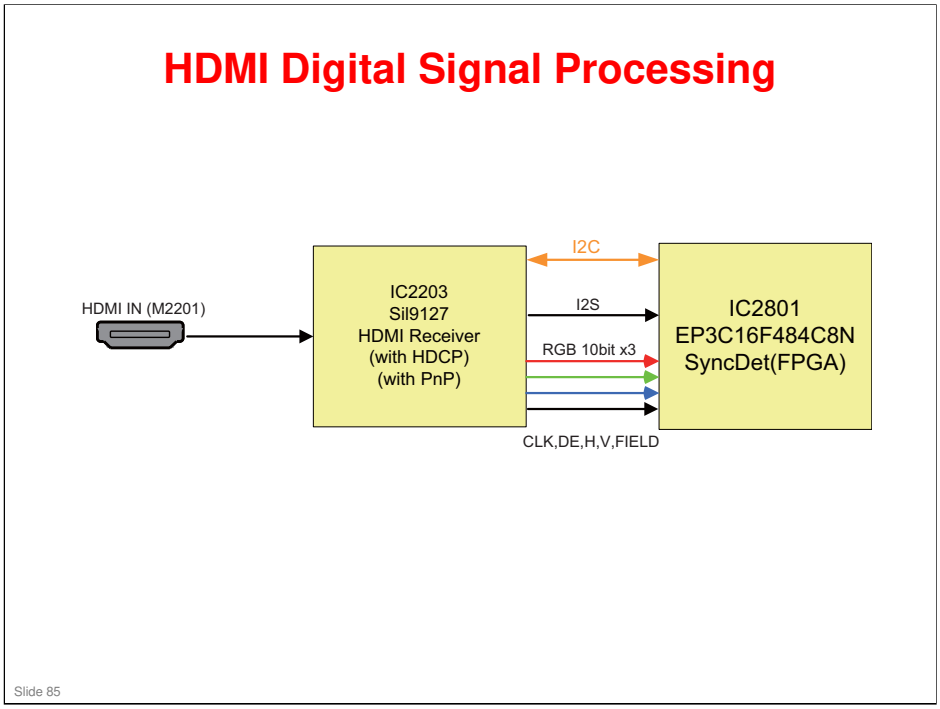
- The sync signal (H/V or CS) which is input from COMPUTER 1 (D-SUB15pin M1702) and COMPUTER 2 (D-SUB15pin M1701) is input to the A/D Converter (IC2003), respectively. The COMPUTER 3 (BNC x5 M1001) signal is also input to the A/D Converter via the POIO2 connector from the IO_PWB.
- The video signal is converted to a 10-bit digital signal with the internal A/D Converter. This A/D Converter is also has a built-in PLL circuit, and the clock locked with H-sync signal and timing pulse are internally generated. It outputs the video signal from the terminal selected with the projector MENU to SyncDet (IC2801) after A/D conversion.

Monitor Output

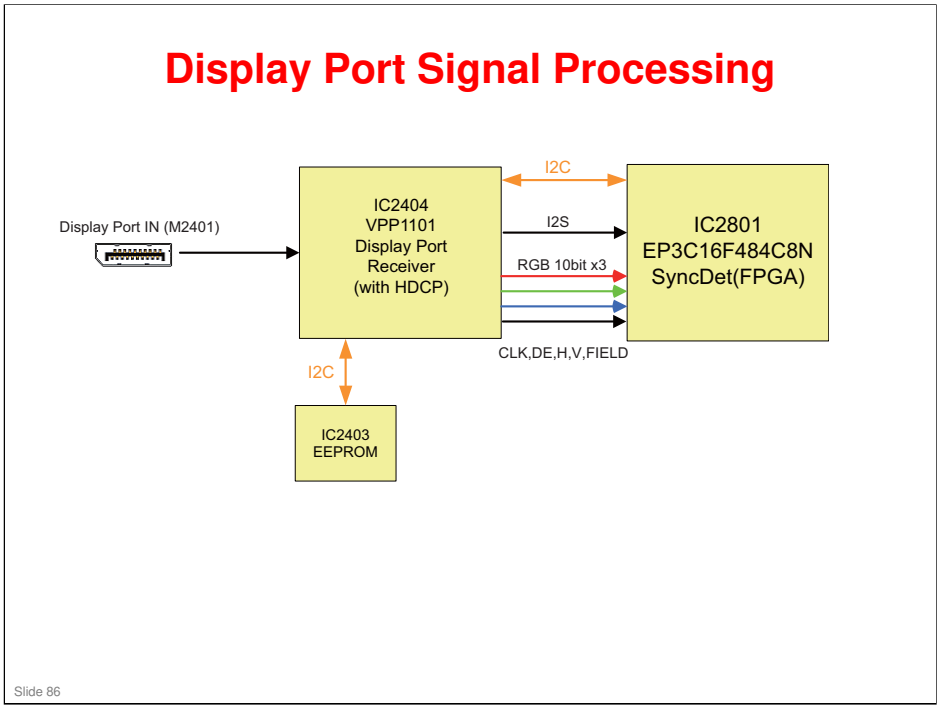


Slide 84

- The video signal which is input to COMPUTER 1 (M1702) is transformed to 6dB AMP in EL5306 (IC1706), then outputs to the MONITOR OUT terminal (M1003) of the IO_PWB board via POIO1 connector. The sync signal goes through the buffer circuits, Q1703, Q1704, Q1705, Q1706, and outputs to the MONITOR OUT terminal of the IO_PWB board via the POIO1 connector.
- Monitor output is possible when Standby Mode of the projector is set to Normal. However, when Power-Saving or Network Standby is selected, the monitor output is not enabled when the status is changed to their Standby Mode.

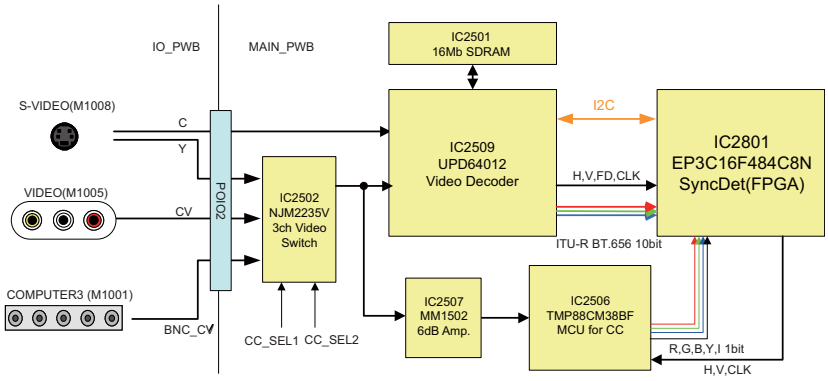


- The TMDS signal which is input to the HDMI terminal is transmitted to the HDMI Receiver IC (IC2203) and converted to RGB 10-bit digital video signals, clock signal, horizontal/vertical sync signal, DE signal, and FIELD signal, then input to SyncDet (IC2803).
- In addition, the audio signal is converted to Master Clock (MCLK), Bit Clock (BCLK), Word Clock (WCLK), and Data (DO), then input to SyncDet.
- This Receiver IC is equipped with a HDCP function. If the video output device is also equipped with a HDCP function, the encryption unlock is processed between the video output device and the Receiver IC, and when encryption is unlocked, the device can output the video. If not unlocked, the video will not be output.
- Also, the Receiver IC has a built-in memory area for EDID.



- The digital signal which is input to the Display Port terminal is transmitted to the Display Port Receiver IC (IC2404) and converted to RGB 10-bit digital video signals, clock signal, horizontal/vertical sync signal, DE signal, and FIELD signal, then input to SyncDet (IC2803).
- In addition, the audio signal is converted to Master Clock (MCLK), Bit Clock (BCLK), Word Clock (WCLK), and Data (DO), then input to SyncDet.
- This Receiver IC is equipped with a HDCP function. If the video output device is also equipped with a HDCP function, the encryption unlock is processed between the video output device and the Receiver IC, and when encryption is unlocked, the device can output the video. If not unlocked, the video will not be output.
- In addition, the external EEPROM (IC2403) stores EDID data and firmware for the Display Port.

Video Signal Processing



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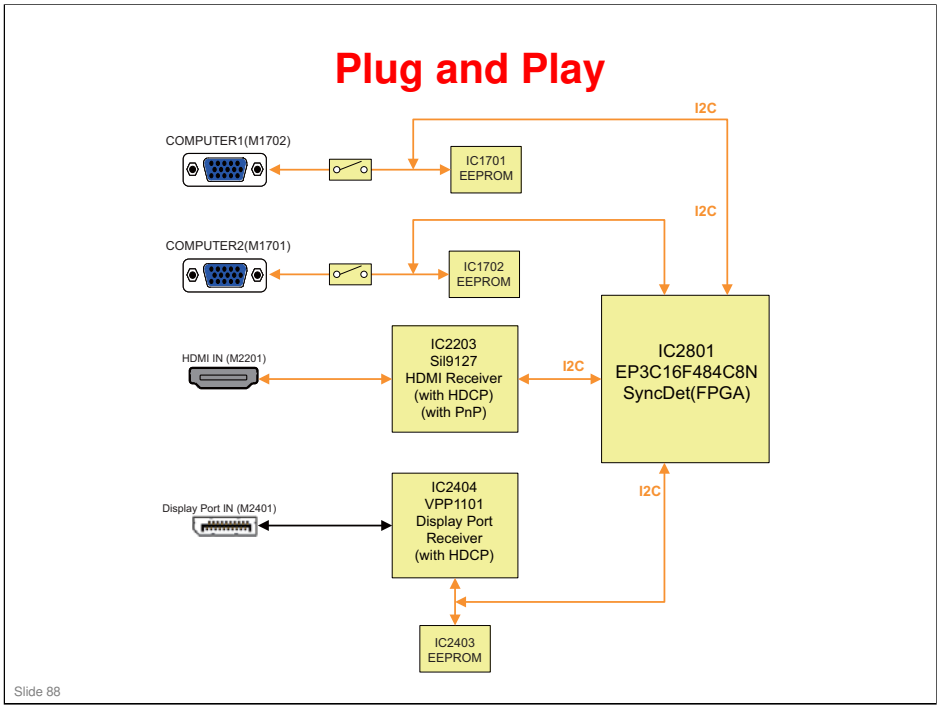
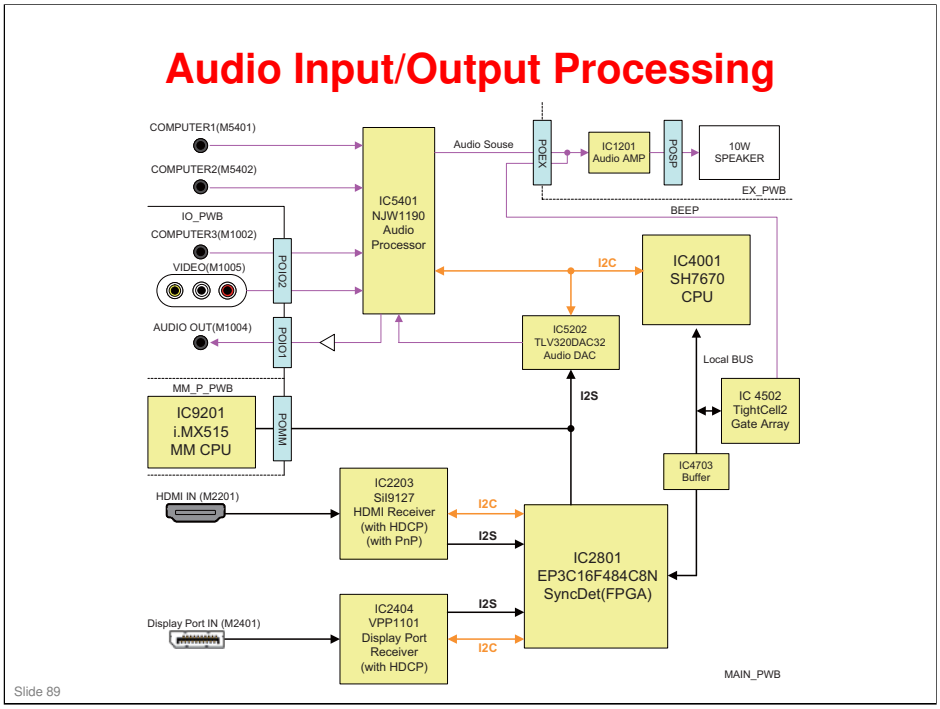
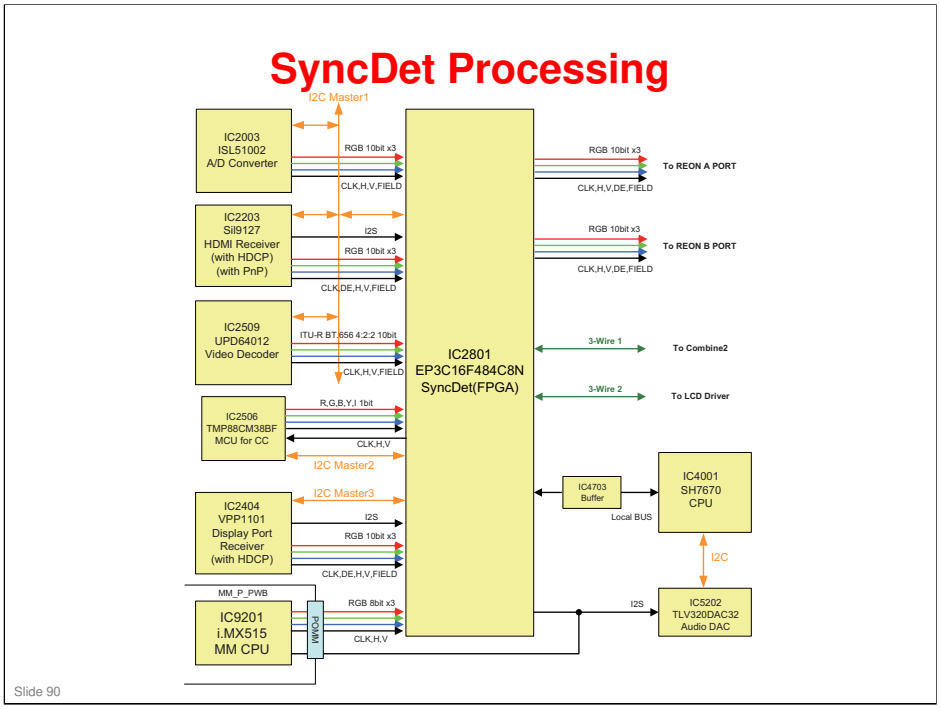
- The VIDEO signal, S-VIDEO signal, and the signal from COMPUTER3 (M1001) in VIDEO Mode is input to the 3ch Video Switch (IC2502) provided on the MAIN_PWB via the POIO2 connector. The CPU controlling CC_SEL1 and CC_SEL2 selects the terminal, and input to Video Decoder (IC2509). However, the S-VIDEO color signal is directly input to the Video Decoder.
- In the Video Decoder, color system recognition, horizontal lock detection, vertical frequency detection are performed and transmitted to SyncDet (IC2801) via the I2C-BUS, then stored into a register which is readable by the CPU.
- The video signals, Y/C separation of NTSC, 3LINE Y/C separation of PAL using external SDRAM (IC2510), and Y/C separation of SECAM using BPF&TRAP are processed.
- The video output from the video decoder is ITU-R BT.656 4:2:2 10bit, and input to SyncDet.
- Also, this projector supports closed caption. The video signal is input to the Micro Control Unit which is customized for the closed caption decoding via 6dB AMP (IC2507). The decoded signal is synchronized with the sync signal from the SyncDet and output. Then it is layered on the video outputs.



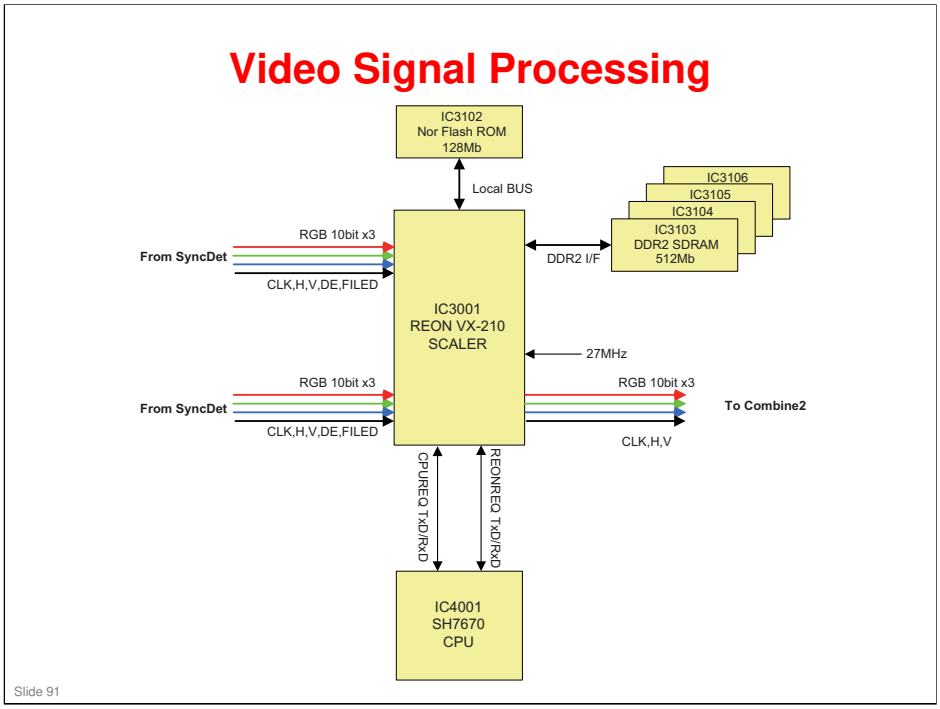
- The serial control terminals, COMPUTER1 (M1702) and COMPUTER2 (M1701), are connected to the EEPROMs for Plug and Play, COMPUTER1 for IC1701, COMPUTER2 for IC1702, respectively. This enables the reading PC to read EDID information and detect the projector. (COMPUTER3 is not supported.)
- The HDMI terminal (15,16 pin) is connected to the HDMI Receiver IC (IC2203). This enables the PC to read EDID information and detect the projector.
- For the Display Port, when the Display Port Receiver IC (2404) is powered, it reads EDID data from the external EEPROM (IC2403) and stores it in the Display Port Receiver IC. Using the AUX Channel of the Display Port terminal (pins 15, 17), EDID information stored in the Display Port Receiver IC is read. This enables the PC to detect the projector.
- This projector's Plug and Play corresponds to DDC/2B.
- In addition, using a dedicated tool for the EDID writing, writing in COMPUTER1: EEPROM (IC1701), COMPUTER2: EEPROM (IC1702), HDMI: HDMI Receiver IC (IC2203), Display Port: EEPROM (IC2403) are possible via the route of PC, CPU, SyncDet (IC2801).
- It is only possible via PC. Direct writing from each terminal is not possible.



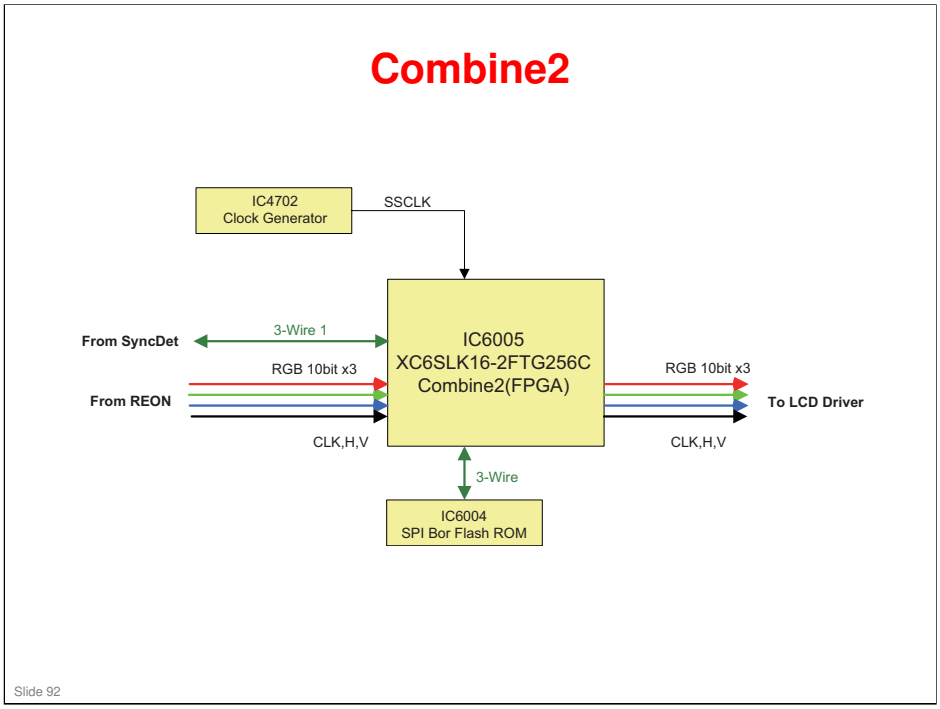
- The audio signals which are input from COMPUTER 1 (M5401), COMPUTER 2 (M5402), COMPUTER 3 (M1002), and VIDEO (M1005) are input to the Audio Processor IC (IC5401).
- The audio signals of HDMI and Display Port are output from each Receiver IC (IC2203/2404) in I2S (MCLK/BCLK/WCLK/DO), and once input to SyncDet (IC2801). Then only the I2S of the terminal selected by the projector menu is output. The output I2S is Wired OR with I2S output from the MM board and input to DAC (IC5202). The D/A conversion is processed with this audio DAC and input to the audio processor IC.
- In the audio processor IC, only the audio signal from the selected terminal by the projector menu is output. Then L/R signal multiple processing is performed and input to the audio amplifier (IC1201). Then after amplification, the signal is output from the monaural speaker (8Ω) (MAX: 10W).
- When a cable is connected to the Audio Out terminal, the speaker will be muted, and only the L/R signal which is output from the audio processor IC will be output to the Audio Out terminal.
- The audio output is possible when Standby Mode of the projector is set to Normal. However, when Power-Saving or Network Standby is selected, the output is not enabled when the status is changed to their Standby Mode.
- The VOLUME control is performed by controlling the audio processor IC from CPU (IC4001) via I2C.
- This projector is equipped with a beep function on start-up or key operation. The beeping is achieved by the multiple processing of PWM output of the TightCell2 (IC4502) connected to the Local BUS of the CPU with the audio amplifier input.



- SyncDet(IC2801) is FPGA. It will function on start-up by being configured by the CPU (IC4001).
- The digital video output from the A/D Converter (IC2003), HDMI Receiver IC (IC2203), Video Decoder (IC2509), Display Port Receiver IC (IC2404), and MM CPU (IC9201) are input to SyncDet in the ratio of 1:1, and the signal from the terminal selected by the menu of the projector is output to the REON A Port. When the functions of PIP (Picture in Picture) and PBP (Picture by Picture) are used, the Video Decoder output is also output to the REON B Port.
- When the Closed Caption function is enabled, the captions which are output from MCU (IC2506) and the video output from the Video Decoder are layered in SyncDet.
- This IC calculates required information from the sync signals and also by reading from each device via I2C. The CPU reads the information via the Local Bus to recognizs the signals. After that, each device is controlled by I2C via SyncDet, and performs adjustment following the result of the signal recognition. However, adjustment will not be performed for the output from the Multi Media CPU, since its output signal is fixed.
- Also, the CPU performs adjustment by I2C control via SyncDet, when the video adjustment function is used by the user.
- This IC has 2 circuits of 3-wire interfaces, and the CPU is enabled to control the downstream Combine2 and LCD Driver via SyncDet.

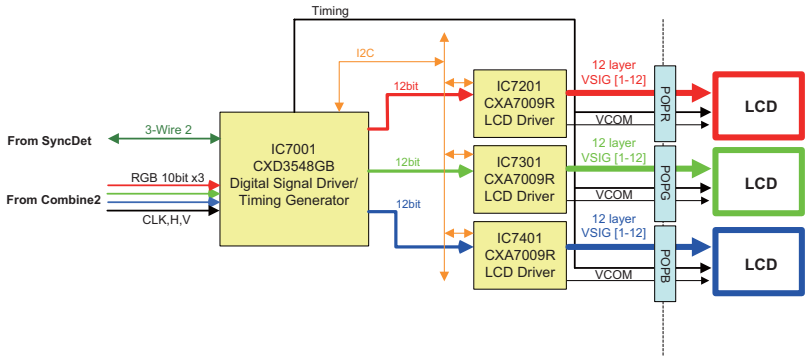


- REON (IC3001) is a LSI which has a integrated function of CPU, video signal processing circuit, OSD generation/multiple processing, USB, and peripheral functions (I2C, UART, GPIO). It is mainly used for various video signal processing, including resolution conversion, keystone correction, sharpness, OSD, and PIP/PBP.
- With the peripheral devices, a 128Mb Flash ROM (IC3102) in which firmware is stored, and 512Mb DDR2 SDRAM x4 (IC3103, IC3104, IC3105, IC3106) as work memory for the video signal processing are connected. For the communication with the CPU, 2nd circuit serial interfaces are used.
- The video signal which is output from SyncDet (IC2801) is processed in this order: sharpness, resolution conversion, OSD generation/multiple processing, keystone correction. Then a 10-bit 3ch video signal is output to Combine2.



- Combine2 (IC6005) is an FPGA. It functions by reading data stored in the SPI Flash ROM (IC6004) and performs configuration.
- The Combine2 performs the following color adjustments.
  - Color correction
  - Color temperature setting
  - Gamma correction
  - Wall color correction
- The APL/histogram detection for IRIS control is also performed with this IC.
- The 10-bit 3ch video signal and sync signal output from REON (IC3001) are re-synchronized with SSCLK (XGA: 65MHz, WXGA: 85MHz), spread spectrum signal, output from Clock Generator (IC4702). Then the signal is output as a 10-bit 3ch video signal.

Panel Drive Processing



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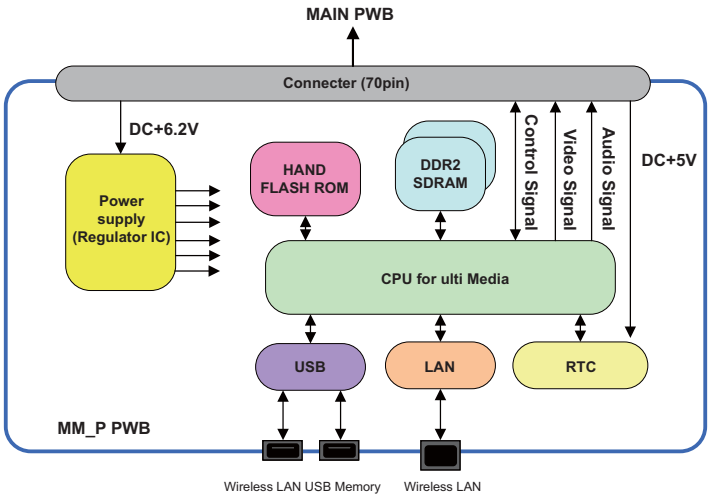
- The video signal and sync signal output in 10-bit 3ch from Combine2 (IC6005) is input to the digital signal driver/timing generator IC (IC7001) for the liquid crystal panel. Then it is output to the liquid crystal panel driver IC (IC7201, 7301, 7401) passing through each correction circuit, including V-T correction, color shading correction.
- In the V-T correction part, the input signal is converted to the data subject to characteristics of the liquid crystal panel according to the lookup table. In the color shading correction part, arithmetic processing is performed on the video signals, so that correction data provided at each point in the window which is divided into 29 (horizontally) times 17 (vertically) in case of XGA, and 30 (horizontally) times 17 (vertically) in case of WXGA, is equalized.
- The digital signal driver/timing generator IC for the liquid crystal panel is controlled by the 3-wire serial interface from SyncDet (IC2801).
- The 12-bit 3ch 2-phase video signals output from the digital signal driver/timing generator IC for the liquid crystal panel are converted to 12-phase analog signals, in packs of RGB colors after D/A, and level conversion by the liquid crystal panel driver IC, and supplied to the liquid crystal panel.
- The timing signal driving for the liquid crystal panel is configured by the digital signal driver/timing generator IC for the liquid crystal panel, and the output timing signal will be supplied to the liquid crystal panel. The common voltage (VCOM) for the liquid crystal panel is supplied to each panel using a dedicated terminal for the liquid crystal panel driver IC. Each common voltage is set by I2C control from the digital signal driver/timing generator IC for the liquid crystal panel.

Multi Media (MM) Processing Unit
MM Entire Configuration



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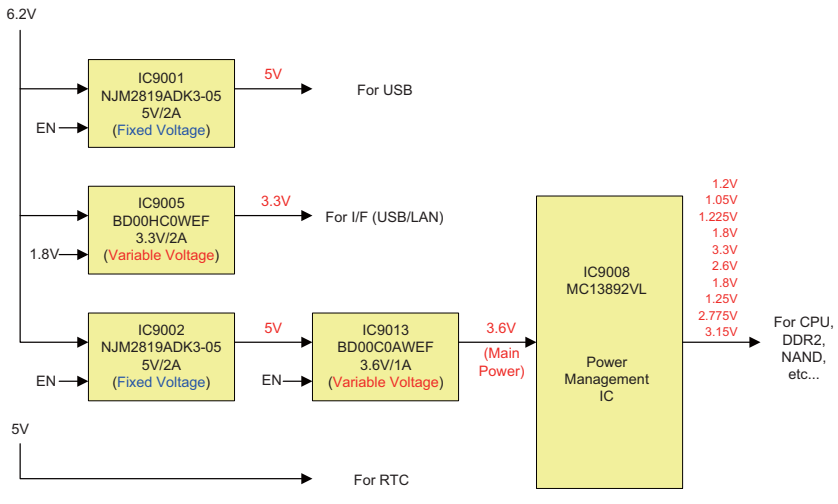
- When Viewer and Network are selected in the menu of the projector, the video output from the MM board is output to the MAIN board via POMM2 (70 pin connector) to project the video output.
- The interface with the MAIN board is performed via POMM2 (70 pin connector). The main signals to the POMM2 connector are the power supply, the control signal, the video signal, and the audio signal. The communication (control signal) with the MAIN board are possible with 2 circuits, USB and UART.
- The main circuit configuration of the MM board is as follows;
  - Power circuit: Generates electric power required in the MM board from +6,2V.
  - CPU circuit: Consists of CPU, NAND Flash, and DDR2SD RAM.
  - USB circuit: Consists of CPU, USB-HUB, Hi-Side SW, and USB terminal.
  - LAN circuit: Consists of CPU, LAN-PHY, and RJ-45 terminal.
  - RTC circuit: Consists of RTC-IC (Real Time Clock).

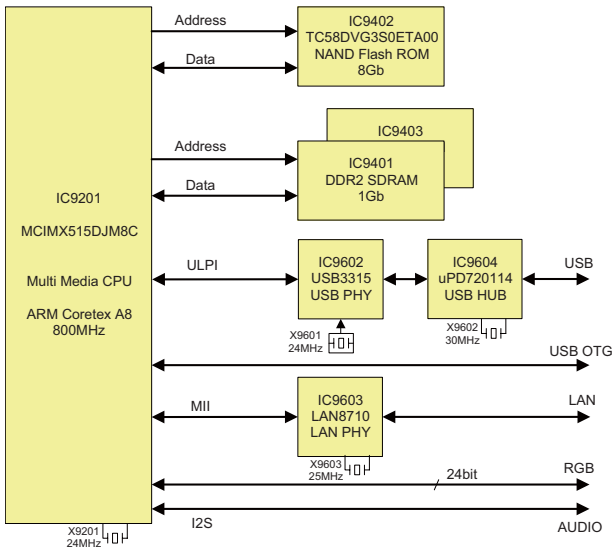
Multi Media (MM) Processing Unit
Power Circuit



- The MM board operates by +6.2V supplied from POMM2 (70-pin connectors) 1 to 5, 36 to 40 pin. And for RTC, operates on +5V supplied from pins 42, 45, 48.
  - IC9001: 5V regulator IC (Power supply for USB VBUS(5V))
  - IC9005: 3.3V regulator IC (Power supply for USB-PHY, USB-HUB, LAN-PHY)
  - IC9002: 5V regulator IC (Upstream of IC9013)
  - IC9013: 3.6V regulator IC (Supply for IC9008)
  - IC9008: PMIC (Generates required power of the CPU.)
- The ON/OFF control of IC9001, IC9002, and IC9013 is performed by the MM_PWON signal from the MAIN board.
- When the MM_PWON signal is "L", the power of the MM board is OFF. However, 5V for RTC is always ON.
- IC9005 and IC9013 are voltage-controlling type regulator ICs, and the output voltage is set by the external resistance. (IC9005: Set at 3.3V output, IC9013: Set at 3.6V output)
- The Power IC IC9008 is an exclusive power IC for the CPU, 3.6V single power supply. The power required for the CPU is output following the activation sequence in the order of power supply start. Also on start-up, it outputs the RESET signal for the CPU and 32.768KHz clock signal for the CPU boot-up.

Multi Media (MM) Processing Unit

Multi Media CPU



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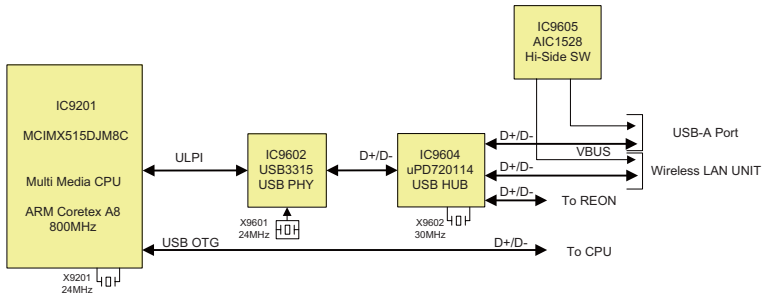
- The Multi Media CPU (IC9201) operates with main CPU clock "800MHz" oin the PLL circuit based on the 24MHz crystal oscillator (X'Tal). And with external IC connections, processing including USB function, wired LAN, wireless LAN images, image file playback, video signal output, and audio signal output are performed.
- The Main OS is "WindowsCE6.0 R3". The firmware is stored in the NAND Flash ROM (IC9402). Also, the user settings in the MM board in relation to networks are stored in IC9402.
- DDR2 SDRAM (IC9401, IC9403) operates with a 200MHz clock from the CPU, and the internal processing speed is 400MHz.
- The USB processing is connected with USB-PHY (IC9602) and ULPI. The signals are converted to USB signals (D+, D-), then to 3rd-circuit USB signals in USB-HUB (IC9604). The 1st circuit is used for the external USB terminal, 2nd circuit for the wireless LAN unit USB terminal, and 3rd circuit for the internal communications. In addition, Hi-Side SW (IC9605) is used as the overcurrent protection circuit for the VBUS of USB.
- The LAN processing is input to RJ-45 terminal connected with LAN-PHY (IC9603) and MII interface.
- Also, the CPU outputs the 8 bit R/G/B video signals to the MAIN board with the POMM2 connector.
- On CPU start-up, it is activated with a 32.768KHz clock signal output from PMIC (IC9008). And after the firmware is activated, the external 24MHz crystal oscillator (X'tal: X9201) is activated.
- The CPU is equipped with the following internal communication (communication among ICs or boards) in addition to the external terminal control.
  - 1 circuit for internal I2C BUS communication.
  - For communication with IC (IC9601) for RTC.
  - 1 circuit for UART for internal communication.
  - For communication with MAIN board.
  - 1 circuit for USB OTG for internal communication.
  - For communication with the CPU on the MAIN board (12Mbps).

Multi Media (MM) Processing Unit
USB



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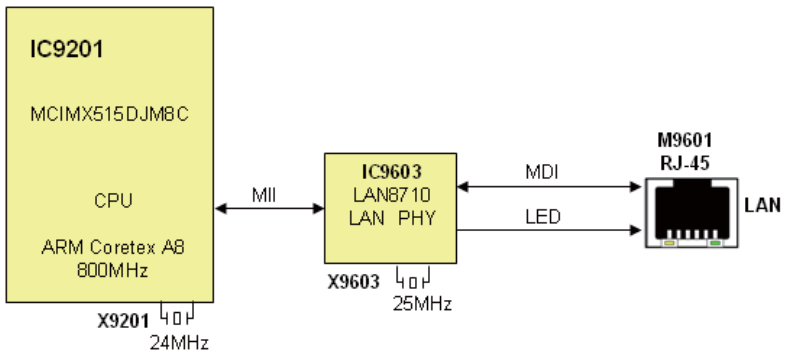
- The Multi Media CPU (IC9201) and USB-PHY (IC9602) are connected with ULPI (UTMI+Low Pin Interface), an interface standard between the USB controller (logical layer circuit) and the transceiver (physical circuit).
- The USB-PHY is operated with a 24MHz clock signal from a crystal controlled oscillator (X9601). And the USB-HUB (IC9604) which is operated with a 30MHz crystal oscillator (X9602) splits into 3 circuits of I/O: USB signals for the external USB terminal, the wireless LAN unit terminal, and internal communication. The USB signals conform to USB2.0 (High-Speed/Full-Speed/Low-Speed). However, the signals for the internal communication operates in Full-Speed.
- The VBUS (+5V) of the USB terminal is controlled by the overcurrent protection circuit, Hi-Side SW (IC9605).
- The wireless LAN function is enabled by connecting a dedicated LAN unit with a USB-A terminal (exclusive use for wireless LAN) to achieve wireless communication with the PC. By using dedicated software, it is possible not only to control the projector, but also to display images from the PC to the projector.

Multi Media (MM) Processing Unit
Wired LAN



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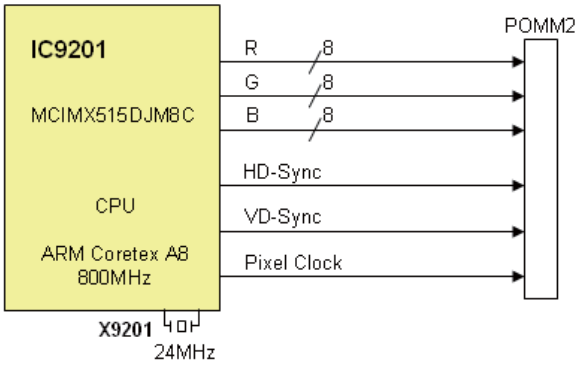
- The Multi Media CPU (IC9201) and LAN-PHY (IC9603) are connected with IEEE802.3u standard, MII (Media Independent Interface), an interface between MAC layer and physical layer on the 10M,100M bit/sec CSMA/CD method LAN (Ethernet). The LAN PHY operates with a 25MHz crystal oscillator (X9603), and connects to the RJ-45 terminal (M9601) with a pulse transformer. The RJ-45 terminal has a built-in LED which indicates the operating state. It is controlled by LAN PHY.
  - Green LED: Lit when 100Base is linked.
  - Yellow LED: Off during data communication.
- The wired LAN function enables communication with the PC on the network by connection with the RJ-45 terminal.
- By using dedicated software, it is possible not only to control the projector, but also to display images from the PC to the projector.

Multi Media (MM) Processing Unit
Video Output



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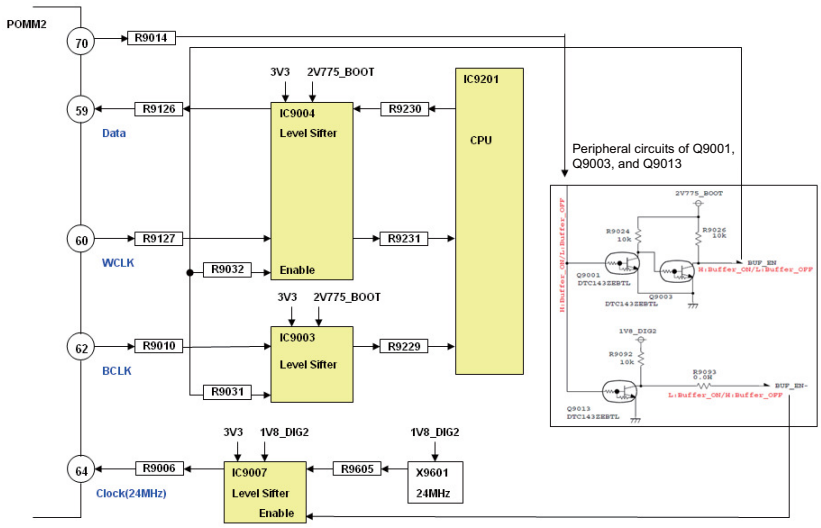
- From the Multi Media CPU (IC9201), 8-bit RGB video signals, synchronized with Pixel Clock are output. Also, HD-Sync (horizontal sync signal) and VD-Sync (vertical sync signal) are output.
- The output video signal is processed in the MAIN board side via POMM2.

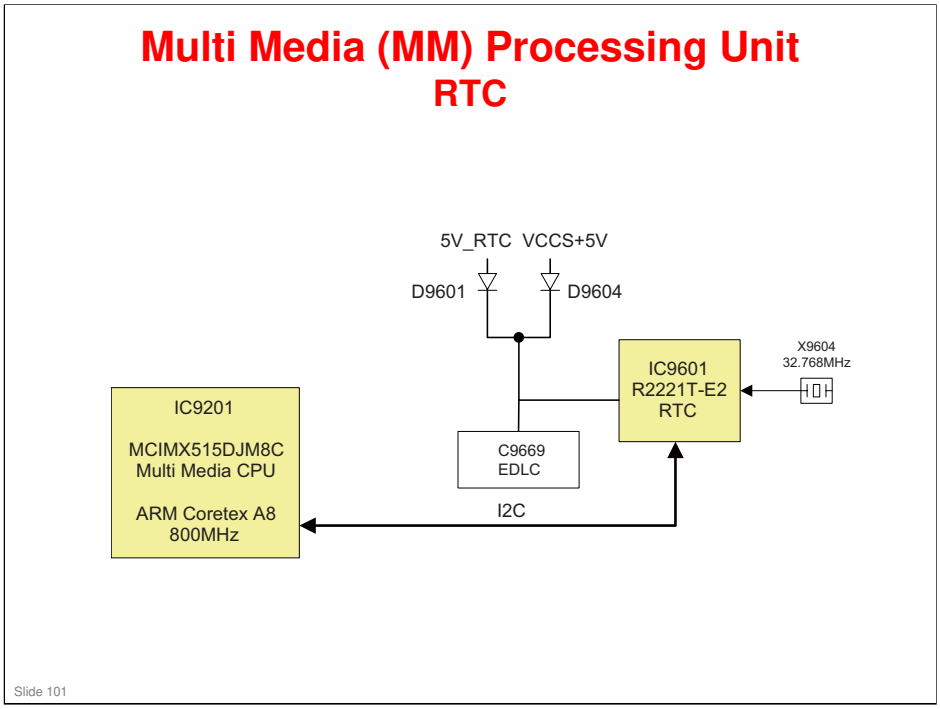
Multi Media (MM) Processing Unit
Audio Output



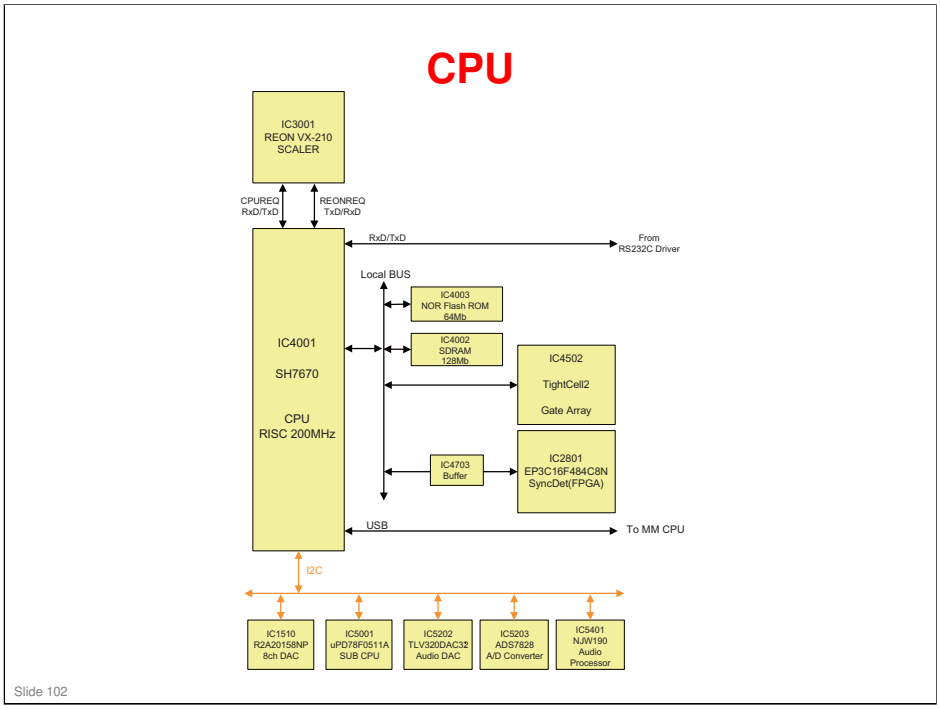
Slide 100

- The audio output from the MM board functions when audio is to be output in the video playback.
- The 24MHz-Clock signal from the crystal oscillator (X9601) is output to the MAIN board via POMM2 (70-pin connector). This 24MHz-Clock signal is input to the audio DAC (IC5202) of the MAIN board. The audio DAC outputs BCLK (Bit Clock) and WCLK (Word Clock) based on the 24MHz-Clock signal. This signal is input to the CPU (IC9201) via POMM2 (70-pin connector). The CPU (IC9201) outputs the audio data which is synchronized with BCLK (Bit Clock) and WCLK(Word Clock), then input to the audio DAC on the MAIN board. The analog audio signal which is converted to a digital signal is input to the audio processor IC (5401). The signal level of 24MHz-Clock/BCLK (Bit Clock) and WCLK (Word Clock)/audio data differ in the MM board side and the MAIN board side, therefore level conversion is processed with IC9003, IC9004, and IC9007. IC9003, IC9004, and IC9007 are controlled by the BUF_EN signal (enable signal).

Multi Media (MM) Processing Unit
RTC



- The RTC(Real Time Clock) keeps the date and time. It is used for program timer functions and checking the expiration date of the network certificate. To keep the time information while the projector power is OFF, it can operate with electric charge stored in the double-layer capacitor (EDLC:C9669). The standard clock is 32.768KHz (X9604), and communication with the CPU is achieved via I2C communication.

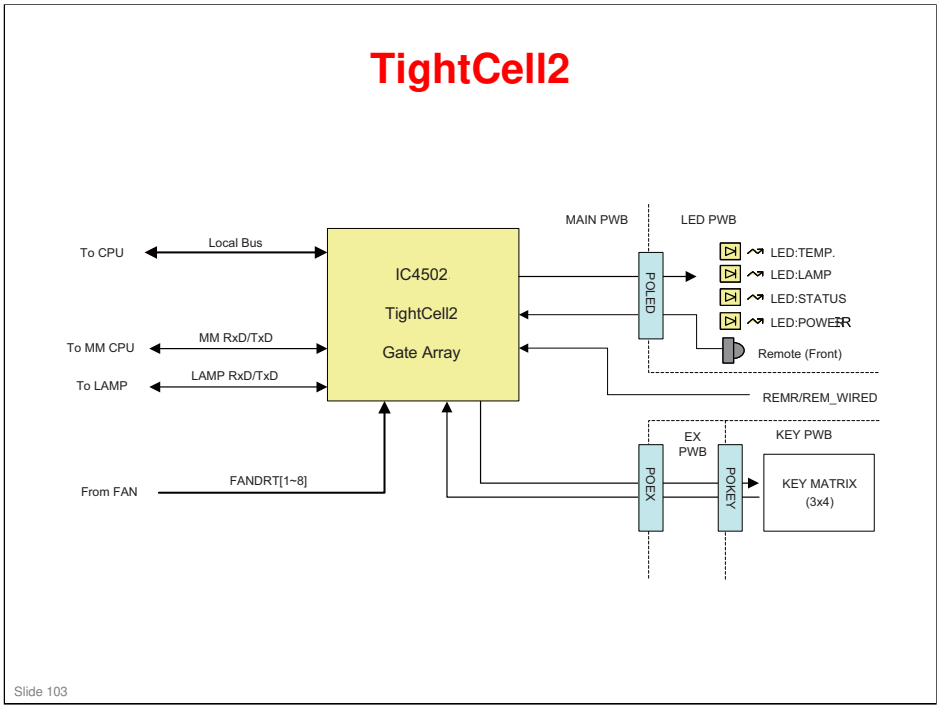


- The CPU (IC4001) is equipped with USB Host & Device, Ethernet MAC, I2C, UART, and GPIO. It controls the projector.
- The following are connected to the Local BUS of the CPU: firmware, factory-set data and 64Mbit Nor Flash ROM(IC4003) which stores initial data for each device, 128Mb SDRAM(IC4002) for the work memory, Gate Array TightCell2 (IC4502) for the feature expansion, and SyncDet (IC2801) via Buffer (IC4703).
- The main uses of the CPU are as follows:
  - I2C BUS x1: Used with audio processor IC, audio DAC, A/D Converter, D/A Converter, and SUB CPU.
  - UART x3

    0ch : Used with a PC control terminal

    1ch: Communication with REON 1 (CPUREQ TxD/RxD)

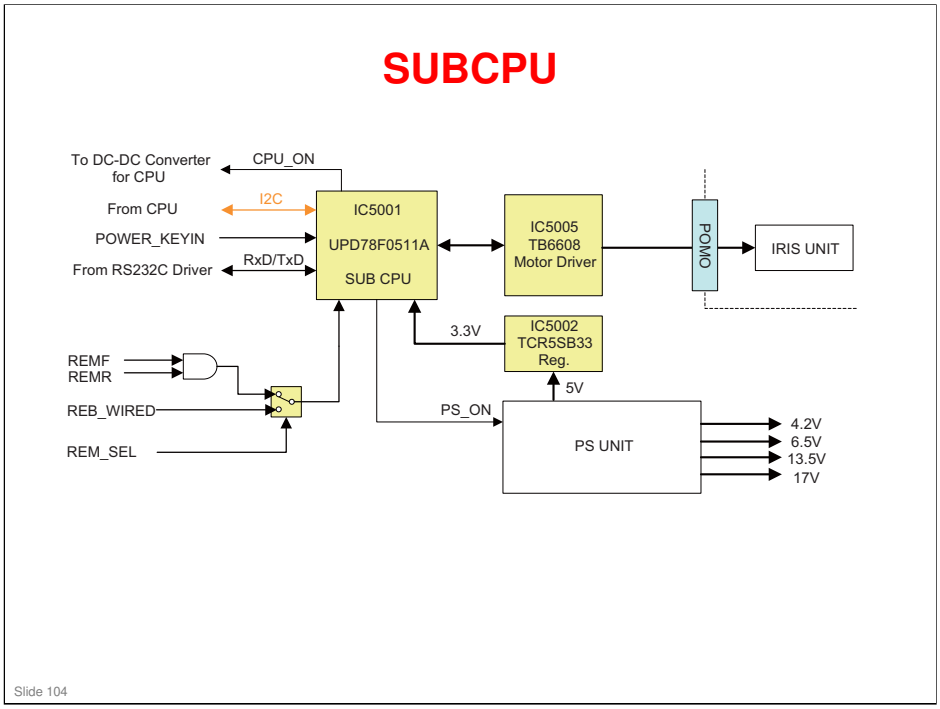
    2ch: Communication with REON 2 (REONREQ TxD/TxD)
  - GPIO: Used for power control signal, reset signal, state checking, or switching operation of each device.
  - USB Host & Device: Connected with Multi Media CPU for UPDATE and communications.
  - Ethernet MAC: Not in use



- Tight Cell2 (IC4502) is a Gate Array which is equipped with the following features, including fan revolution detection, key matrix, LED control. Tight Cell2 is controlled by the CPU (IC4001) via Local BUS. The supported functions are as follows;
  - Fan revolution detection x8: Detects the revolution from the rotational frequency pulse signal which is output from the fan. "FAN STOP" is detected when the revolution falls below the specification.
  - Key matrix control: The CPU regularly monitors the key array.
  - General-purpose I/O: Used for lighting control of LEDs and each IC.
  - UART x2:

    1st circuit for communication with the lamp.

    2nd circuit for communication with the Multi Media CPU.
  - PWM output: Used for beep generation.
  - 2nd circuit MIX for remote control signal light receiving section: Detects the remote control header section of each signal of the light receiving section.
  - Decoder circuit for remote controller: Decodes the received signals in accordance with the hardware.



- SUBCPU (IC5001) controls the power of PS-UNIT and the CPU (IC4001). When the power is supplied, 5V is supplied to the regulator IC (IC5002) from PS-UNIT, and 3.3V is generated for SUBCPU. This 3.3V activates SUBCPU, and the PS_ON signal is input to PS-UNIT. This performance enables power output other than 5V. After that, the CPU is activated by CPU_ON signal input to the DC-DC converter for the CPU.
- SUBCPU, as a substitute for the CPU, decodes the remote control's Power ON command, and detects the Power ON command from the PC and Power key input. In the normal Power ON state, it controls the IRIS motor driver IC(IC5005).

Protection - 1

- **When any of the following abnormal conditions is detected, the projector blinks the corresponding LED (Status, Lamp, Temp) and returns to the standby state.**
  - For details, refer to the appendix of the operation manual (List of indicator display).
- **Lamp cover removed (Status LED Red, 1 time cycle blinking)**
  - When it is detected while the lamp is lit, the lamp will be turned off and fan drive is turned OFFautomatically.
  - Also, if it is detected while in the standby state, the power will not be turned ON.
- **Abnormal temperature detection (Temp LED Red, 2 times cycle blink): The projector internally monitors the temperature at 3 points, and abnormal temperature is detected with at least one error. The usage and control are as follows:**
  - Detection with bimetal
    - » It is detected when lamp temperature is abnormal. The lamp is turned OFF automatically. When an abnormal state is detected with bimetal, the state will not be restored until the temperature inside the projector is adequately lowered. The range of temperature detection with bimetal is 140° C±5° C, and set as Normal: SHORT, and Abnormal: OPEN.
  - Detection with temperature sensor (intake temperature)
    - » The output of the temperature sensor (TH8701) controls the fan revolution read by the CPU as digital data from A/D Converter (IC5203). When abnormal temperature is detected, it assumes that the environment temperature is out of the working range and power is turned OFF by S/W. The sensor is provided on the sub board. (TH1_PWB)
  - Detection with temperature sensor (exhaust temperature)
    - » The output of the temperature sensor (TH8901) controls the fan revolution read by the CPU as digital data from A/D Converter (IC5203). When abnormal temperature is detected, it assumes that the environment temperature is out of the working range and power is turned OFF by S/W. The sensor is provided on the sub board. (TH3_PWB)

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No additional notes

Protection - 2

- **Fan (x8) abnormal revolution detection (Status LED Red, 4 times cycle blink)**
  - It is detected when at least 1 fan revolution falls below the specification.
- **Super Capacitor abnormal detection (Status LED Red, 4 times cycle blink)**
  - It is detected when Super Capacitor peripheral circuit loaded for Direct Power OFF is in an abnormal state, or the connector (POLCAP) is not connected.
- **LAMP unlit detection (Temp LED Red, 6 times cycle blink)**
  - The operation status is regularly monitored, and unlit state and communication error is detected via serial communication.
- **Iris Error detection (Status LED Red, 9 cycle blink)**
  - It is detected when the Iris unit and its peripheral circuits are in an abnormal state, or the connector (POMO) is not connected.

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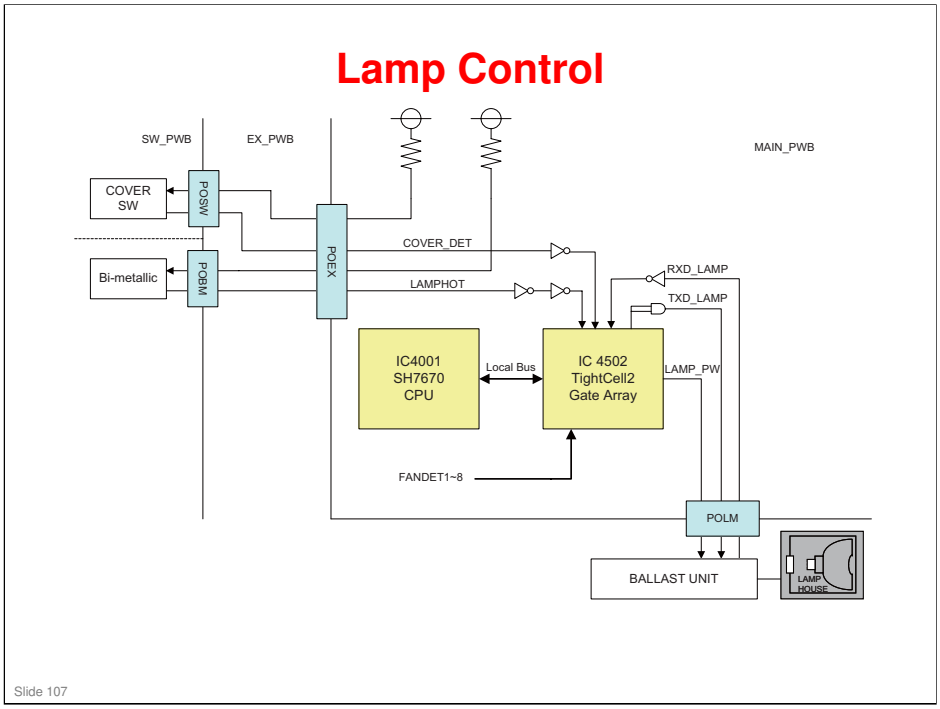
No additional notes



- Lamp on/off is controlled by High/Low of TightCell2 (IC4502)'s Port: LAMP_PW signals. Also, the lit status monitoring and brightness are controlled by the serial communication function of TightCell2 (TXD_LAMP/RXD_LAMP). The LAMP_PW signal's lighting control is enabled only when the status of lamp cover, bimetal, and fan are in the normal state. In other cases, TightCell2 will detect the mechanical signal (COVERDET/LAMPHOT/FANDET1~8) and turn off the lamp.
- Also, there is an ECO Mode and this controls the lamp power as follows:
  - When ECO is OFF: Lamp power is 100%
  - When ECO is ON: Lamp power is 80%

I2C Control

- CPU, SyncDet, and digital signal driver/timing generator IC for the liquid crystal panel are controlled by I2C control.
- The following table is a list of ICs that are controlled by I2C.
  - See the accompanying file: I2C table.pdf

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No additional notes

List of Integrated Circuits

- See the accompanying file: IC list.pdf

Slide 109

No additional notes

No additional notes