SERVICE MANUAL

HD20/HD200X/HD2200/HD20LV/HD21/HD23

Date	Revise Version	Description
2009/07/02	V1.0	Initial Issue
2009/10/15	V2.0	Add HD20's extended models: HD2200 and HD200X
2009/11/30	V3.0	Add EH1020
2010/02/22	V4.0	Modify CH4 "Defect specification table"
2010/04/19	V5.0	Remove EH1020&Add HD20LV
2011/04/08	V6.0	Modify DMD sponge 's position
2011/09/09	V7.0	Add HD21/HD23

TSD: Mina Check: Amy Approved:

Preface

This manual is applied to HD20/HD200X/HD2200/HD20LV/HD21/HD23 projection system. The manual gives you a brief description of basic technical information to help in service and maintain the product.

Your customers will appreciate the quick response time when you immediately identify problems that occur with our products.We expect your customers will appreciate the service that you offer them.

This manual is for technicians and people who have an electronic background.Please send the product back to the distributor for repairing and do not attempt to do anything that is complex or not mentioned in the troubleshooting.

Notice:

The information found in this manual is subject to change without prior notice. Any subsequent changes made to the data herein will be incorporated in future edition.

HD20/HD200X/HD2200/HD20LV/HD21/HD23 Service Manual

Manual Version 7.0

HD20/HD200X/HD2200/HD20LV/ HD21/HD23 Comparison List

Models / Parts	HD20	HD200X	HD2200	HD20LV	HD21	HD23
MAIN BOARD MODULE	70.8EG33GR01		70.8EG42GR01	70.8HW01GR01	80.8MQ01G001	80.8NJ01G001
LAMP Driver	70.8EG38GR01			70.8HW05GR01	70.8MQ20GR01	70.8NJ12GR01
LVPS	75.8CT01G001				75.8MQ01GP01	75.8CT01G001
Engine Module	70.8EG36GR01			70.8HW03GR01	70.8NJ10GR01	
DMD CHIP	48.8EG01G001				48.8MQ01G001	
Color Wheel	70.8EG37GR01			70.8HW04GR01	70.8KZ26GR01	70.8NJ11GR01

Table of Content

Chapter 1

Introduction

1-1 Highlight

No	Item	Description
1	Dimensions (WxDxH)	• 324x234x97mm
2	Power Supply	• Auto-ranging: 100V ~ 240V ± 10%, 50-60Hz • Auto-ranging: 90V ~ 264V ± 10%, 50-60Hz(For HD20LV)
3	Keystone correction	• +/- 5 degree
4	DMD chip	• 0.65” 1080P DC2 DMD -8 • 0.65” 1080P DC3 DMD -7(for HD21/HD23)
5	Throw ratio	• 1.5~1.8(D/W) @ 60”
6	Lamp life	• 2500 hrs in Bright mode • 4000 hrs in ECO mode
7	Lamp	• 230W Osram E20.8
8	Temperature	• Operating: 5 ~ 35 °C 5 ~ 40 °C(For HD20LV/HD21/HD23) • Non-operation: -10°C ~ 60°C (For All)
9	Input signal spec	• VGA-in: D-sub 15 pin x 1 • VIDEOx1 • Composite: RCA x 1(Y/Pb/Pr) • HDMI: 2 x HDMI v1.3 (HDCP)
10	Power consumption	For HD20/HD200X/HD2200/HD20LV • Bright Mode: 308W +/- 10%@110V AC • ECO Mode: 254W +/- 10%@110V AC • Standby mode: < 1W For HD21/HD23 • Bright Mode: TYP 308W MAX 338W @ 110V/220V AC • ECO Mode: TYP 252W MAX 277W @ 110V/220V AC • Standby mode: <0.5W

No	Item	Description
11	Video compatibility	• NTSC: M/J 3.58MHz, 4.43MHz • PAL: B/D/G/H/I/M/N, 4.43MHz • SECAM: B/D/G/K/K1/L, 4.25/4.4 MHz For HD20/HD200X/HD2200/HD20LV • HDMI: 480i/p, 576i/p, 720p(50/60Hz), 1080i/p(24/50/60Hz) (1080P24 must be displayed at 48Hz) • Component: 480i/p, 576i/p, 720p(50/60Hz),1080i/p(50/60HZ) For HD21/HD23 • SDTV: 480i/p, 576i/p • HDTV: 720p(50/60Hz), 1080i/p(24/50/60Hz)
12	Color Wheel	• 6S (R62G64B54R62G64B54), Filter Diameter 42 mm Speed (Hz) : 2X, 7200 RPM • 6S (R94Y46M33G93C22B72), Filter Diameter 42 mm Speed (Hz) : 2X, 7200 RPM (For HD20LV/HD23)

1-2 Compatible Mode

Computer Compatibility

Compatibility	Resolution	H-Sync [KHz]	V-Sync [Hz]	Digital	Analog
PAL/SECAM	720 x 400	31.5	70	○	○
PAL/SECAM	720 x 400	37.9	88	○	○
PAL/SECAM	720 x 576		50	○	○
PAL/SECAM	720 x 576		60	○	○
VGA	640 x 480	31.5	60	○	○
VGA	640 x 480		67	○	○
VGA	640 x 480	37.9	72.8	○	○
VGA	640 x 480	37.5	75	○	○
SVGA	800 x 600	35.2	56.3	○	○
SVGA	800 x 600	37.9	60.3	○	○
SVGA	800 x 600	46.9	75	○	○

Compatibility	Resolution	H-Sync [KHz]	V-Sync [Hz]	Digital	Analog
SVGA	800 x 600	48.1	72.2	○	○
SVGA	832 x 624		80	○	○
XGA	1024 x 768	48.4	60	○	○
XGA	1024 x 768	56.5	70.1	○	○
XGA	1024 x 768	60	75	○	○
XGA	1152 x 870		75	○	○
HD720	1280 x 720		50	○	○
HD720	1280 x 720		60	○	○
WXGA-800	1280 x 800		60	○	○
SXGA	1280 x 1024	64	60	○	○
SXGA+	1400 x 1050		60	○	—
UXGA	1600 x1200	75	60	○	○
HDTV	1920 x 1080	33.8	30	○	○
HDTV	1920 x 1080	28.1	25	—	—
HDTV	1920 x 1080i		50	○	○
HDTV	1920 x 1080i		60	○	○
HDTV	1920 x 1080p		24	○	○
HDTV	1920 x 1080p		25	○	○
HDTV	1920 x 1080p		30	○	○
HDTV	1920 x 1080p		50	○	○
HDTV	1920 x 1080p		60	○	○
HDTV	1280 x720	45	60	—	—
HDTV	1280 x720p		50	○	○
SDTV	720 x 576	31.3	50	—	—
SDTV	720 x 576i		50	○	○
SDTV	720 x 576p		50	○	○
SDTV	720 x 480	31.5	60	—	—
SDTV	720 x 480i		60	○	○
SDTV	720 x 480p		60	○	○

Note: If the Computer Compatibility supportive signal is different from User's Manual, please refer to User's Manual.

Chapter 2

Disassembly Process

2-1 Equipment Needed & Product Overview

1. Screw Bit (+): 105
2. Screw Bit (+): 107
3. Screw Bit (-): 107
4. Hex Sleeves 5 mm
5. Tweezers
6. Screw Bit (+): No.00
7. Projector

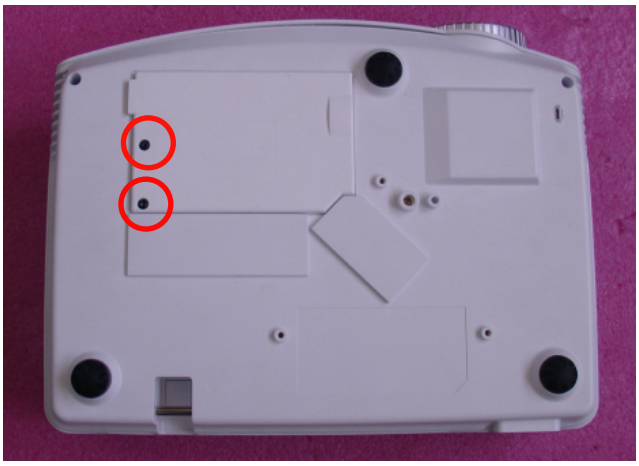
** Before you start: This process is protective level II. Operators should wear electrostatic chains.*

** Note: - If you need to replace the main board, you have to record the lamp usage hour.*

- As the process of HD20/HD200X/HD2200/HD20LV/HD21/HD23 disassembling is the same as HD20, we take HD20 for example here.

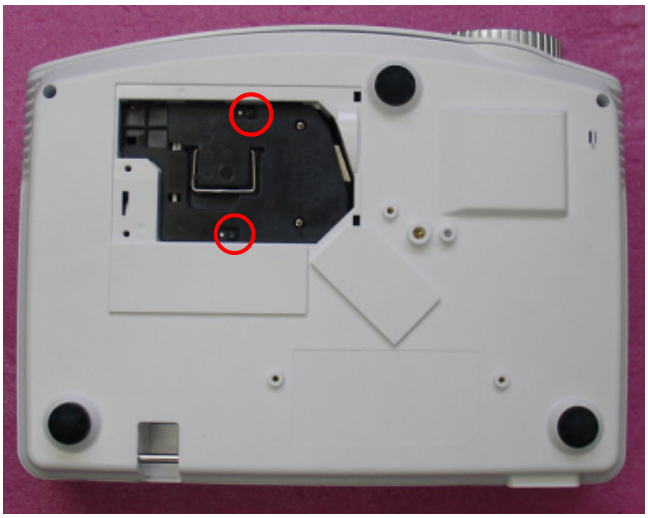
2-2 Disassemble Lamp Cover Module

1. Unfasten 2 screws (as red circle) on the Lamp Cover.
2. Disassemble the Lamp Cover Module.



2-3 Disassemble Lamp Module

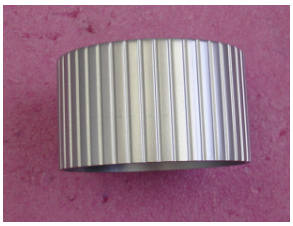
1. Unfasten 2 screws (as red circle) on the Lamp Module.
2. Take off the Lamp Module.

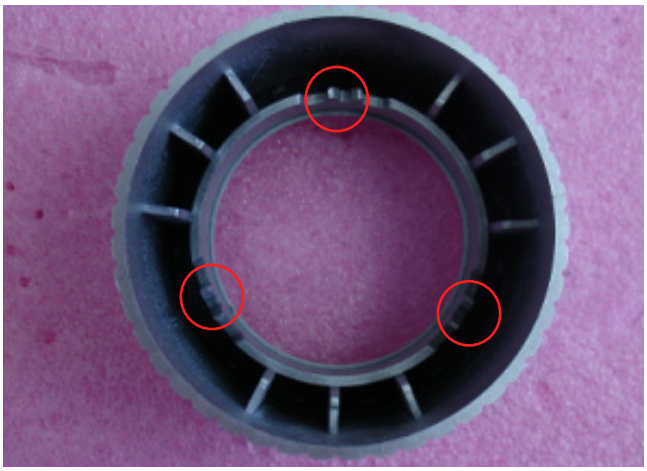


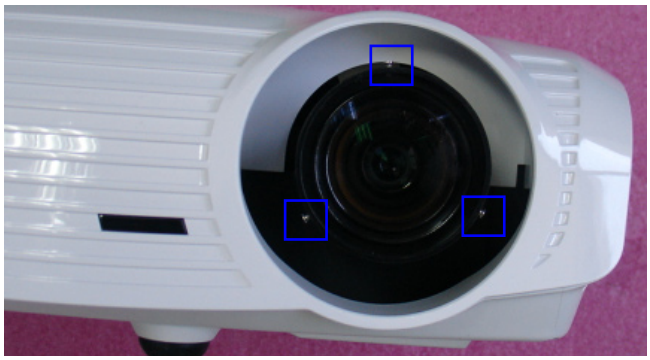
2-4 Disassemble Focus Ring

1. Rotate Focus Ring by anti-clockwise to the end (as red arrow). Push against projector lens so as to pull out the Focus Ring.
2. Then take off Focus Ring carefully.

Note: When you assemble the Focus Ring, ensure the three card slot (as red circle) stuck in the double-screw bolt (as blue square) properly, then the focus ring can be well adjusted.







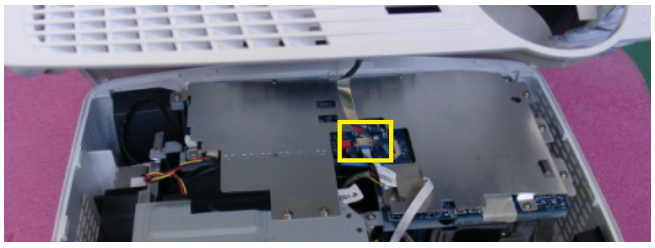
2-5 Disassemble Top Cover Module

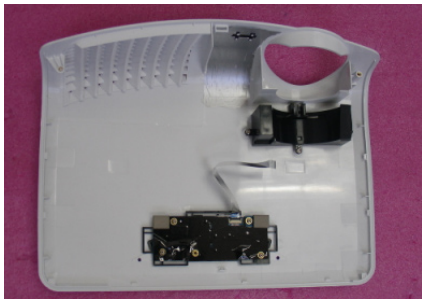
1. Unscrew 3 screws (as red circle) from the Bottom Cover.
2. Extrude the two sides of the projector as the red arrow and push them as blue arrow.
3. Remove the Top Cover Module.

Note: - When you remove the Top Cover, take care of the connector (as yellow square) which connected Main Board and Keypad Board Module, then unplug it from Keypad Board Module.

- Avoid damaging when pulling keypad FPC cable.

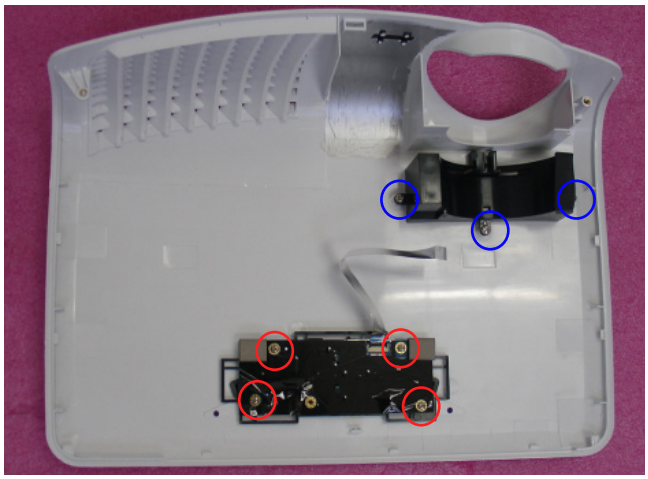
- Make sure the FPC cable plug into the correct ports when assembling it.

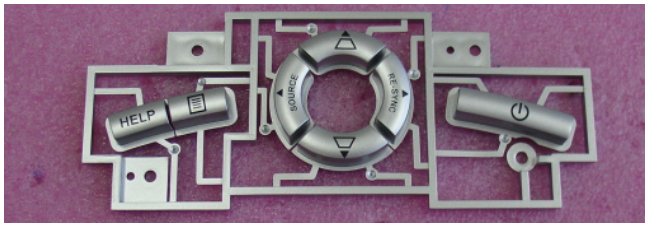


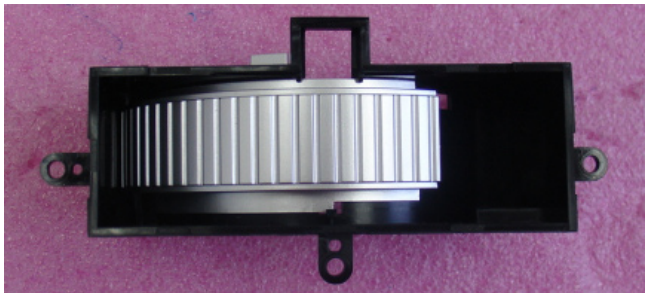


2-6 Disassemble Keypad Board Module and Zoom Ring

1. Remove the FPC cable.
2. Unscrew 4 screws (as red circle) to disassemble the Keypad Board Module from the Top Cover Module.
3. Separate the Keypad from the Top Cover Module.
4. Unscrew 3 screws (as blue circle) to disassemble Zoom Ring.
5. Disassemble Zoom Ring from the Top Cover Module.

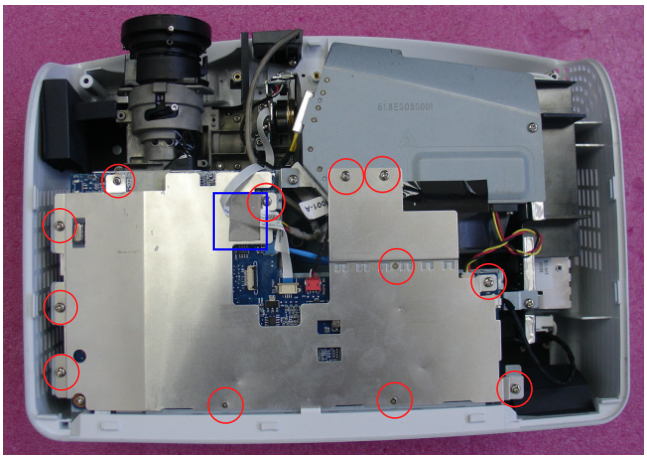


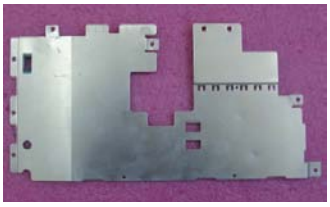




2-7 Disassemble Top Shielding

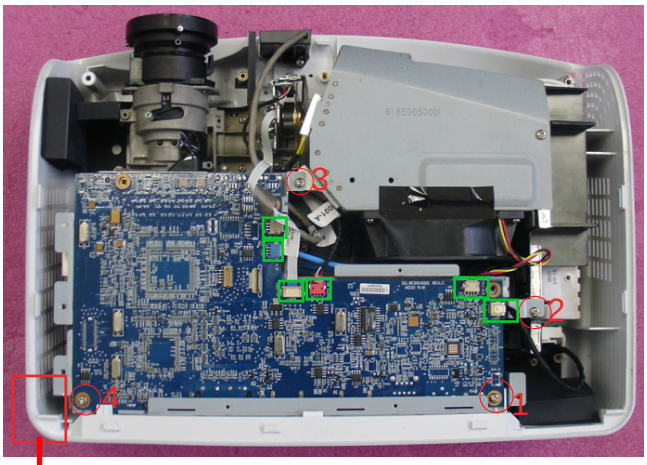
1. Tear off EMI (as blue square).
2. Unscrew 12 screws (as red circle).
3. Disassemble the Top Shielding.

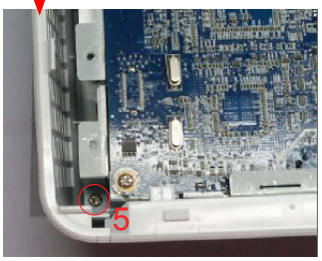




2-8 Disassemble Main Board Module

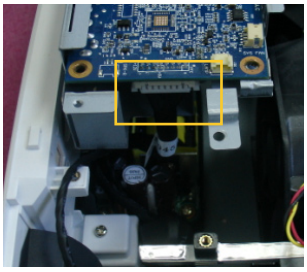
1. Unscrew 5 screws (as red circle).
2. Unplug 6 connector (as green square).



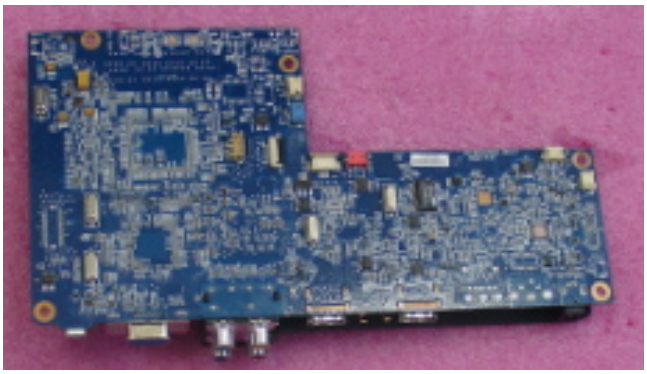


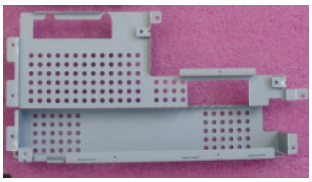
3. Unscrew 3 screws (as blue circle).

4. Unplug 1 connector (as yellow square).



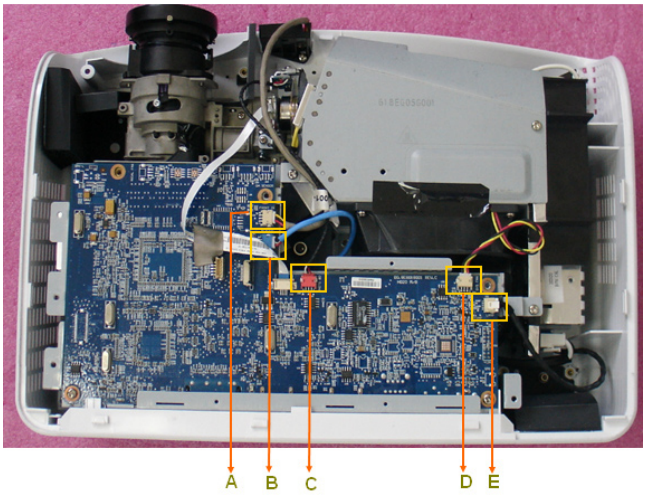
5. Disassemble Main Board and Main Board Shielding.

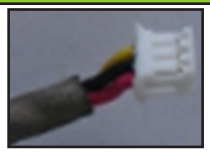
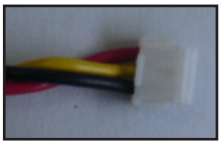
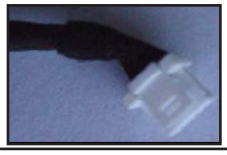




Note: - Make sure cables plug into the correct ports when assembling the unit.

Please refer to the below table details of each connector on Main Board.

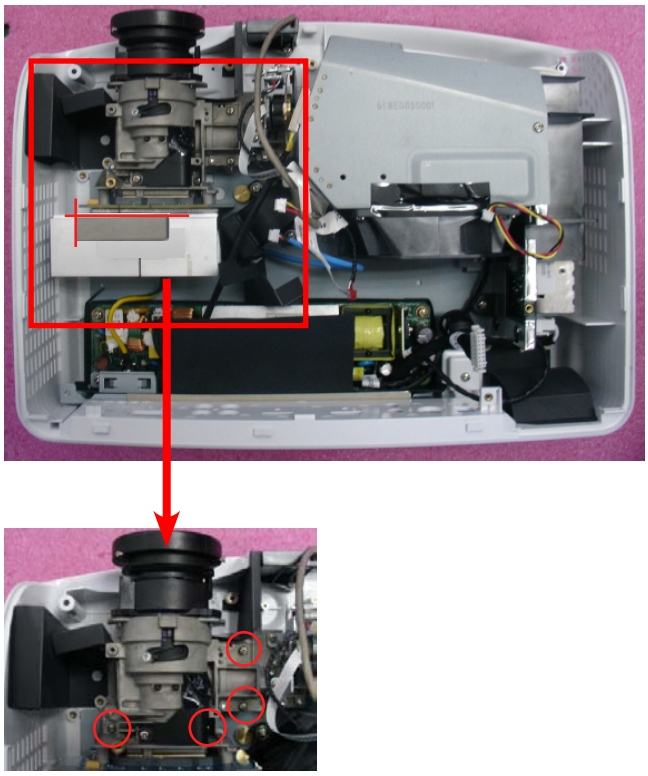


Item	Male Connector on Main Board	The key feature	Figure
A	FRONT IR	Compose of Black/Yellow/Red Wire and Gray tube(3 pin)	
B	BLOWER	Compose of Black/Yellow/Red Wire and Blue tube(3 pin)	
C	PHOTO SENSOR BD	Compose of Black/White/Red Wire, Red Connector and Black tube(3 pin)	
D	SYSTEN FAN	Compose of Red/Yellow/Black Wire (3 pin)	
E	LAMP DRIVER	Black wire tube (5 pin)	

2-9 Disassemble Engine Module

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

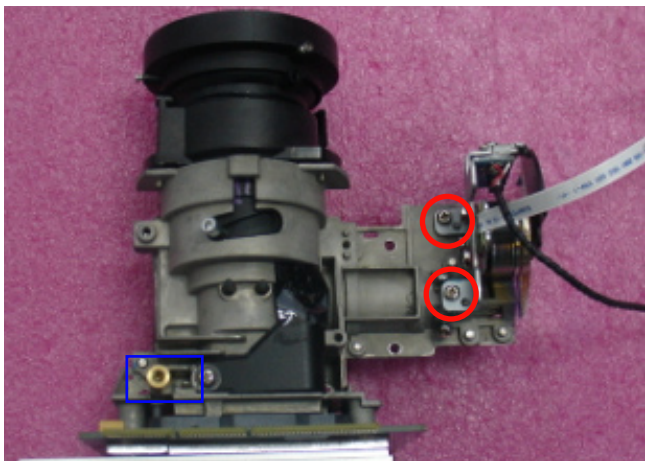
Note: The position of the sponge should be at the front of heat sink and the left of DMD board, as right picture show.

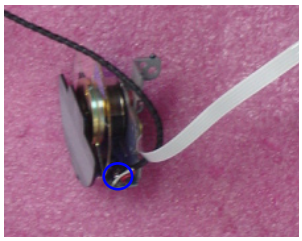


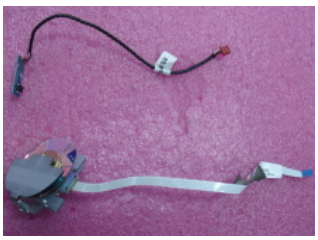
2-10 Disassemble Color Wheel Module

1. Unplug 1 double-screw bolt (as blue square).
2. Unscrew 2 screws (as red circle) to disassemble the Color Wheel Module.
3. Unscrew 1 screw (as blue circle) to disassemble the Photo Sensor Board from the Color Wheel Module.

Note: - Avoid touching the glass parts of color wheel.





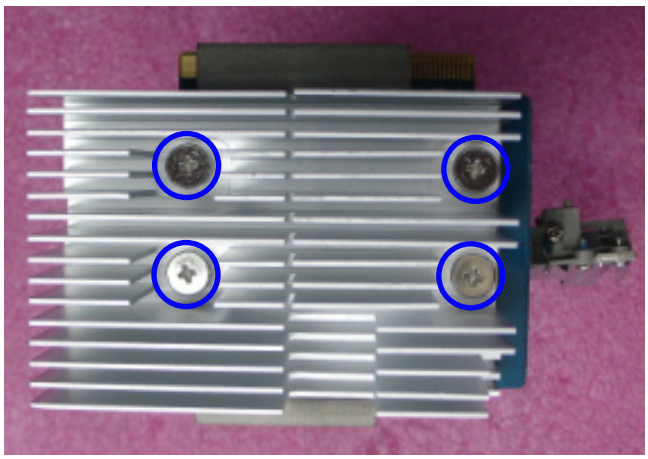


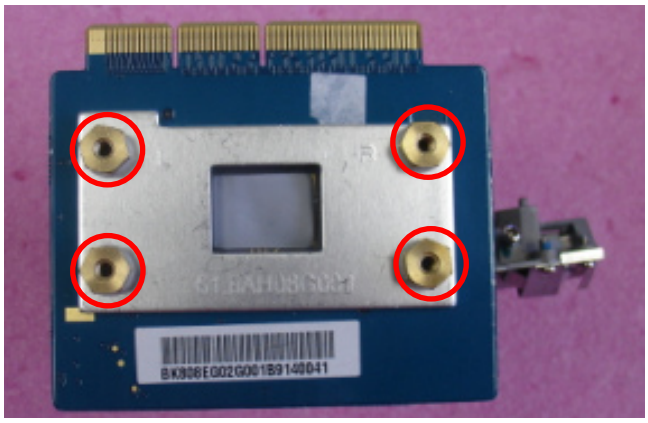
2-11 Disassemble DMD Chip and DMD Board

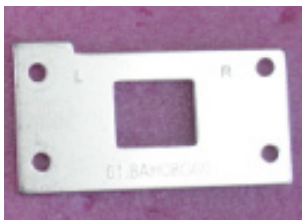
1. Unscrew 4 screws (as blue circle) to disassemble the Heat Sink and DMD Module.
2. Unscrew 4 screws (as red circle) to disassemble DMD Module.

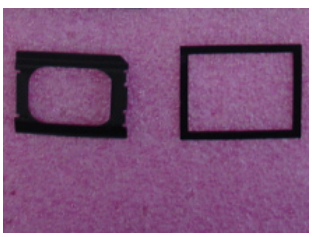
Note: - Avoid touching the DMD Chip when you disassemble it.

- Pay attention to the fixed position when assembling the DMD Chip.





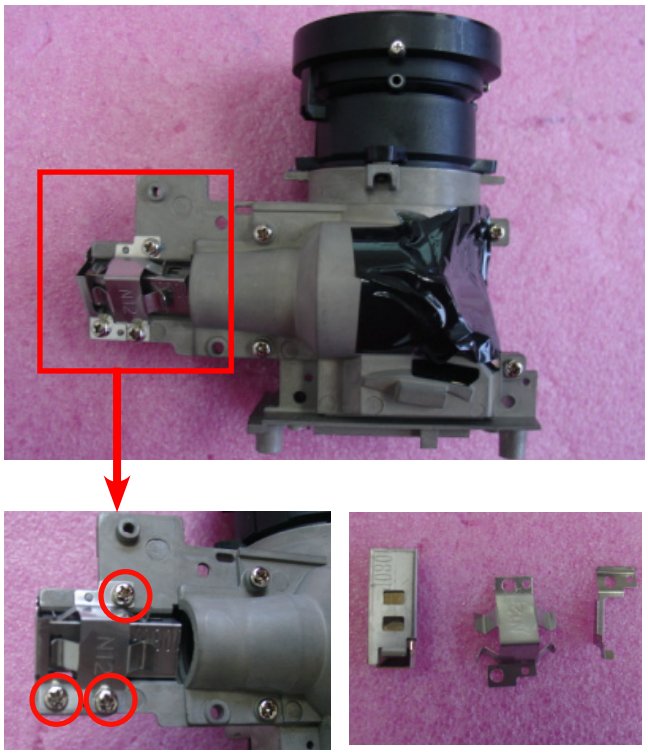




2-12 Disassemble Rod Module

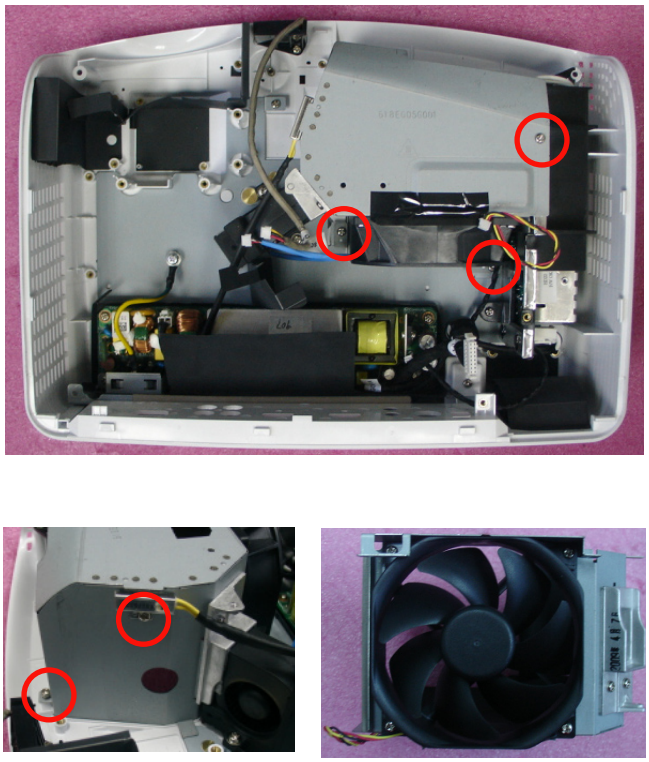
1. Unscrew 3 screws (as red circle)
2. Remove the Rod Module.

Note: - Avoid touching the Rod when you disassemble or assemble it.

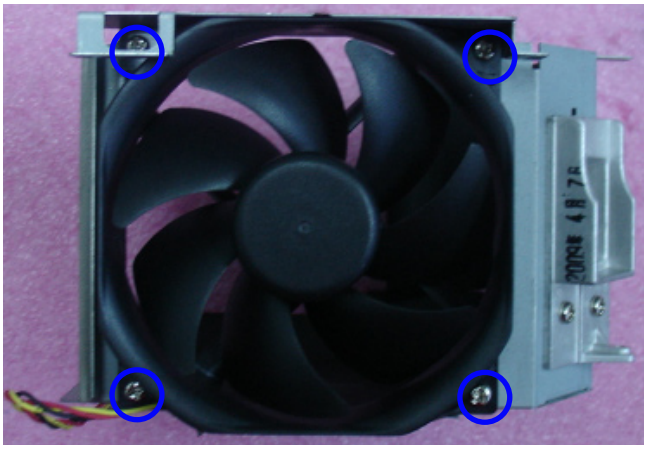


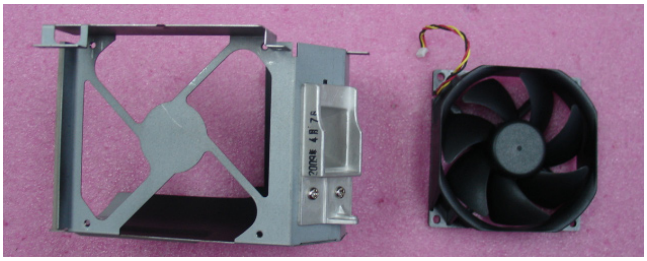
2-13 Disassemble System Fan Module

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



2. Unscrew 4 screws (as blue circle) to separate System Fan and System Fan Shielding.





Note: - Take the Fan Module as the right gesture.

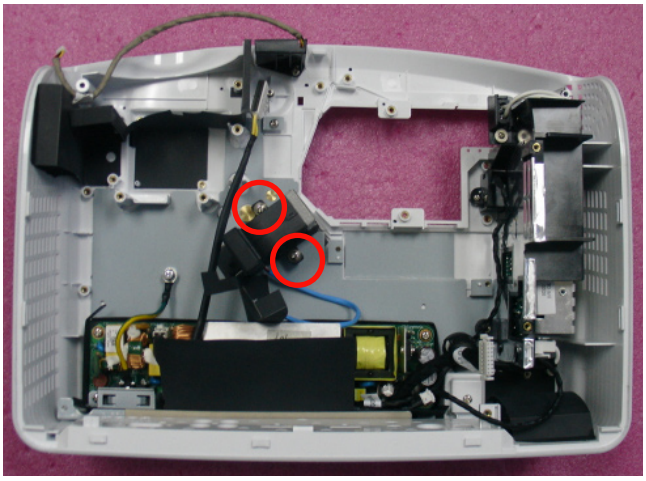
the right gesture

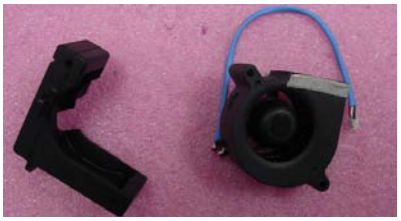
the wrong gesture

2-14 Disassemble Lamp Blower Module

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

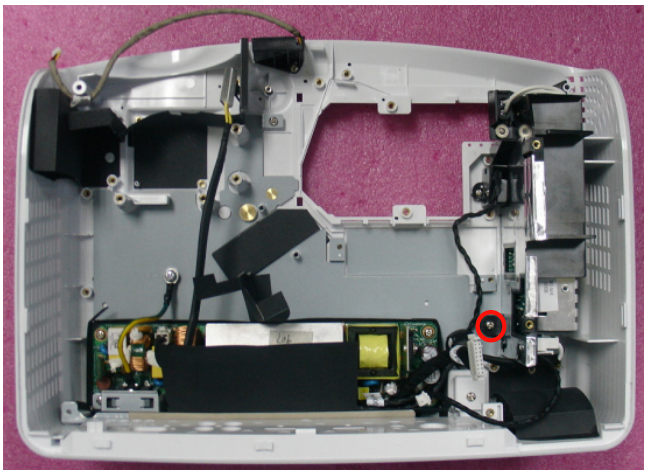
2. Separate Lamp Blower Module.

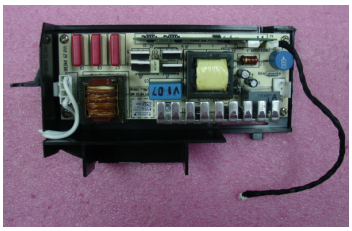




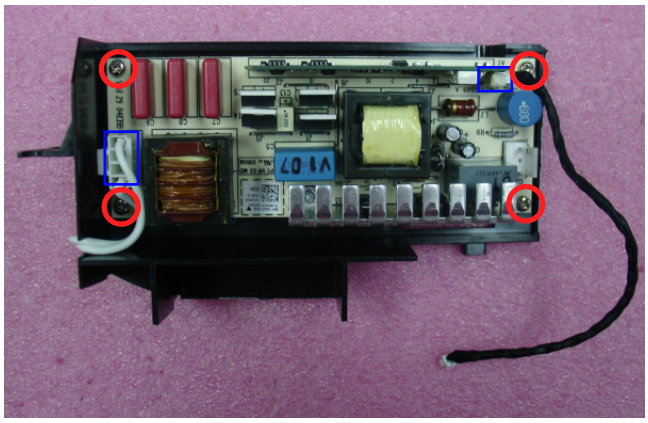
2-15 Disassemble Lamp Driver Module

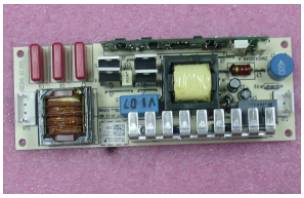
1. Unscrew 1 screw (as red circle) to remove the Lamp Driver Module.

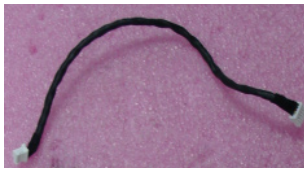




2. Unplug 2 connectors (as blue square).
3. Unscrew 4 screws (as red circle) to disassemble the Lamp Driver Module.

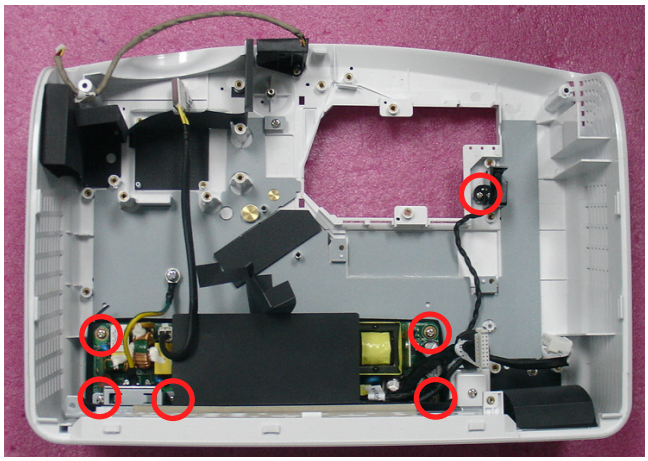


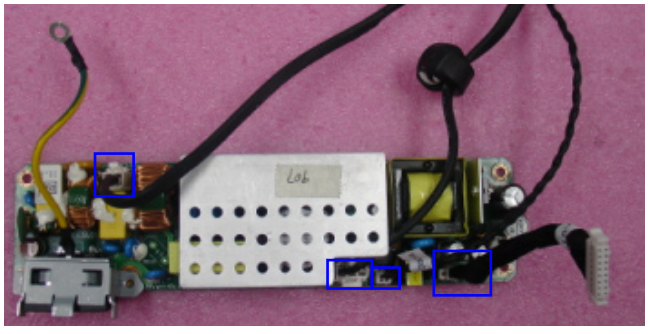




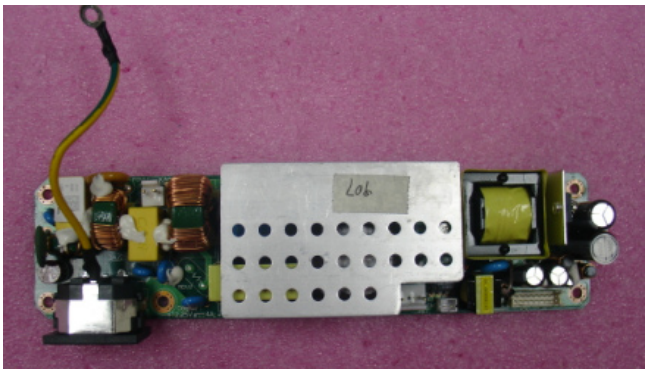
2-16 Disassemble LVPS Module

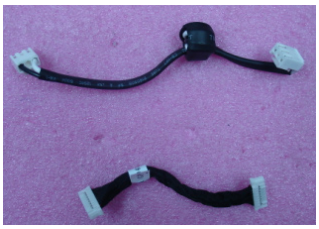
1. Unscrew 6 screws (as red circle).
2. Disassemble the LVPS Module.
3. Unplug 4 connectors (as blue square).





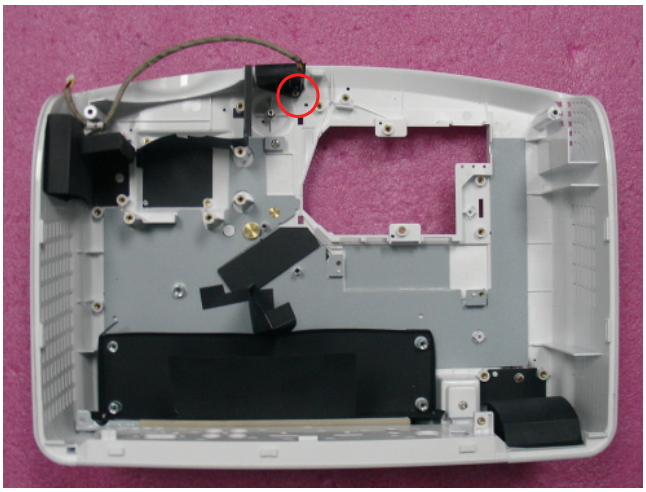
4. Disassemble LVPS Module.





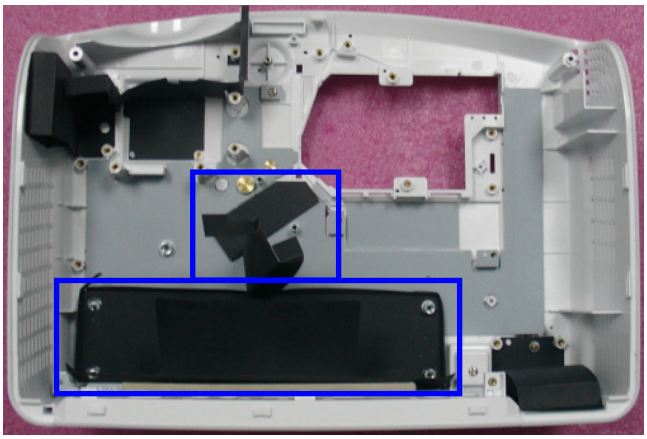
2-17 Disassemble IR

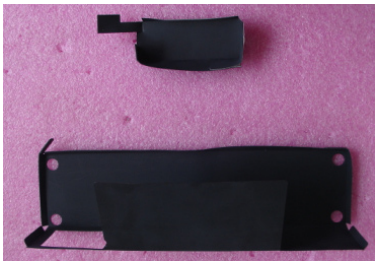
1. Unscrew 1 screw (as red circle) to disassemble IR.



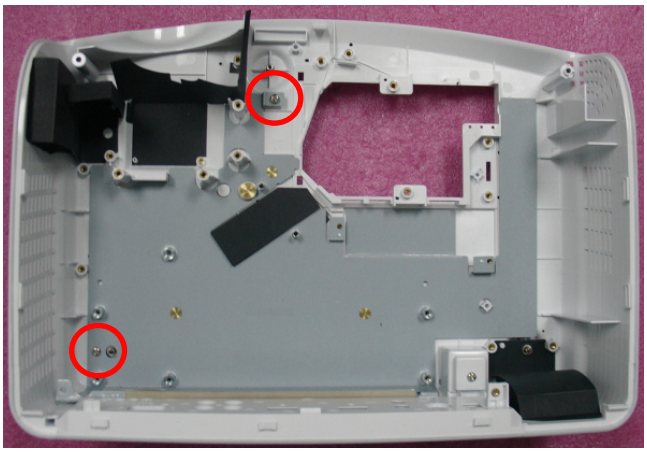
2-18 Disassemble Bottom Cover Shielding

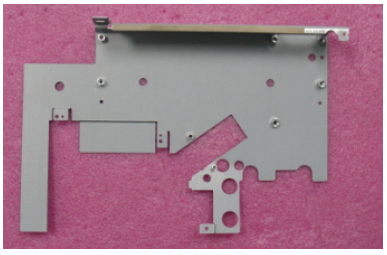
1. Tear off 2 mylar (as blue square).





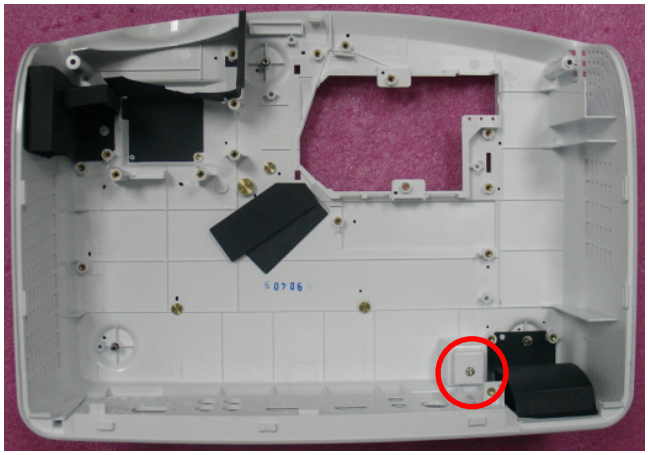
2. Unscrew 2 screw (as red circle) to disassemble the Bottom Cover Shielding.





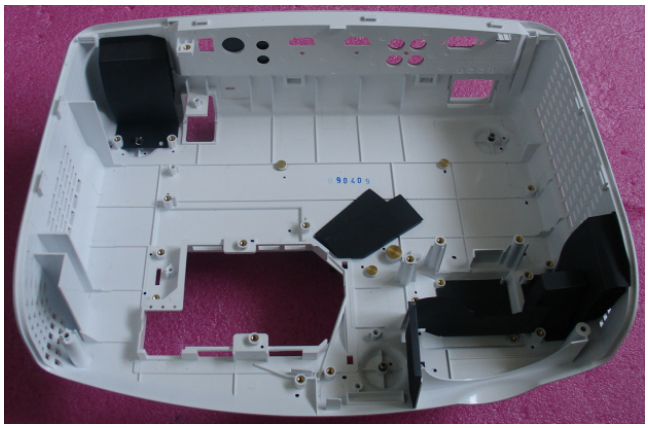
2-19 Disassemble Security Bar Cap

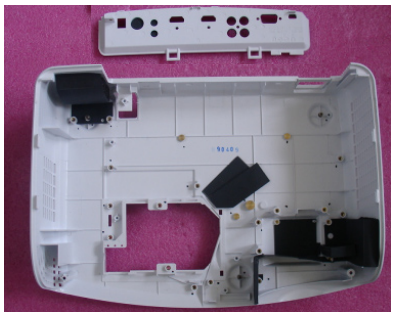
1. Unscrew 1 screw (as red cricle) to disassemble the Security Bar Cap.



2-20 Disassemble I/O Cover

1. Remove the I/O Cover.





2-21 Rod Adjustment

1. Environment Adjustment

   - The distance between the engine and the screen is 2.4 M.

   - This process should be done at a dark environment (under 10 Lux).

2. Procedure Adjustment

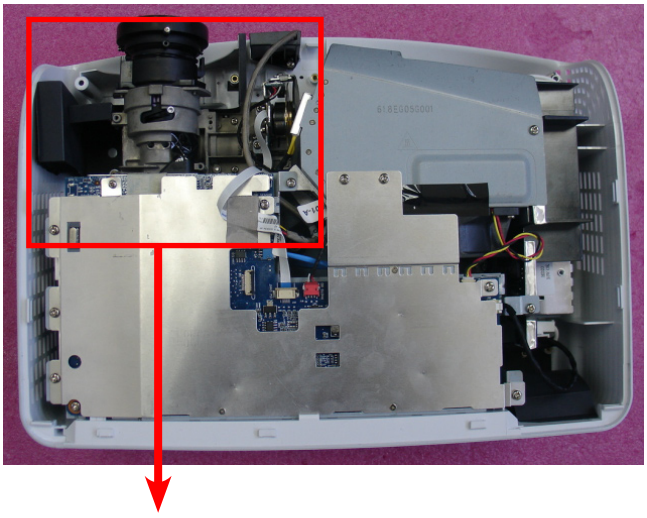
   - Change the screen to "white screen".

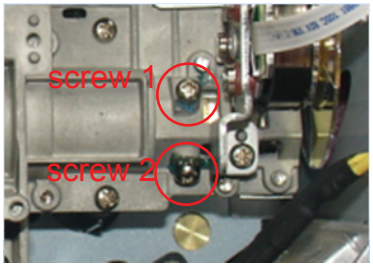
   - Adjust the screws by using the rod on the engine module to readjust the image.

     ("screw 1" should be adjusted first, and then "screw 2".)

3. Abnormal image inspection

   - It should not have any abnormal color at the rim of the image by estimating through the eyes.





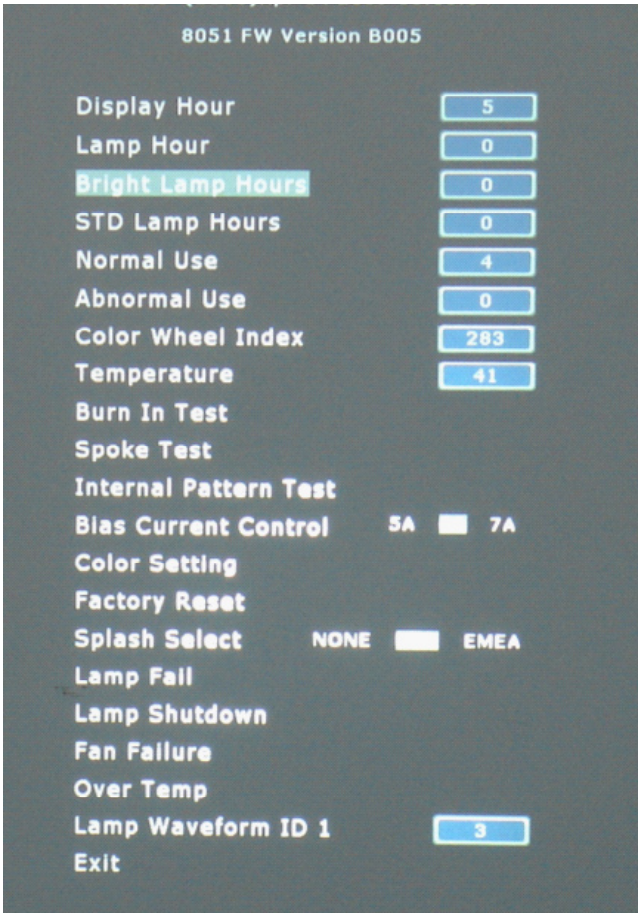
Z type driver

Note: - To avoid over adjusting the rod.

- After the opreation, please use the glue to fix the screws.

- Please use Z type driver to adjust Rod screw 2.

2-22 Re-write Lamp Usage Hour



1. Get into service mode

   - Press "Power", "Left", "Left" and “up" buttons sequentially to get into service mode 1.

2. Re-write Bright Lamp Hours

   - Use "up" and "down" key to select " Bright Lamp Hours ". Use "left" and "right" key to re-write “Bright Lamp Hours ".

3. Re-write " STD Lamp Hours"

   - The way of re-write " STD Lamp Hours" is the same as " Bright Lamp Hours".

4. The "Lamp Hour" will increase/decrease

   - Follow the Bright Lamp Hours and STD Lamp Hours increase/decrease.

5. Press “Menu" to exit the service mode.

Note: - left key = decrease lamp hour

- right key =increase lamp hour

- The Bright Mode Hours increase/ decrease 1 hour,the lamp Hour will increase/decrease 1 hour.The Standard Mode Hours increase/decrease 1 hours, the lamp Hour will increase/decrease 1 hour.

Chapter 3

Trobleshooting

3-1 LED Lighting Message

Message	ON/STANDBY LED (Green/Amber)	Temp LED (Red)	Lamp Led (Red)
Standby State (input power cord)	Amber	O	O
Power on (Warming)	Flashing Green	O	O
Lamp lighting	Green	O	O
Power off (Cooling)	Flashing Green	O	O
Error (Over Temp)	Flashing Amber	☼	O
Error (Fan fail)	Flashing Amber	Flashing	O
Error (Lamp fail)	Flashing Amber	O	☼

*Note: * Steady light =>* ☼, *No light =>* O

** ON/STANDBY LED be ON when OSD appears, be OFF when OSD disappears.*

3-2 Main Procedure

No	Symptom	Procedure
1	No Power	- Ensure the Power Cord and AC Power Outlet are securely connected - Ensure all connectors are securely connected and aren't broken - Check Lamp Driver - Check LVPS - Check Main Board
2	Auto Shut Down	- Check LED Status a. Over Temp: ON/STANDBY LED flashes amber, Temp LED lights on red - Check Fan - Check Thermal Switch - Check Main Board b. Fan fail: ON/STANDBY LED flashes amber, Temp LED flashes red - Check Fan - Check Main Board c. Lamp fail: ON/STANDBY LED flashes amber, Lamp LED lights on red - Check Lamp - Check Lamp Driver - Check Color Wheel - Check Photo Sensor - Check Main Board

No	Symptom	Procedure
3	No Light On	- Ensure all connectors are securely connected and aren't broken - Check Lamp Cover and Interlock Switch - Check Lamp - Check LVPS - Check Lamp Driver - Check Main Board - Check Color Wheel - Check Photo Sensor Board
4	No Image	- Ensure the Signal Cable and Source work (If you connect multiple sources at the same time, use the "Source" button switch) - Ensure all connectors are securely connected and aren't broken - Check Main Board - Check Engine Module - Check DMD Board - Check DMD Chip
5	Mechanical Noise	- Check Color Wheel - Check Fan Module
6	Line Bar/Line Defect	- Check if the Main Board and the DMD Board are assembled properly - Check Main Board - Check DMD Board - Check DMD Chip

No	Symptom	Procedure
7	Image Flicker	- Do "Reset (All data)" of the OSD Menu - Ensure the signal cables and source work well - Check Lamp Module - Check Lamp Driver - Check Color Wheel - Check Photo Sensor - Check DMD Board - Check Main Board
8	Color Abnormal	- Do "Reset (All data)" of the OSD Menu - Adjust Color Wheel Index - Check Main Board - Check DMD Board - Check Color Wheel
9	Poor Uniformity/ Shadow	- Ensure the projection screen is without dirt - Ensure the projection lens is clean - Ensure the Brightness is within spec. - Check rod alignment - Check Engine Module
10	Dead Pixel/Dust (Out of spec.)	- Ensure the projection screen is without dirt - Ensure the projection lens is clean - Clean DMD Chip and Engine Module - Check DMD Chip - Check Engine Module
11	Garbage Image	- Ensure that the signal cables and source work well - Check Main Board - Check DMD Board

Chapter 4

Function Test & Alignment Procedure

4-1 Test Equipment Needed

- IBM PC with HDTV resolution
- DVD player with Multi-system, equipped “Component”, “S-Video”,“Composite” and "HDMI".
- HDTV Source (720P,1080P,1080i)
- Minolta CL-100
- Quantum Data 802B or CHROMA2327 (Color Video Signal & Pattern Generator)

Note: The function test and alignment procedure for HD20/HD200X/HD2200/HD20LV/HD21/HD23 is the same,we take HD20 for example here.

4-2 Service Mode

The projector has two kinds of service mode, use different ways to get into each service mode:

1. Turn on the projector
2. (1) Press “Power”, “Left”, “Left” and “Up” button sequentially to get into service mode1.
   (2) Press “Power”, “Left”, “Up” and “Down” button sequentially to get into service mode2.

4-3 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 setting:

1. Please get into OSD menu.
2. Execute "Reset" function.

4-4 Test Condition

- Circumstance brightness: Dark room less than 10 lux.
- Inspection distance: 1.5m~2.0m functional inspection.
- Screen size: 60 inches diagonal.
- After repairing each unit, a Run-in test is necessary (refer to the below table).

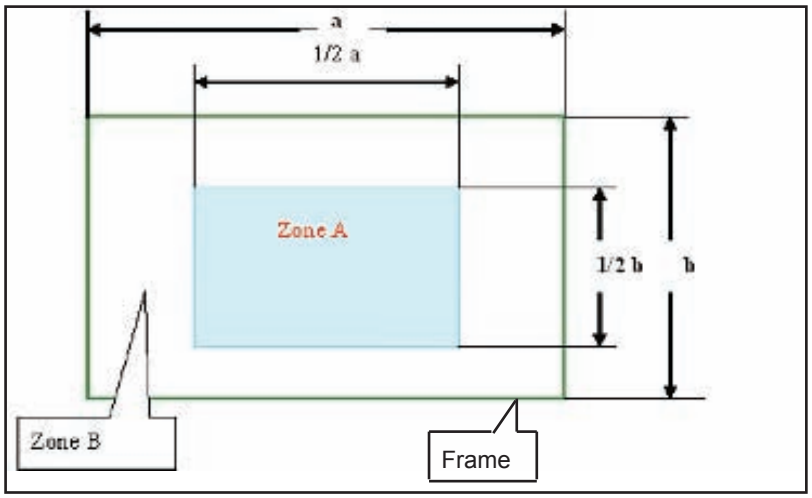
Symptom	Run-in Time
Normal repair	2 hours
NFF	4 hours
Auto shutdown	6 hours

- Get into Burn-In Mode

** Cycle setting is based on the defect symptoms. ie: If it is NFF, the run-in time is 4 hours. You have to set the lamp on for 50 min. and lamp off for 10 min for 4 cycles.*

Press power > left > left > up to get into service mode 1	
Choose Burn-In Test > enter	
Lamp On	Press right key to adjust the time (50)
Lamp Off	Press right key to adjust the time (10)
Set burn in cycle	Press right key to adjust the cycle
After setting up the time, choose "Get into Burn-In Mode" and hit enter	

Screen Defects



< Figure: Zone A, Zone B & Frame(as green line) Definition,

Active area=Zone A+ Zone B >

Defect specification table

Order	Symptom	Pattern	Criteria
1	Bright pixes	Gray 10 pattern	A+B=0
2	Dark pixels	White pattern	A=0 B≤2
3	Unstable pixels	Any pattern	A+B=0
4	Adjacent pixels	Any pattern	A+B=0
5	Dark blemish	Blue 60 pattern	A=0 B≤4 (diameter<1 inch)
6	Bright blemish	Gray 10 pattern	A=0 B≤4 (diameter<1 inch)
7	Bright dots on frame	Gray 10 pattern	≤1

4-5 Test Inspection Procedure

Update	Change parts					
	Main Board	Firmware	Color Wheel	Lamp Module	Engine Module	Blower
Version Update	v	v				
Color Wheel Index	v		v			
PC Calibration	v					
Video Calibration	v					
Reset lamp hour				v		
OSD Reset	v	v				
EDID	v					
Re-write Lamp Hour Usage	v					
Calculate W-factory	v					v
Rod adjustment					v	

Note: If Color appears abnormal after changing Main Board Module, please do Color Wheel index adjustment.

4-6 PC MODE

Note: 1. When getting into function test, adjust “lens shift”" to guarantee the lens at the highest state and the image maximum, and adjust the focus to guarantee the image at the clearest, then start testing.

2. Get into service mode 2 and guarantee that W-Factory is greater than 4650. If not, please follow 4-10 to do "Calculate W-factory", Press "Menu" button to exit service mode 2.

3. Test signal: analog 1920 x 1080@60Hz (for all models),

4. We take HD20 for example here.

1. Frequency and tracking boundary

Procedure

- Test equipment: video generator.
- Test signal: analog 1920 x 1080@60Hz
  - Test Pattern: general-1 or master
- Check and see if the image sharpness is well

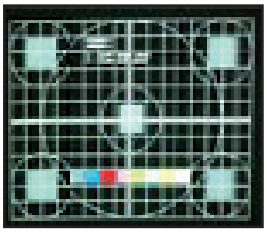
performed.

- If not, re-adjust by the following steps:

  (1) Select "Frequency" function to adjust the total pixel number of pixel clock in one line period.

  (2) Select "Tracking" function and use right or left arrow key to adjust the value to minimize video flicker.

- Adjust Resync or Frequency/Tracking/H. Position/V. Position to the inner screen.



General-1

Master

Inspection item

- Eliminate visual wavy noise by Rsync, Frequency or Tracking selection.
- Check if there is noise on the screen.
- Horizontal and vertical position of the video should be adjustable to the screen frame.

Criteria

- If there is noise on the screen, the product is considered as failure product.
- If there is noise on the screen, use auto or manual “frequency” function or “tracking” function to adjust the screen.
- The PC mode functionally sure be workable include support format with frequency and auto detected functional will be workable.

2. Bright pixel

Procedure

- Test equipment: video generator.
- Test signal: analog 1920 x 1080@60Hz
- Test Pattern: Gray 10

Gray 10

Inspection item

- Bright pixel check.

Criteria

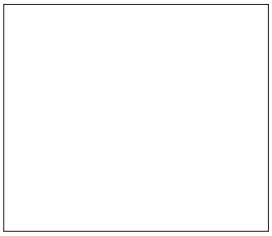
- Bright pixel is unacceptable in the active zone; 1 pixel is allowed on the frame.
- Adjacent pixels are unacceptable.
- Ref. Defect specification table

3. Dark Pixel

Procedure
- Test equipment: video generator.
- Test signal: analog1920 x 1080@ 60HZ
- Test Pattern: full white

Inspection item
- Dead pixels check.

Criteria
- The dark pixel is unacceptable in zone A and no more than 2 in zone B under full white pattern.
- Adjacent pixels are unacceptable.
- Ref. Defect specification table



Full white

4. Bright Blemish

Procedure
- Test equipment: video generator.
- Test signal: analog 1920 x 1080@60Hz.
- Test Pattern: Gray 10

Inspection item
- Bright blemish check.

Criteria
- The bright blemish is unacceptable in zone A and no more than 4 in zone B under gray 10 pattern.
- Ref. Defect specification table

Gray 10

5. Dark Blemish

Procedure
- Test equipment: video generator.
- Test signal: analog 1920 x 1080@60Hz.
- Test Pattern: blue 60

Inspection item
- Dark blemish check.

Criteria
- The dark blemish is unacceptable in zone A and no more than 4 in zone B under blue 60 pattern.
- Ref. Defect specification table

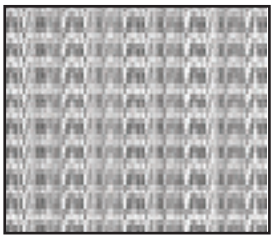
Blue 60

6. Focus test

Procedure
- Test equipment: video generator.
- Test signal: analog 1920 x 1080@60Hz
- Test Pattern: full screen

Inspection item
- Focus check

Criteria
- From screen 2.39 M via visual to check the focus, look at the entire screen, focus shall be clear, crisp, and sharp over the entire surface of the display pattern. (Blur word on one of the corner after adjustment is acceptable. However, the word should at least be recognizable.)



Full screen

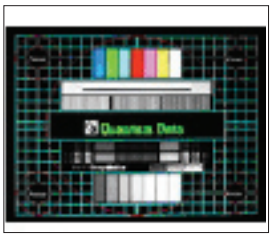
7. Color performance

Procedure
- Test equipment: video generator.
- Test signal: 720p, 1080p
- Test Pattern: Master, 64 gray RGBW or SMPTE RP-133

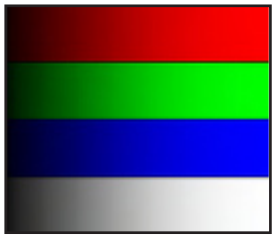
* Please refer to 4-2 to get into service mode 1. Use 720p & 1080p signal, master pattern to do HDTV test. Color cannot discolor to purple and blue.

Inspection item
- Check if each color level is well-functioned.
- Color saturation

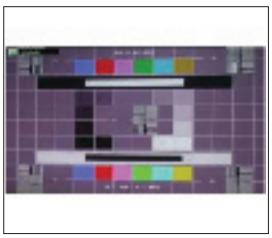
Criteria
- Screen appears normal. It should not have any abnormal condition, such as lines appear on the screen and so on.
- Color appears normal.
- It is unacceptable to have few lines flashing.
- RGBW should all appear normal on the screen and sort from R -G-B-W.
- Color levels should be sufficient and normal. (The unidentified color levels on both left and right sides should not over 4 color levels.)
- Gray level should not have abnormal color or heavy lines.
- If color appears abnormal, please get into service mode 1 to do color wheel index adjustment.



Master



64 gray RGBW



SMPTE RP-133

4-7 Video Performance

1. CVBS

Procedure	- Test equipment: DVD player - Test signal: CVBS
Inspection item	- Video performance test
Inspection Distance	- 1.5M ~2.0M
Criteria	- Check any abnormal color, line distortion or any noise on the screen.

Motion video

2. HDTV/ Component

Procedure	- Test equipment: DVD player - Test signal: Ycbcr/YPbPr
Inspection item	- HDTV performance test
Inspection Distance	- 1.5M ~2.0M
Criteria	- Check any abnormal color, line distortion or any noise on the screen.

3. HDMI Test

Procedure	- Test equipment: DVD Player with HDMI output. - Test signal: 720p,1080p,1080i
Inspection item	- HDMI performance test.
Inspection Distance	- 1.5M ~2.0M.
Criteria	- Ensure the image is well performed and the color can not discolor.

4-8 Calibration

1. Video calibration

Procedure	- Test equipment: video generator. - Once main board is changed, Video calibration should be done as well.

(1) Test signal: 720p @ 60HZ

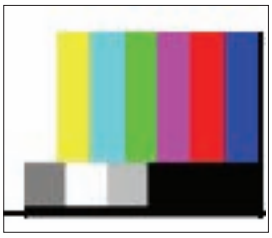
(2) Test Pattern: SMPTE BAR

- Note

(1) Calibration pattern should be in full screen mode.

(2) Please refer to 4-2 Guide to get into service mode 1 and choose ‘‘color setting’’.

(3) Choose and get into ‘‘Video Calibration’’, press “Enter” button to adjust the screen to its normal status. Choose “Menu” or “Exit” to leave service mode 1.



SMPTE BAR

Inspection item - Color saturation

Criteria - There should not have any lack of SMPTE BAR. The color should appear normal and sort in right order.

- Color levels should be sufficient and normal.

2. PC calibration

Procedure - Test equipment: video generator

- Once main board is changed, PC calibration should be done as well.

(1) Test signal analog: 800x600@60Hz

(2) Test Pattern: 16 Grays

- Note

(1) Calibration pattern should be in full screen mode.

(2) Please refer to 4-2 Guide to get into service mode 1 and choose ‘‘color setting’’.

(3) Choose and get into PC Calibration for correction in service mode. Choose “Menu” or “Exit” to leave the service mode after all.

16 Grays

Inspection item - Color saturation

Criteria - Color levels should be sufficient and normal. (the unidentified color levels on both left and right sides should not be over 2 color levels.)

- Gray level should not have abnormal color or heavy lines.

4-9 Optical Performance Measure

Inspection Condition
- Environment luminance: 10 Lux
- Product must be warmed up for 5 minutes
- Distances from the screen: 2.39 M
- Screen Size: 60 inches diagonal

1. Test equipment

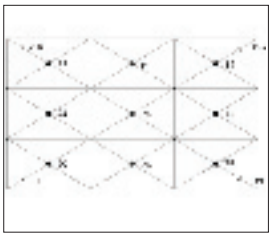
Procedure
- Press “Power→Left→Left→Up” to get into service mode 1.
- Select “Spoke Test”

2. Brightness

Procedure
- Full white pattern
- Use CL100 to measure brightness values of P1~P9.
- Follow the brightness formula to calculate brightness values.

☼ Brightness Formula

Avg. (P1~P9)*1.1m^2



Full white pattern

Criteria
- 600 ANSI lumen

3. Full On/Full Off Contrast

Procedure
- Full white pattern & full black pattern
- Use CL100 to measure brightness values of full white pattern P5 & full black pattern B5 (see image: full white)
- Follow Contrast formula to calculate contrast values.

☼ Contrast Formula

P5/B5

Note: P5 =Lux of center in full white pattern

B5 =Lux of center in full black pattern

Full black pattern

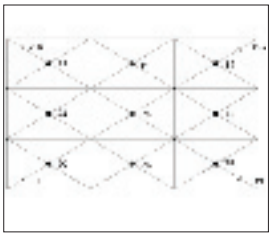
Criteria
- 1200:1

4. Uniformity

Procedure
- Full white pattern
- Use CL100 to measure brightness values of P1~P9 (see image: full white).
- Follow the Uniformity formula to calculate average values.

☼ Uniformity Formula

$$\text{JBMA Uniformity} = \frac{\text{Avg. (P1, P3, P7, P9)}}{\text{P5}} \text{X100\%}$$



Full white pattern

Criteria
• 70%

4-10 Calculate W-factory

After changing main board or blower, please do "Calculate W-factory" by steps below:

(1) Plug power cord in projector.

(2) Hold "Left" button, press "Power" button. Continue holding "Left" button until both Temp LED and Lamp LED light on red. Then release "Left" button, the projector will power on.

4-11 Others

1. Functional Inspection

Keypad button - All keypad buttons must operate smoothly.

General - All OSD functions must be checked for functionality. When OSD menu is displayed, there shall be no visible peaking, ringing, streaking, or smearing artifacts on the screen.

Factory Default - The factory settings (with appropriate centering, size, geometry distortion, etc.) shall be displayed upon “Recall” is selected from OSD.

Display Size - All preset modes shall expand to full screen size using OSD Horizontal and Vertical Size controls.

Display Data Channel (DDC) - The purpose of the DDC test is to verify the DDC1/DDC2B operation of the projector and to verify Plug & Play function.

Acoustic - High pitch sound from cooling fan and color wheel is unacceptable.

2. Check points for exterior and print pattern

Check item	Check point
Text & Pattern	Missing letters & pattern or blurry prints are unacceptable.
Exterior	Dirt, scrape, water ripples and uneven color are unacceptable.
Focus ring	Focus ring is functioning smoothly.
Logo	Missing logo, missing prints and blurry prints are unacceptable
Screw	All screws sure be fixed and in right type.
Pedestal	Well-functioned
Lamp Cover	It should be locked in the correct place.
Plastic Parts	All plastic parts can not be broken and damaged.
Safety or warning label	All safety and warning labels should be visible, including all contents.
Connector	All interface connectors should be complete and workable.

Chapter 5

Firmware Upgrade

Section 1: Firmware Upgrade Procedure

5-1-1 Equipment Needed

Software : (PW392)

- HD20_FW_xxx

Note: "xxx" represent software version.

Hardware :

- projector
- Mini USB cable
- PC or Laptop
- Power Cord (P/N 42.50115G001)

Note: - The FW Upgrade procedure for HD20/HD200X/HD2200/HD20LV/HD21/HD23 is the same as HD20, we take HD20 for example here.

5-1-2 Setup Procedure

1. Plug Power and mini USB cables in the projector, the ON/Standby LED will display "Amber".

2. Hold "Enter"and "Right" buttons, press "Power" button, then release "Power" button and keep holding "Enter" and "Right" buttons, release the "Enter" and "Right" buttons when the power LED flashes in green.

   - The PC will ask to install USB driver (only for the first time). Please refer to 5-1-3 for the installation of USB driver.

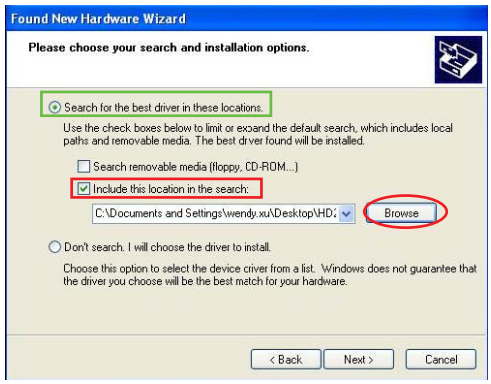
Note: The system fan and the light will not operate.

5-1-3 Install USB Driver

1. Click on the "Found New Hardware Wizard".

   - Select "Install from a list or special location (Advanced)".

   - Click "Next".

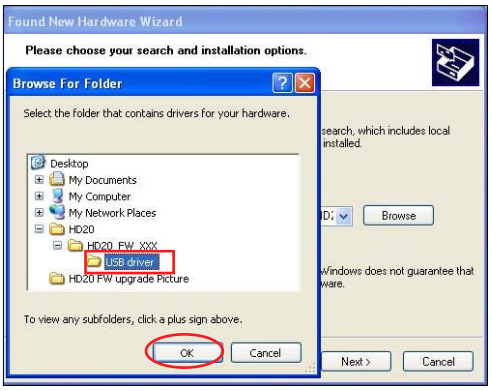


2. Select "Search for the best driver in these locations."

   - Choose "Include this location in the search".

   - Click "Browse".

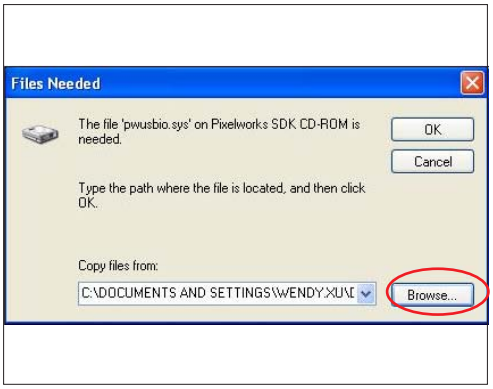
3. Select the folder that contains the driver for your hardware. Click "OK".



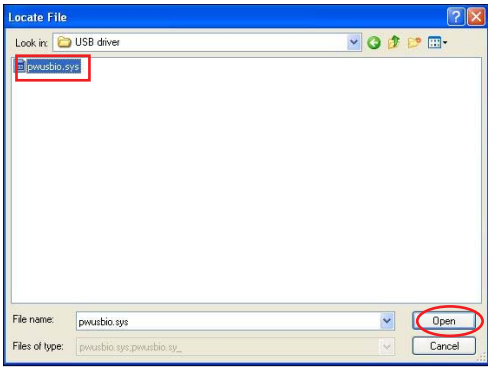
4. Wait for several seconds.

5. Click "Continue Anyway".

6. Click "Browse".



7. Choose the file "pwusbio.sys" and open it.

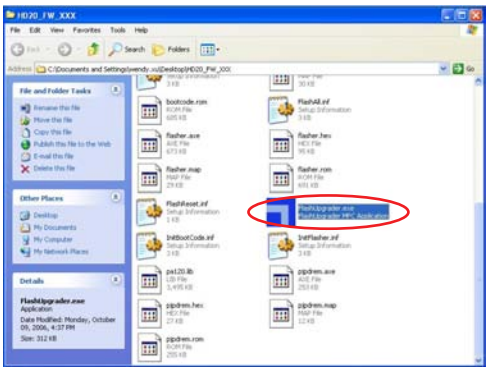


8. Click "Finish".

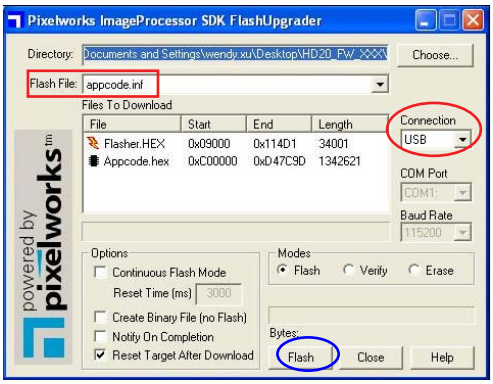
5-1-4 Firmware Upgrade Procedure

1. Double click the folder "HD20_FW_xxx".

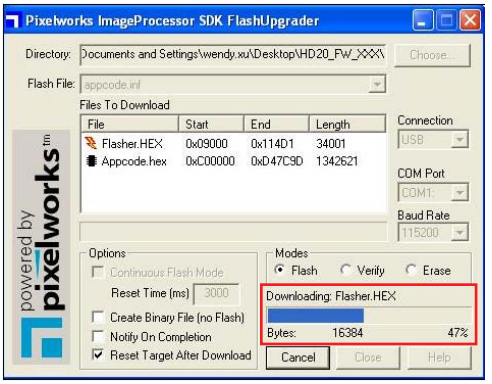
2. Execute "FlashUpgrader.exe"



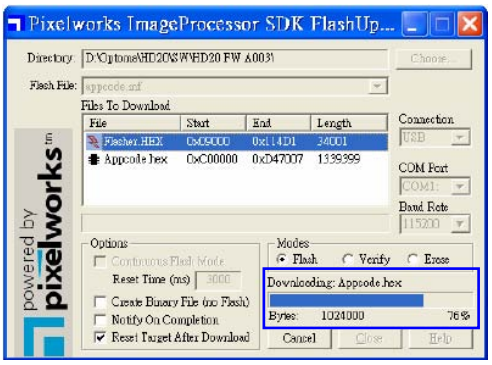
3. - Select "appcode.inf" for Flash File.
   - Select "USB" for Connection.
   - Click ‘Flash’ button.



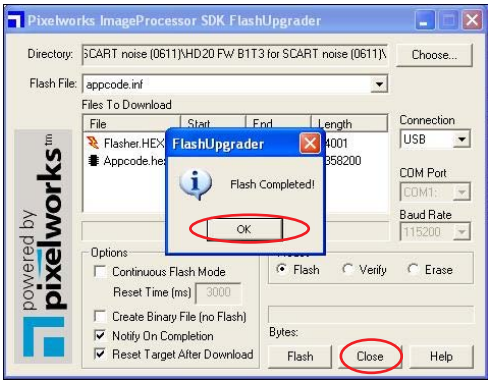
4. The "Downloading Flasher.HEX" will run.



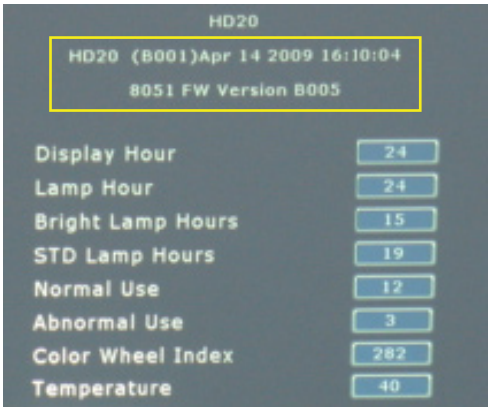
5. When Flasher.HEX downloads compeletly, "Downloading Appcode.hex" will run automatically.



6. When message "Flash Completed" appears, click "OK", then click "Close".



7. Press “Power”, “Left”, “Left” and “Up” button to get into service mode 1 to check firmware version.



Section 2: 8051 Firmware Upgrade Procedure

5-2-1 Equipment Needed

Software: (W79E804 for HD20/HD200X/HD2200/HD20LV

N79A901R for HD21/HD23)

- Setup _NLINK_en
- Manley USB Driver_NLINK
- HD20_8051_xxx.hex

Hardware:

- Projector
- Power cord: 42.50115G001
- Mini USB cable
- NLINK Fixture
- NLINK Cable 2
- PC or Laptop

Note: - The FW Upgrade procedure for HD20/HD200X/HD2200HD20LV/HD21/HD23 is the same as HD20, we take HD20 for example here.

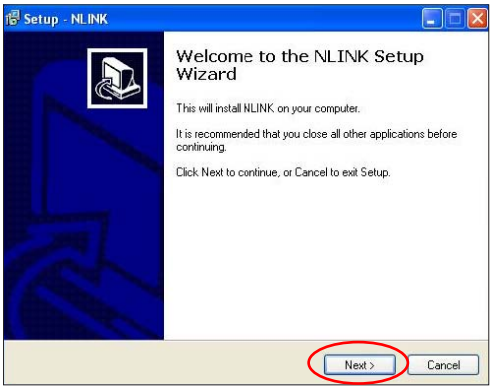




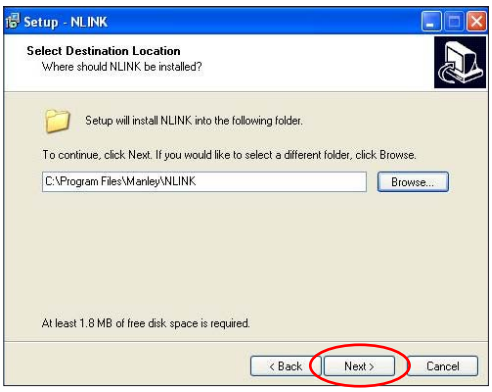
5-2-2 NLINK Setup Procedure

1. Choose "setup_NLINK_en.exe" Program.

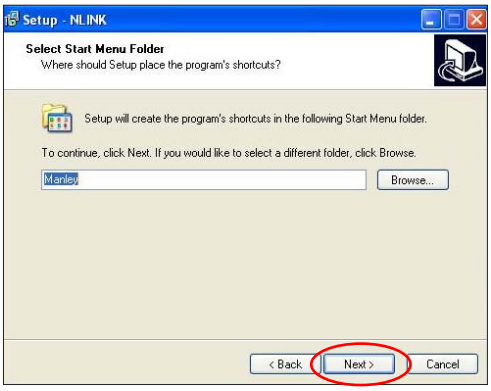
2. Click "Next".



3. Click "Next".

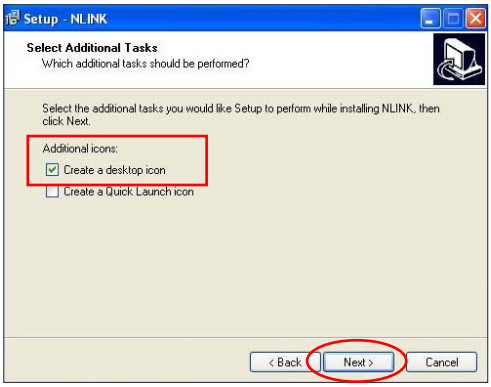


4. Click "Next".

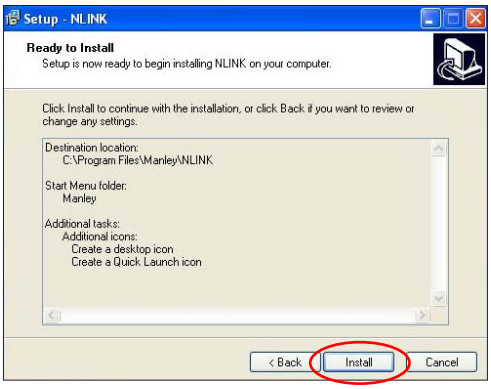


5. Click "Next".

   - Select the additional task that you may create a desktop icon.

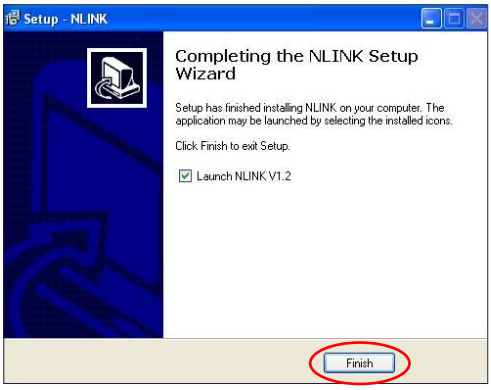


6. Click "Install" to begin installing NLINK Procedure.



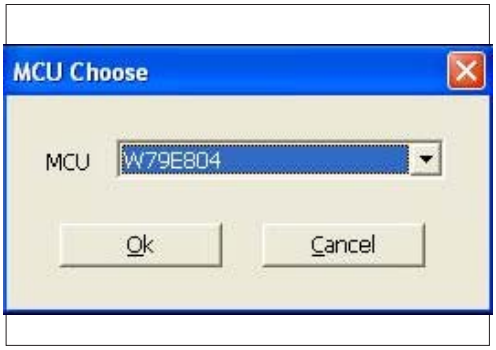
7. Click "Finish".

   - Complete the NLINK setup.



8. "MCU Choose" picture will appear on the screen.

   - Close the picture.



5-2-3 Install Manley USB Driver

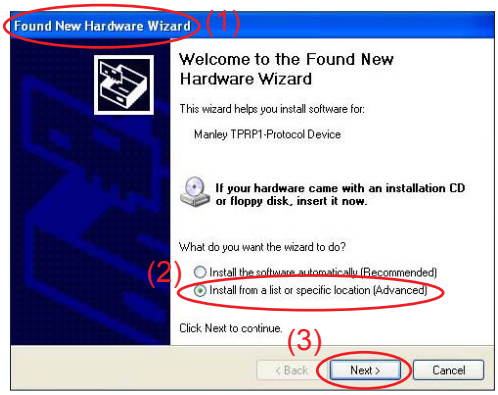
1. Set up

   - Plug power cable in projector.

   - Plug NLINK Fixture into the VGA port of projector.

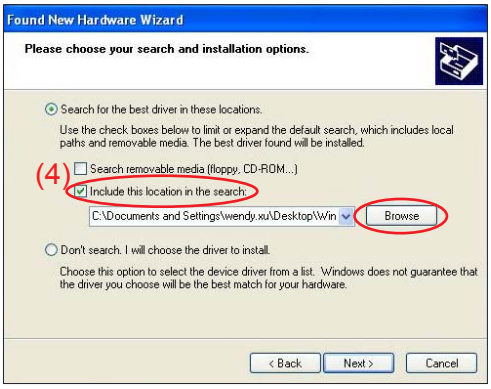
2. Installation procedure

   (1) "Found New Hardware Wiszard" picture will appear on the screen.



   (2) Select "Install from a list or specific location (Advanced)".

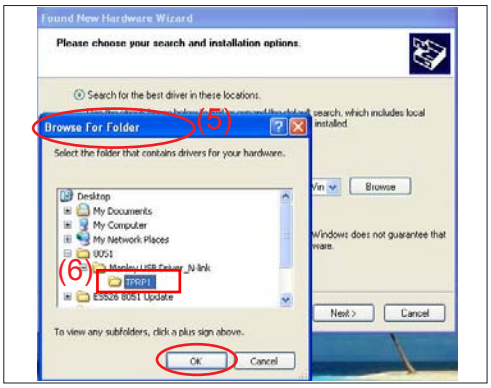
   (3) Click "Next".



   (4) Select "Include this location in the search", then click "Browse".

   (5) "Browse For Folder" picture will appear on the screen.

   (6) Select "TPRP1" folder in the "Manley USB Driver_N-Link" folder, then click "OK".



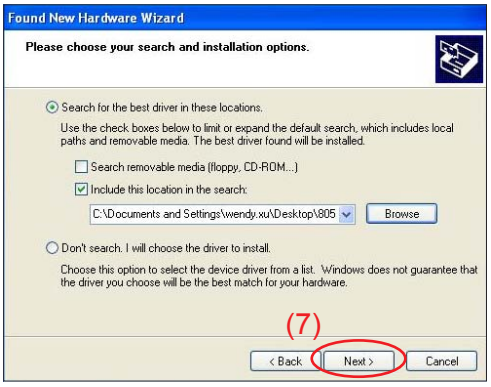
(7) Click "Next".

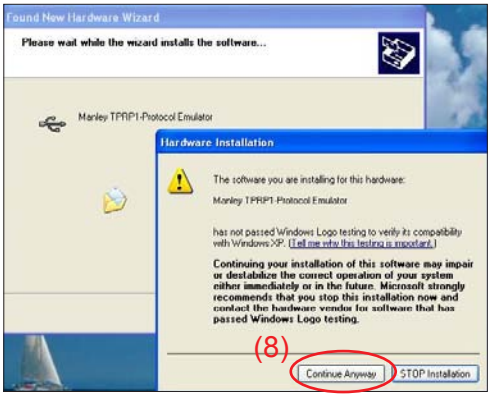
(8) Click "Continue Anyway".

(9) Click "Finish".

- "Manley TPRP1-Protocol Emulator" will appear on the picture.
- Finish the manley USB Driver Upgrade Procedure.

Note: If "Found New Hardware Wiszard" appears again, repeat step 2 to install manley USB Drivier once more.





5-2-4 8051 Firmware Upgrade Procedure

1. Execute 8051 FW Program

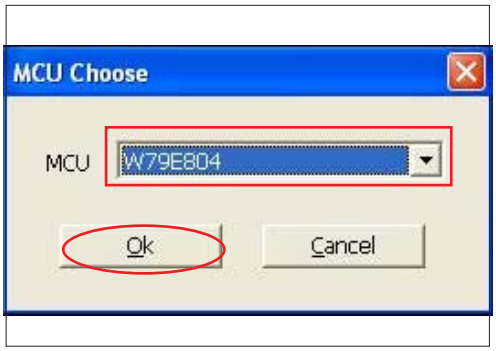
   - Double click "NLINK V1.2" to execute NLINK program.

Note: When we execute NLINK program, the power LED and Fixture LED flash red.

2. Choose the right type of MCU

   - "MCU Choose" picture will appear on the screen, select "W79E804".

   - Click "OK". "Manley Nlink" picture will appear on the screen.



Note:HD20/HD200X/HD2200/HD20LV use "W79E804" type of MCU.

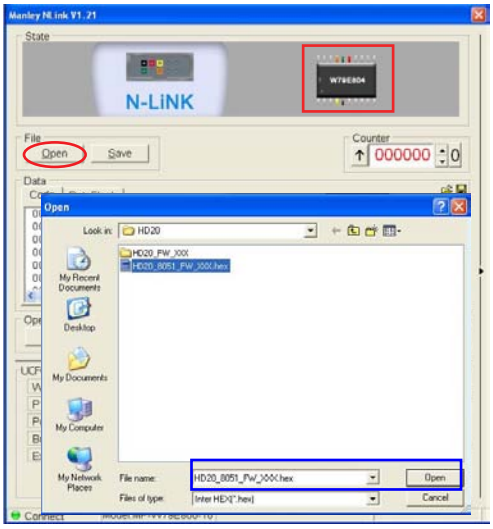
HD21/HD23 use "N79A901R" type of MCU.

3. Choose 8051 file (*.hex)

   - Ensure "MCU" is the one you chose in the last step (as red square).

   - Click "Open".

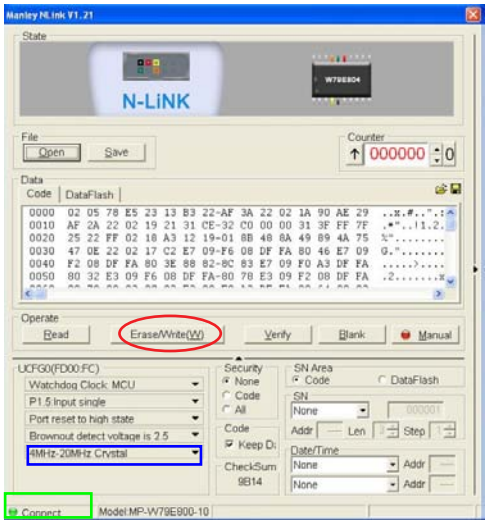
   - Select the 8051 file, then click "Open".



4. Program settings

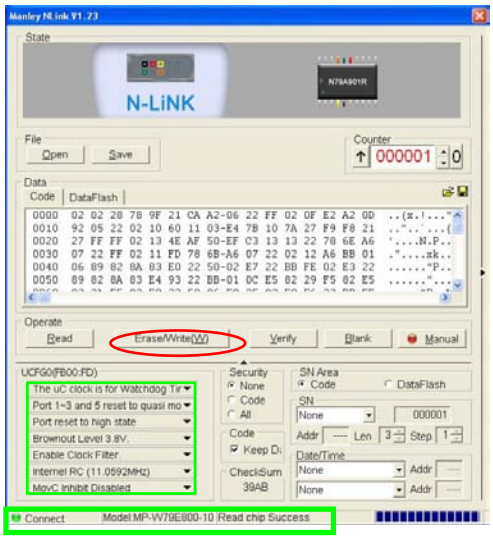
4-1. For HD20/HD200X/HD2200/HD20LV

- Ensure NLINK Fixture and PC are securely connected: the indicator lights on green, and the state is "Connect"(as green square).
- Select "4MHz-20Mhz Crystal" (as blue square).
- Click "Erase/Write(W)" to execute 8051 FW upgrade.



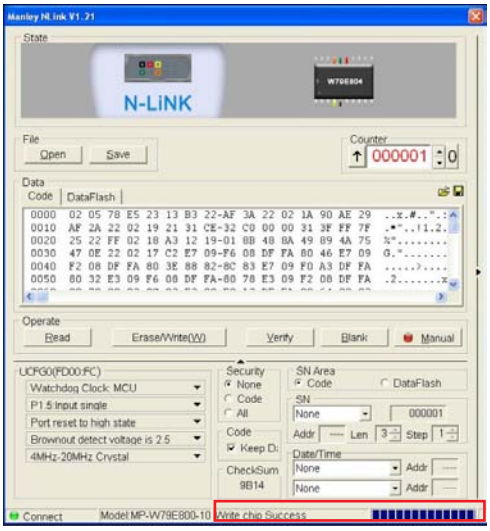
4-2. For HD21/HD23

- Ensure NLINK Fixture and PC are securely connected: the indicator lights on green, and the state is “Connect” (as blue square).
- Select “Brownout Level 3.8V” (as green square).
- Select “Internel RC (11.0592MHZ)” (as green square).
- Click “Erase/Write(W)” to execute 8051 FW upgrade (as red circle).



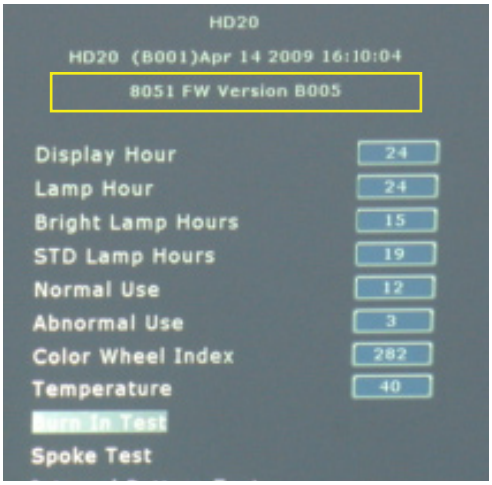
5. Finish

- When 8051 FW upgrade process is finished, "Write Chip success" will be shown.



6. Check 8051 FW version

- Press “Power”, “Left”, “Left” and “Up” button to get into service mode 1 to check firmware version.



Chapter 6

EDID Upgrade

6-1 EDID Introduction

Extended Display Identification Data is a VESA standard data format that contains basic information about a display device and its capabilities, including vendor information, maximum image size, color characteristics, factory pre-set timings, frequency range limits, and character strings for the monitor name and serial number.

The information is stored in the display and is used to communicate with the system through a Display Data Channel (DDC), which sites between the display device and the PC graphics adapter. The system uses this information for configuration purposes, so the monitor and system can work together.

Note: If a display device has digital input ports, like HDMI, but without EDID in its main board, the display device will show no image while the input source is digital signal.

6-2 Equipment Needed

Software

- EDID .exe
- EDID file(*.ini)

Hardware

- HD20 unit
- HDMI(M) to DVI(F) Adapter P/N:42.82B13G001
- DVI to DVI cable P/N:42.83N06G001
- RS-232 9 pin cable (Male to Female) P/N:42.83C07G001
- EDID Fixture (JP3 must be closed) P/N:80.00001.001
- PC
- VGA to VGA cable P/N:42.87305G102
- Power adapter for fixture P/N:47.57803G001
- Power cord P/N:42.53506G002

Note: - The EDID Upgrade procedure for HD20/HD200X/HD2200/HD20LV/HD21/HD23 is the same, we take HD20 for example here.







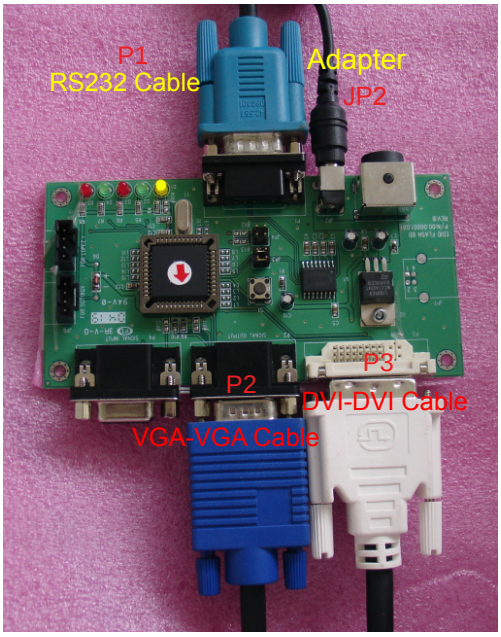


6-3 Setup Procedure

1. Connect all ports

- Power adapter to fixture JP2
- Fixture P1 to PC COM Port
- Fixture P2 to Projector VGA
- Fixture P3 to Projector HDMI
- Power on fixture
- Plug in power cord to unit

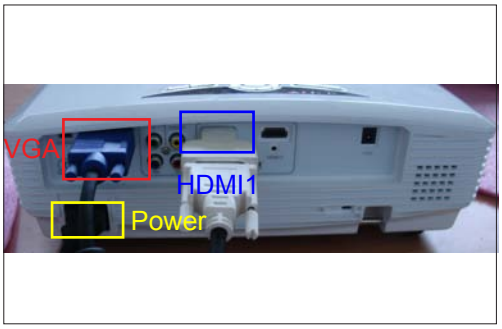
Note: Confirm JP3 is in "Close" status.



6-4 DDC Key-In Procedure (VGA, HDMI 1, HDMI 2 Interface)

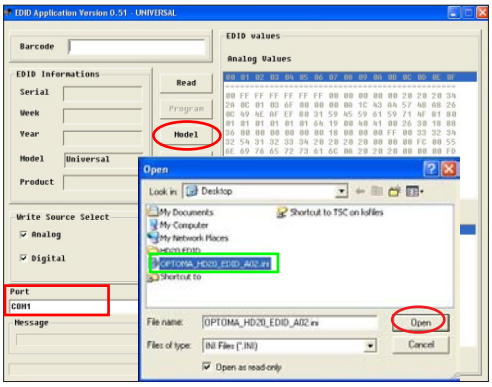
1. Plug VGA cable in VGA port and DVI-HDMI in HDMI1 port.

2. Click on "EDID.exe" to execute EDID program.



3. Choose model

- In the port selection bar, please choose the port you're using. For example: if you use "COM1," choose COM1 in the port selection.
- Click "Model" to choose the EDID file(*.ini) and open it.



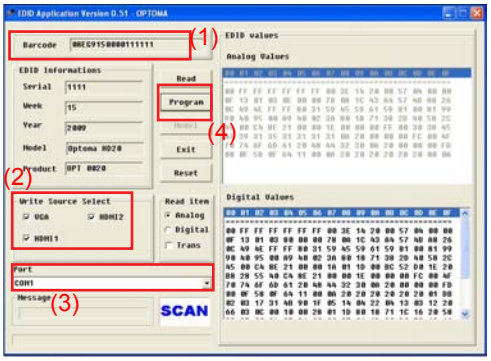
4. Programming

(1) Key in the serial number into the barcode blank space.

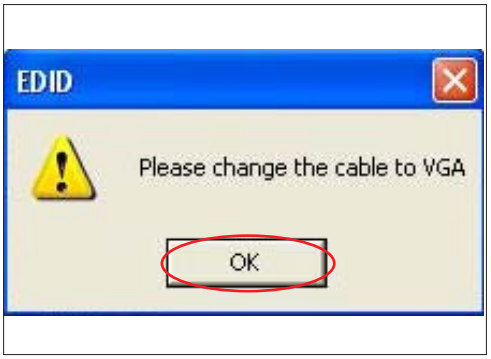
(2) In"Write Source Select"item,select “VGA, “HDMI 1” and “HDMI 2”.

(3) Check whether the port is the one you're using.

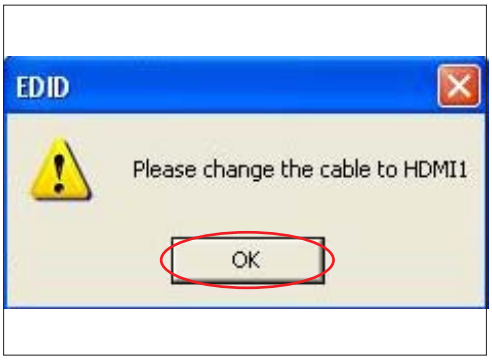
(4) Click "Program" button.



5. When the message “Please change the cable to VGA” is shown on the screen, click “OK” button.



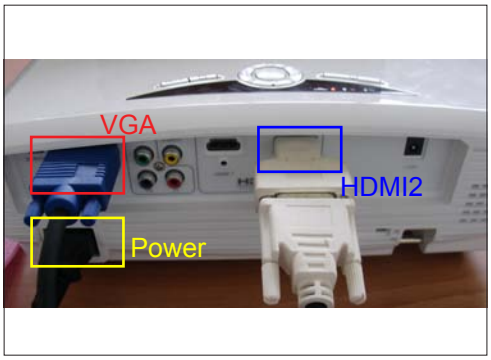
6. When the message “Please change the cable to HDMI1” is shown on the screen, click “OK” button.



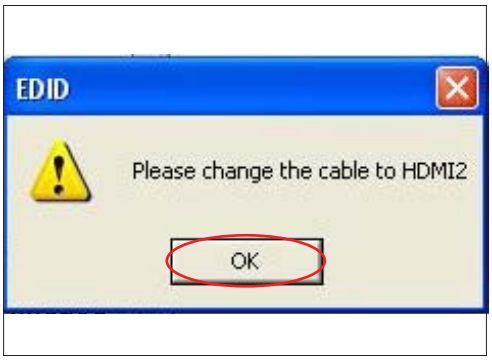
7. When the message “Please change the cable to HDMI2” is shown on the screen,

   (1) Unplug DVI-HDMI from HDMI1 port, then plug it in HDMI2 port.

   (2) Click “OK” button.



8. When the EDID program is completed, a message "OK" will appear on the screen.

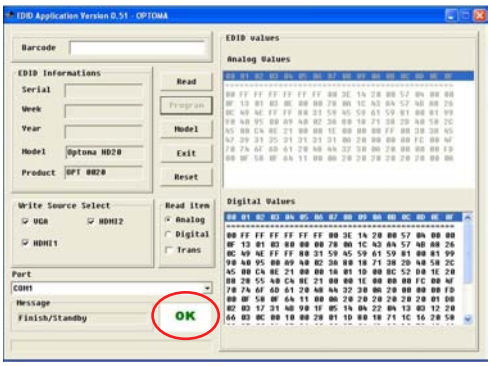


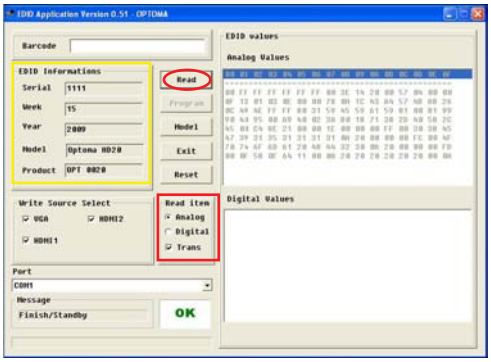
9. Read EDID information for VGA

   - In the Read item, select “Analog” and “Trans”.

   - Click “Read” button.

   - EDID Informations will be shown(as yellow square).

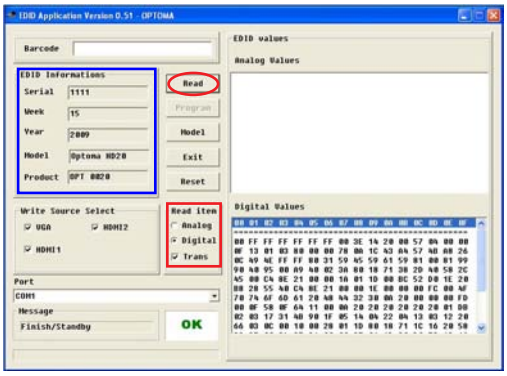




10. Read EDID information for HDMI

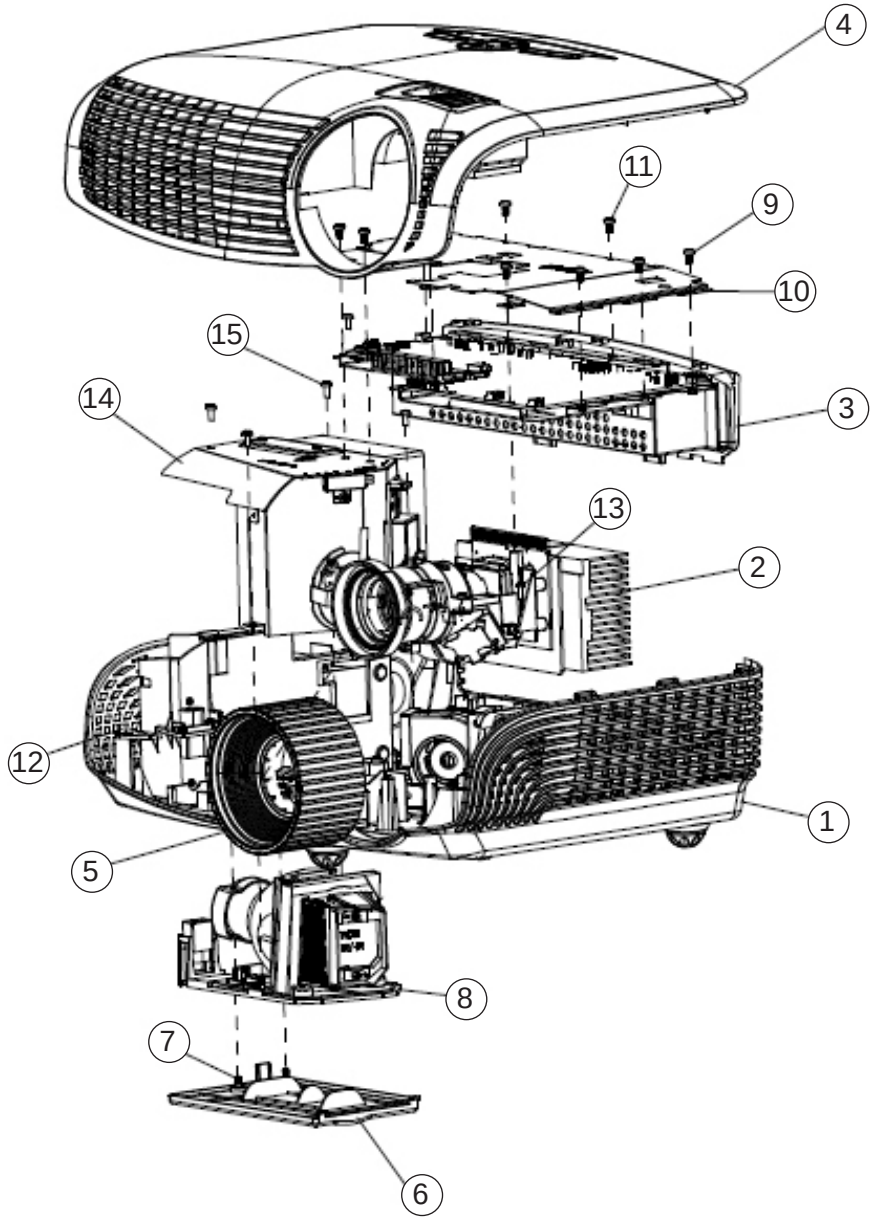
- In the Read item, select “Digital” and “Trans”.
- Click “Read” button.
- EDID Informations will be shown(as blue square).

Note: Both HDMI1 and HDMI2 need to read.



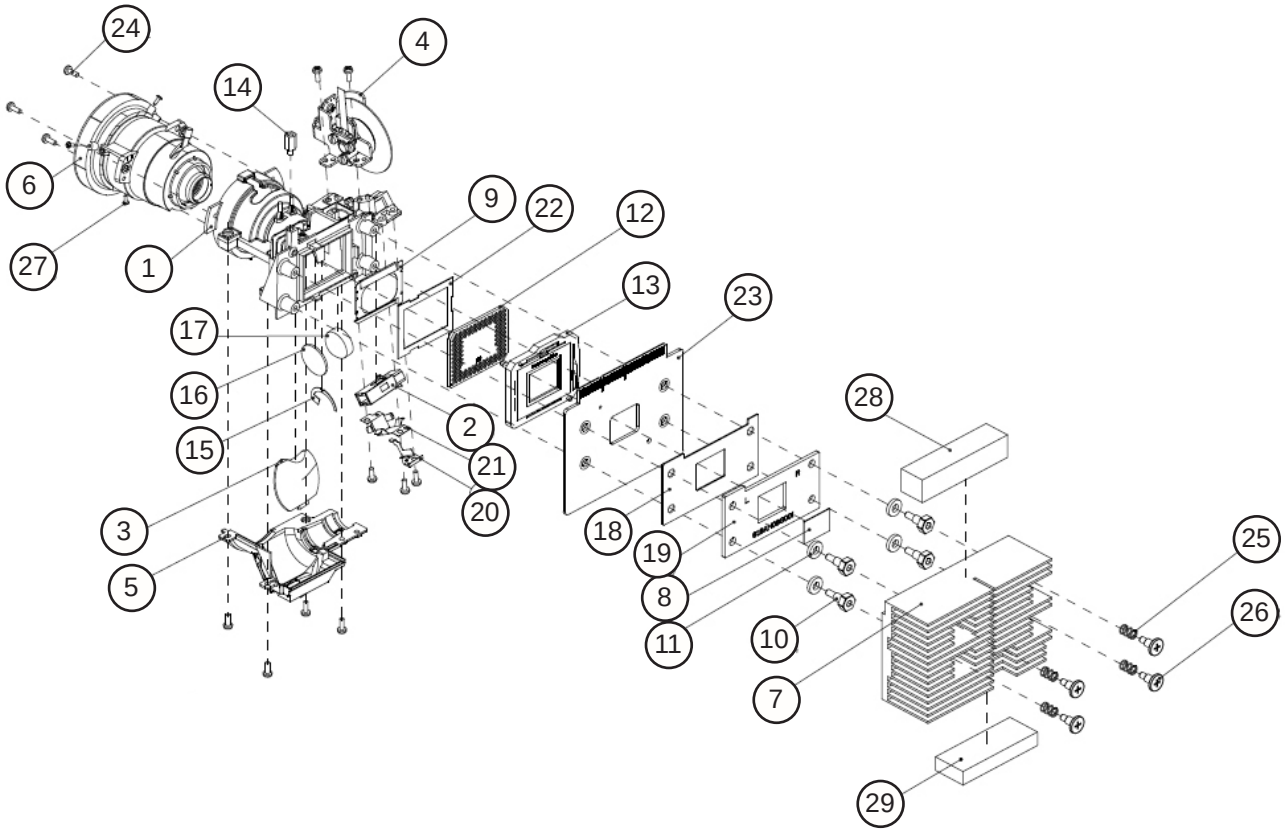
Appendix A

D.C.HD20/HD200X/HD2200/HD20LV/HD21/HD21/HD23



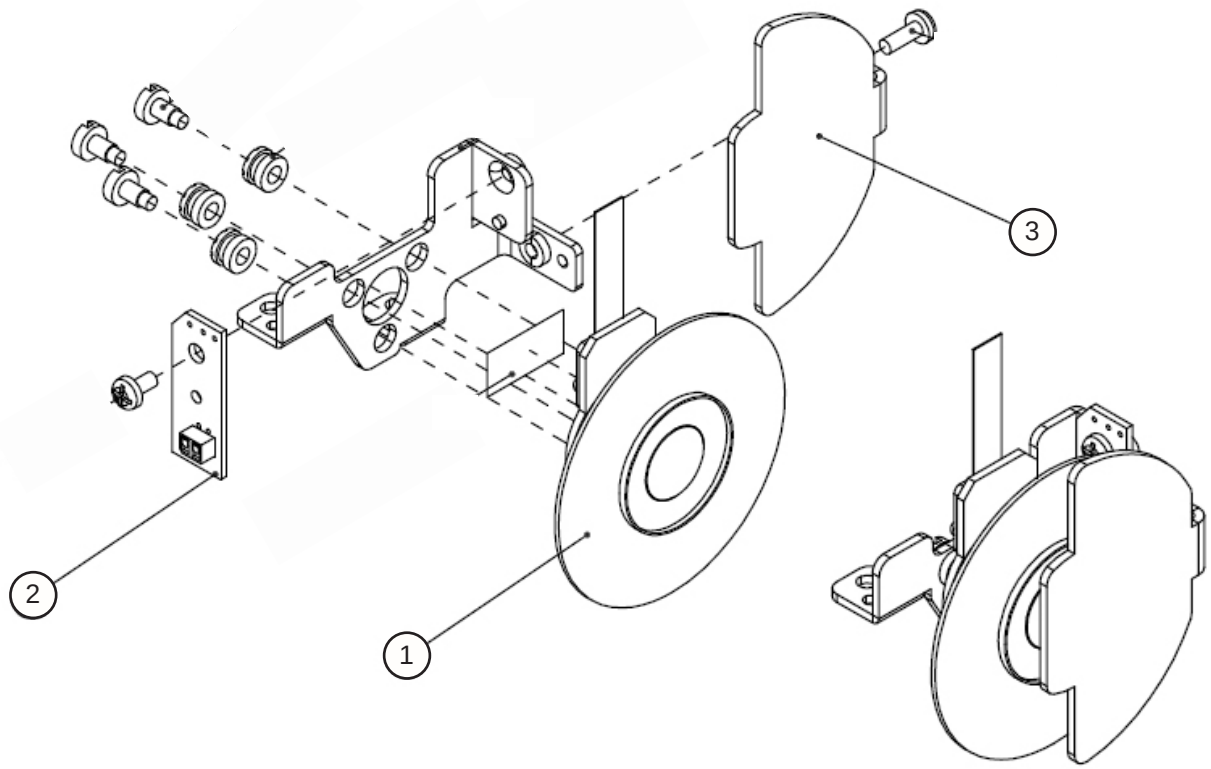
Item	P/N	Description	Parts Supply
1	70.8EF15G001	ASSY 7020 FAN SHIELDING MODULE EX542	
2	70.8EF10G001	EX612 2W SPEAKER HOLDER ASSY	
3	70.8EF08G001	MAIN BOARD ASSEMBLY EX612	
4	70.8EF09G001	IO BOARD ASSEMBLE EX612	
5	51.8EG16G001	FOCUS RING HD20 (FOR YM40)	
	70.8EG40GR01	ASSY LAMP COVER MODULE FOR HD20(SERVICE)	V
6	51.8EG03G001	HD20 LAMP COVER	
7	61.00018G003	LOCK SCREW PAN MECH M3*8.5-3.5 BLACK(1018+HEAT TREATMENT)	
	SP.8EG01GC01	LAMP MODULE FOR PROJECTOR HD20/EX615/ EX612	V
	SP.8MQ01GC01	LAMP MODULE FOR PROJECTOR HD23	V
8	70.8EG13G001	ASSY ORSAM E20.8 230W LAMP MODULE HD20	
9	85.1A123G050	SCREW PAN MECH M3*5 Ni	
10	61.8EG03G001	TOP SHIELDING HD20	
11	85.0A122G030	SCREW DOUBLE FLAT MECH M2*3Ni	
12	85.1A123G080	PAN SCREW M3*8 FOR YM-64 FRONT CELL & SP	
13	85.1A526G060	SCREW PAN MECH M2.6*6 Ni NYLOK	
14	70.8EG17G001	ASSY 8525 FAN SHIELDING MODULE HD20	
15	85.1A123G060	SCREW PAN MECH M3*6 NI	

Assy Optical Engine Module



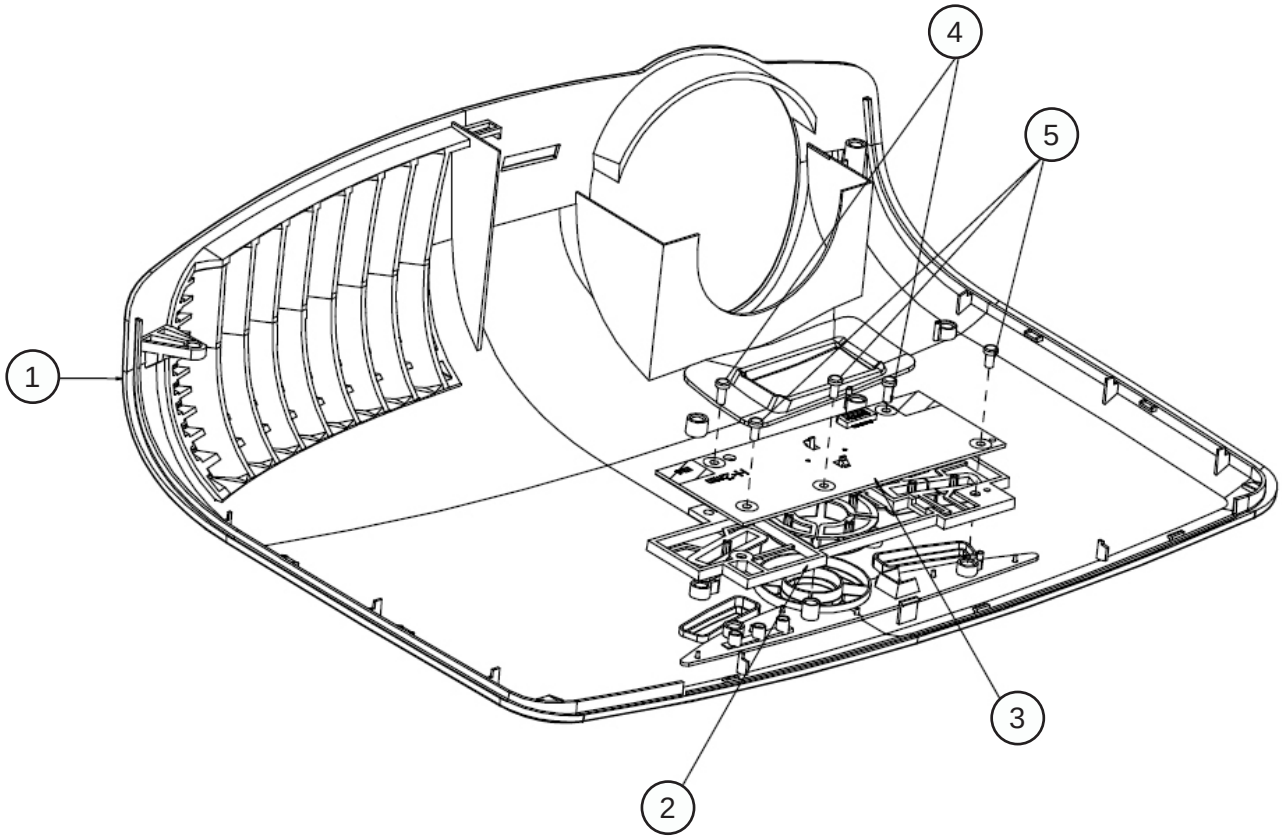
Item	P/N	Description	Parts Supply
	70.8EG36GR01	ASSY ENGINE MODULE FOR HD20 (SERVICE)	V
	70.8HW03GR01	ASSY ENGINE MODULE FOR HD20LV (SERVICE)	V
	70.8NJ10GR01	ASSY ENGINE MODULE FOR 8NJ (SERVICE)	V
1	70.8EG16G001	ASSY ENGINE BASE HD20	
	70.8EG32GR01	ASSY ROD MODULE FOR HD20 (SERVICE)	V
2	70.8EG11G001	ASSY ROD MODULE HD20	
3	70.8CP15G001	ASSY RELAY MODULE Z15	
	70.8EG37GR01	ASSY COLOR WHEEL MODULE FOR HD20(SERVICE)	V
	70.8HW04GR01	ASSY COLOR WHEEL MODULE FOR HD20LV(SERVICE)	V
	70.8NJ11GR01	ASSY COLOR WHEEL MODULE R62G64B54R62G64B54 8NJ(SERVICE)	V
4	70.8EG12G001	ASSY COLOR WHEEL MODULE HD20	
5	70.8AH02G001	ASSY ENGINE BOTTOM COVER M409WX	
6	23.8CV01G001	PROJECTION LENS YM40	
7	61.8EG10G001	DMD HEATSINK AL6063 HD20	
8	52.87319G001	DMD THERMAL PAD 18*13*0.5t	
9	61.80J10G001	DMD LIGHT MASK 739 SUS301	
10	61.88611G001	DMD SCREW Ivy10X	
11	51.00210G001	DMD SCREW WASHER A39	
12	48.8EG01G001	DMD 0.65” 1080P 2xLVDS DC2 TYPE A 1910-6127 WITH SINGLE DDP3021 TI	V
13	11.009F0G007	CNNT F 203P FOR 720P LGA DMD SOCKET PE020323-03040-10;FOXCO	
14	85.00826G080	HEX SCREW M2.6*H8*L4,BRASS	
15	61.8AS03G001	CONDENSER LIGHT STOP SUS304 0.3t 1609WX	
16	23.8AH20G001	CONDENSER1 FOR A15W	
17	23.8AH20G002	CONDENSER 2 FOR A15W	
18	51.89F02G001	DMD INSULATION PC A15	
19	61.8AH08G001	DMD PLATE AL A6061 M409WX	
20	61.8AH05G001	ROD COVER SUS301 0.25t 3/4H M409WX	
21	61.88N12G001	ROD SPRING SUS301,X15	
22	52.80J01G001	DMD ANTIDUST RUBBER 739 SILICONE RUBBER	
23	80.8EG02G001	PCBA DMD BOARD FOR HD20	V
24	85.1A526G060	SCREW PAN MECH M2.6*6 Ni NYLOK	
25	61.8AH13G001	DMD HEATSINK SPRING SUS304 M409WX	
26	61.85927G001	DMD SHOULDER SCREW SB21	
27	85.WA321G040	SCREW PAN TAP M1.7*4 BLACK	
28	41.83F16G001	GASKET W*10 H*10 L*40	

Assy Color Wheel Module



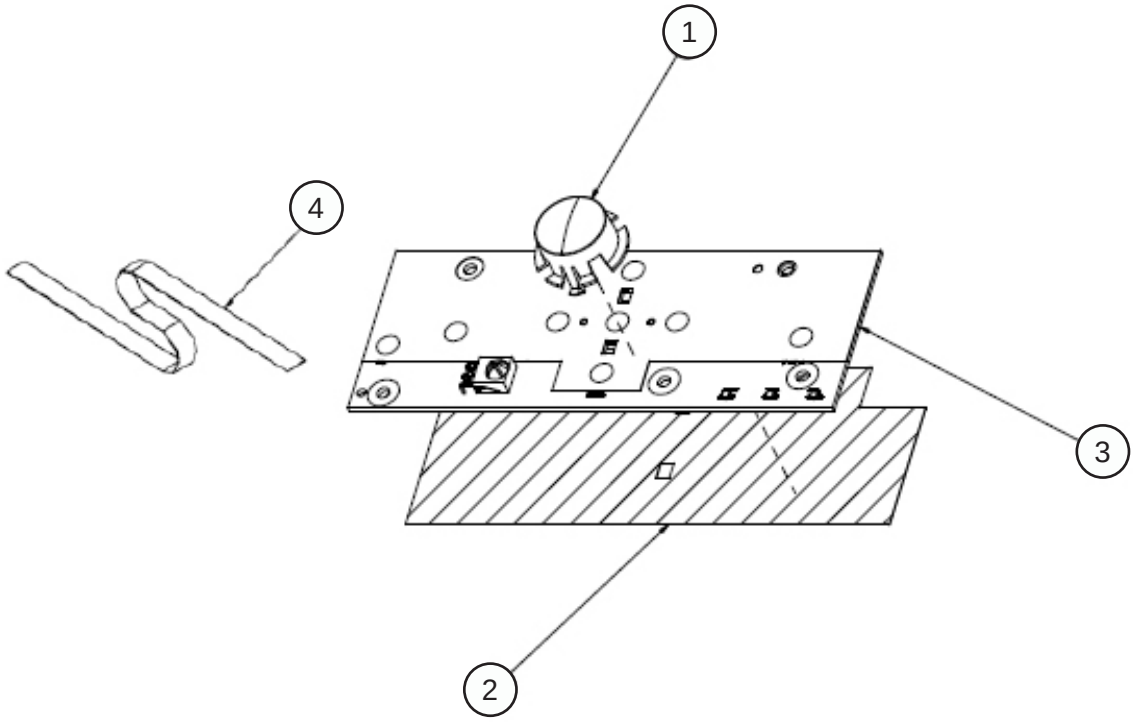
Item	P/N	Description	Parts Supply
1	23.8EG19G013	CW Φ42 R62G64B54R62G64B54 URD20 OERLIKON	
2	80.8LP04G001	PCBA PHOTO SENSOR BOARD FOR ES526X PROJECOR	V
3	61.8EG07G001	D42 CW HOLDER COVER HD20	

Top Cover Assembly



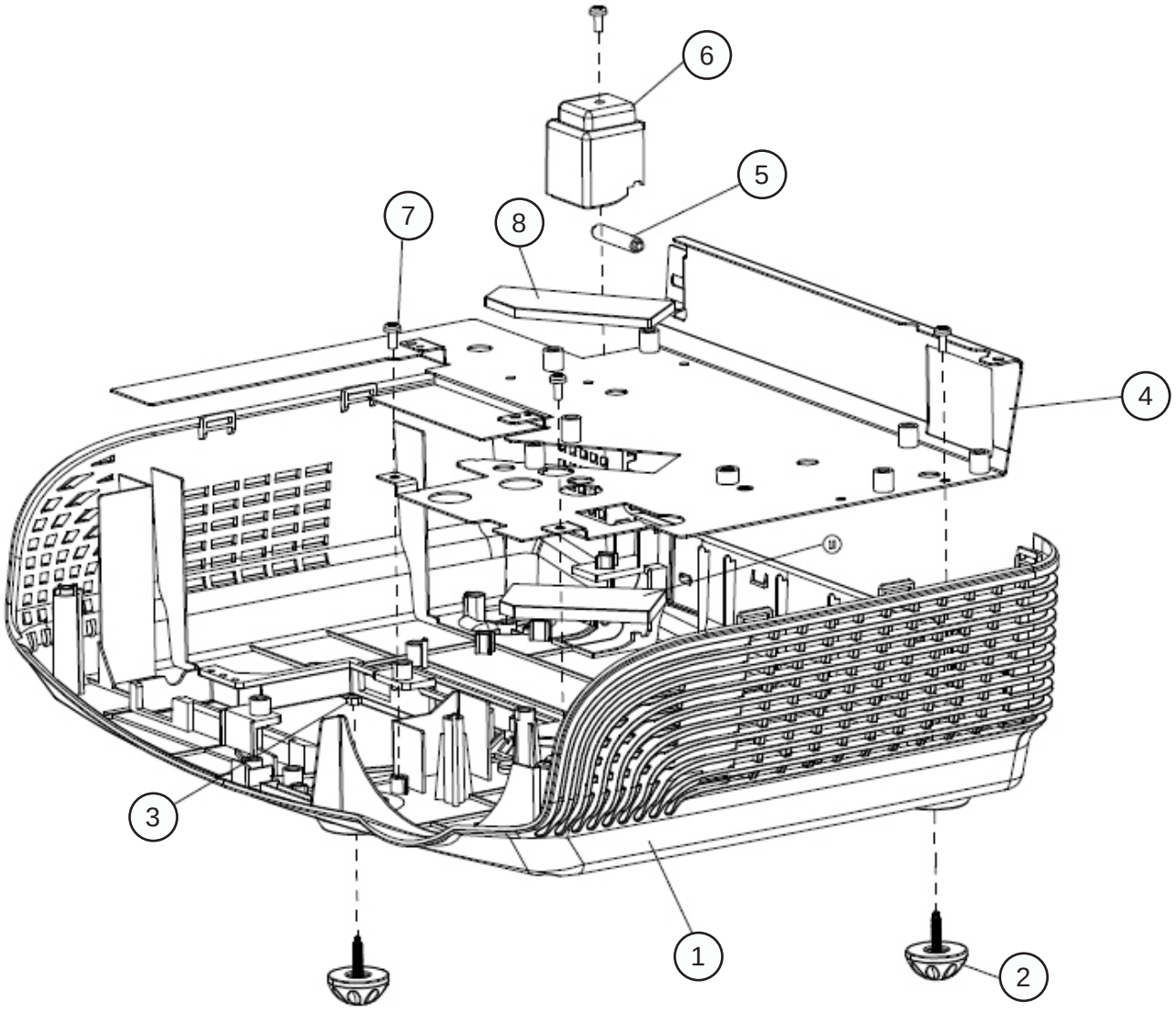
Item	P/N	Description	Parts Supply
1	75.8EG01G003	TOP COVER ASSEMBLY HD20 WHITE	V
2	51.8EG13G001	KEYPAD PLATE HD20	
3	70.8EG05G001	KEYPAD ASSEMBLY HD20	
4	85.1A126G060	SCREW PAN MECH M2.6*6 Ni	
5	85.1A926G050	SCREW PAN MECH PLASTIC M2.6*5 LT20	

Keypad Assembly



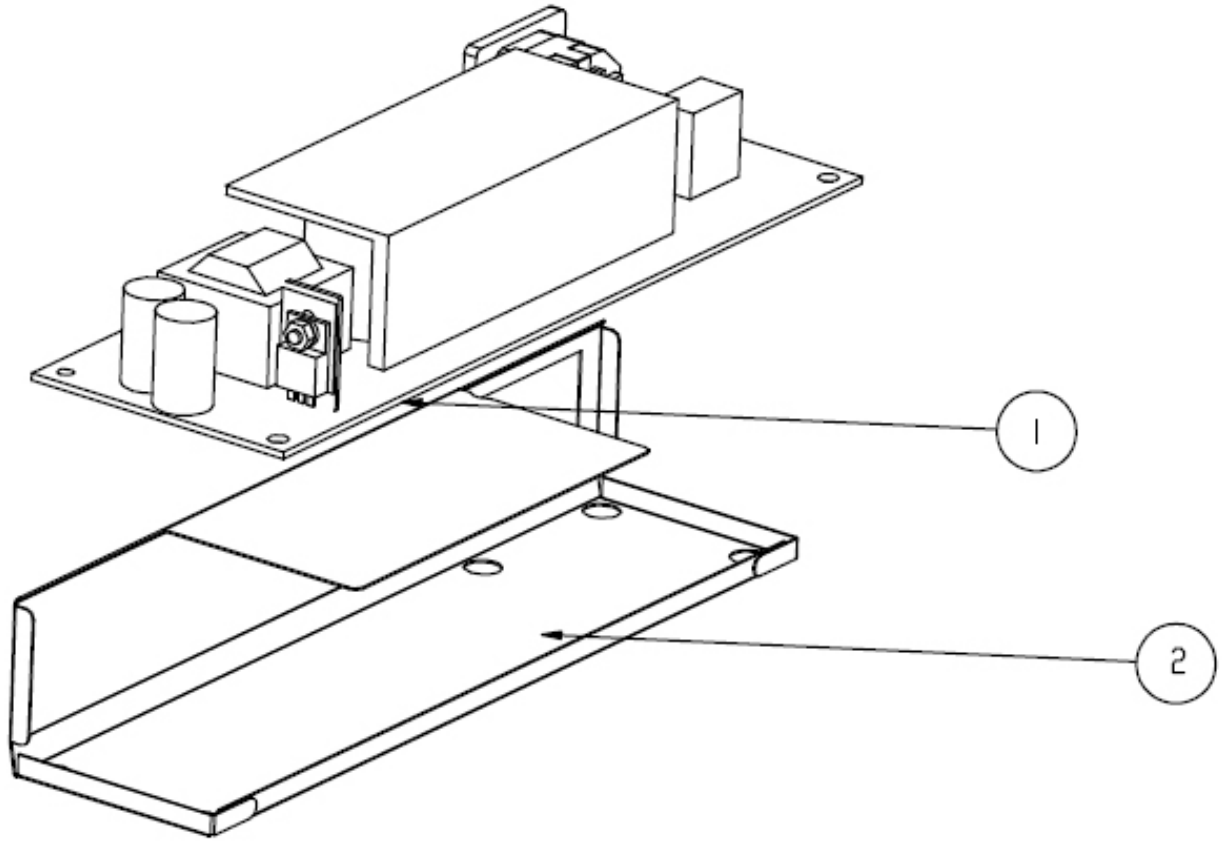
Item	P/N	Description	Parts Supply
1	51.8EG14G001	KEYPAD PLATE ENTER HD20	
	70.8EG34GR01	ASSY PCBA KEYPAD BD MODULE FOR HD20 (SERVICE)	V
	70.8HW01GR01	ASSY PCBA MAIN BD MODULE FOR HD20LV (SERVICE)	V
2	51.8EG23G001	KEYPAD 3M TAPE HD20	
3	80.8EG03G001	PCBA KEYPAD BD FOR SC 1080P	
4	42.00304G001	FFC KEYPAD TO FORMATTER BD 16P P=0.5 122mm HD80	

Assy Bottom Cover Module



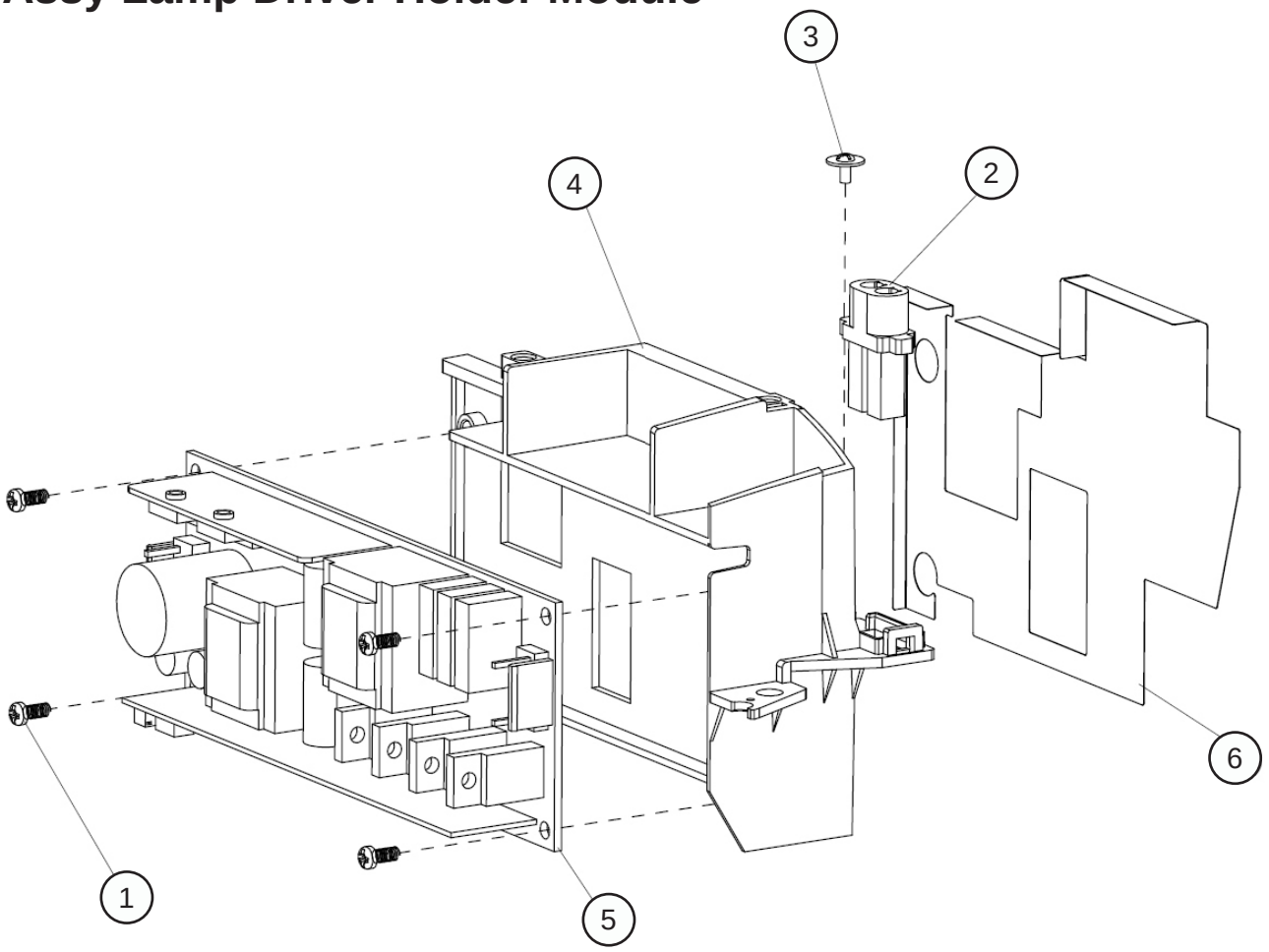
Item	P/N	Description	Parts Supply
	70.8EG35GR01	ASSY BOTTOM COVER MODULE FOR HD20(SERVICE)	V
	70.8HW02GR01	ASSY BOTTOM COVER MODULE FOR HD20LV WHITE(SERVICE)	V
1	51.8EG01G001	HD20 BOTTOM COVER MN3600H	V
2	52.8BA02G001	ADJUST FOOT P1266	
3	86.00122G015	NUT HEX M2.0*0.4P L15 Ni	
4	61.8EG01G001	8EG BOTTOM SHIELDING T=0.6MM	
5	61.8BB09G001	SECURITY BAR EX525ST	
6	51.8BB15G001	SECURITY BAR CAP PC MN3600H BLACK EX525ST	
7	85.WA123G050	SCREW PAN TAP M3*5 Ni	
8	41.89K04G001	EMI GASKET W8*H6*L150	

Assy LVPS Module



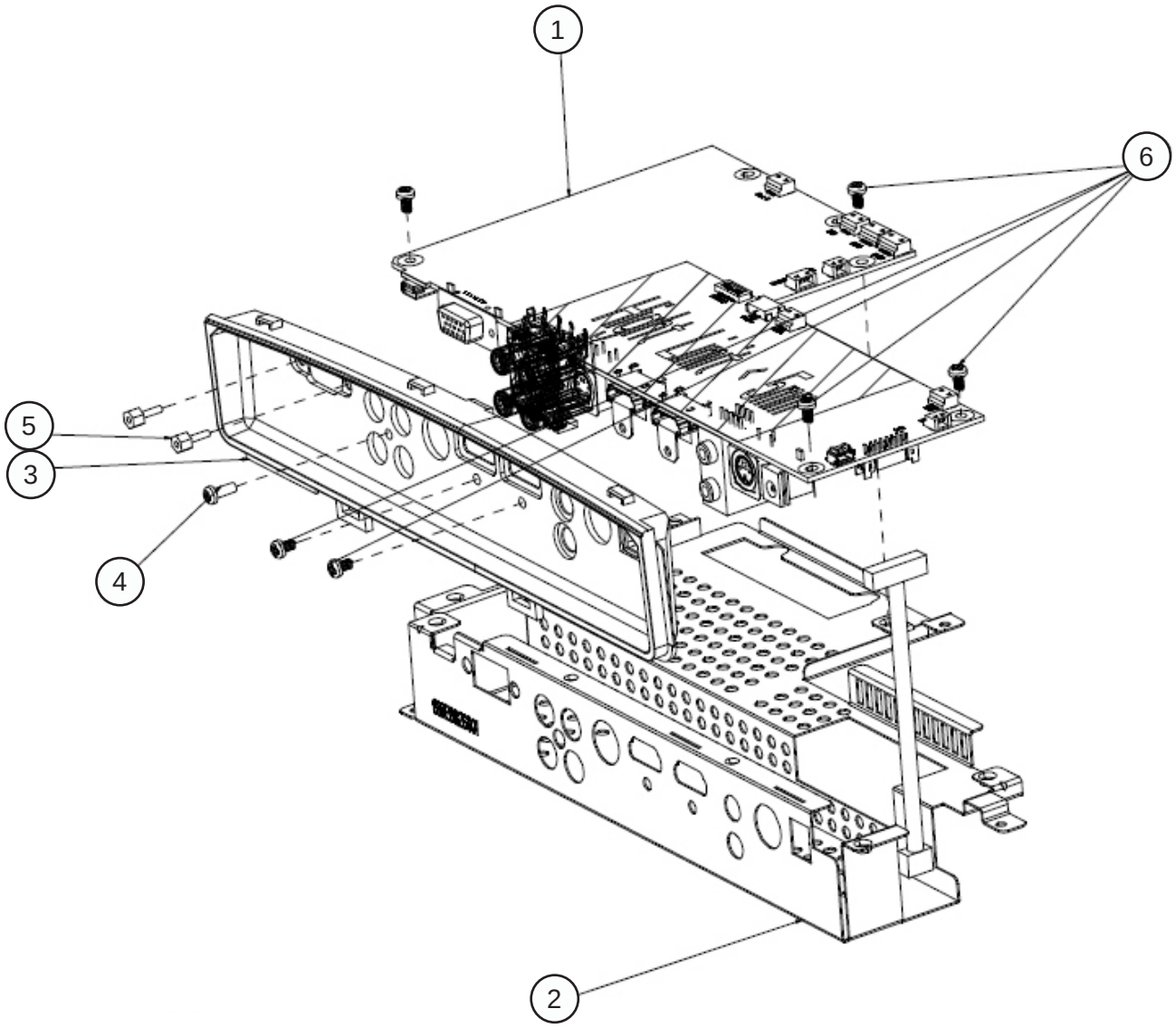
Item	P/N	Description	Parts Supply
	75.8MQ01GP01	ASSY YGE 230W LVPS FOR HD20_S600 WITH EUP	V
1	75.8CT01G001	ASSY MATRITEK 230W LVPS FOR HORUS	V
2	51.8EG20G001	230W LVPS MYLAR PC T=0.43 HD20	

Assy Lamp Driver Holder Module



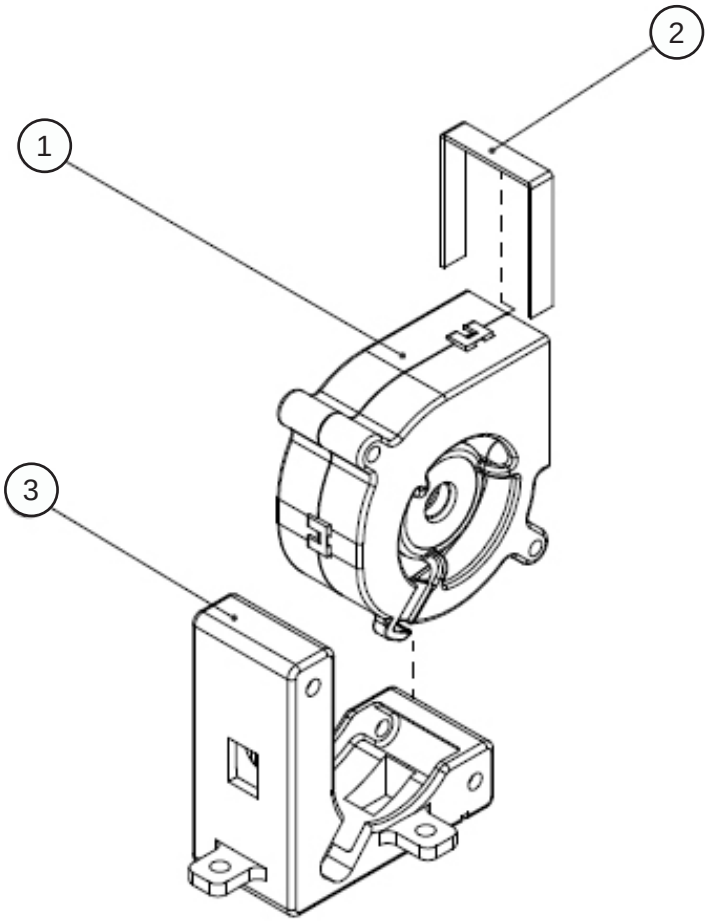
item	P/N	Description	Parts Supply
1	85.1A123G050	SCREW PAN MECH M3*5 Ni	
2	42.0043RG001	W.A. 2P #22 FEMALE 6KV 150C 95mm FOR LAMP DRIVER PDG-DSU30	
3	85.3A122G040	SCREW CAP MECH M2*4 Ni	
4	51.8EG04G001	HD20 LAMP DRIVER HOLDER PPS+40%GF	
	70.8EG38GR01	ASSY OSRAM LAMP DRIVER MODULE 230W FOR HD20 (SERVICE)	V
	70.8MQ20GR01	ASSY OSRAM LAMP DRIVER MODULE 230W 8MQ(SERVICE)	V
	70.8NJ12GR01	ASSY OSRAM LAMP DRIVER MODULE 230W 8NJ (SERVICE)	V
5	61.8EG09G001	LAMP DRIVER ALUMINUM HD20	

Assy Main Board Module



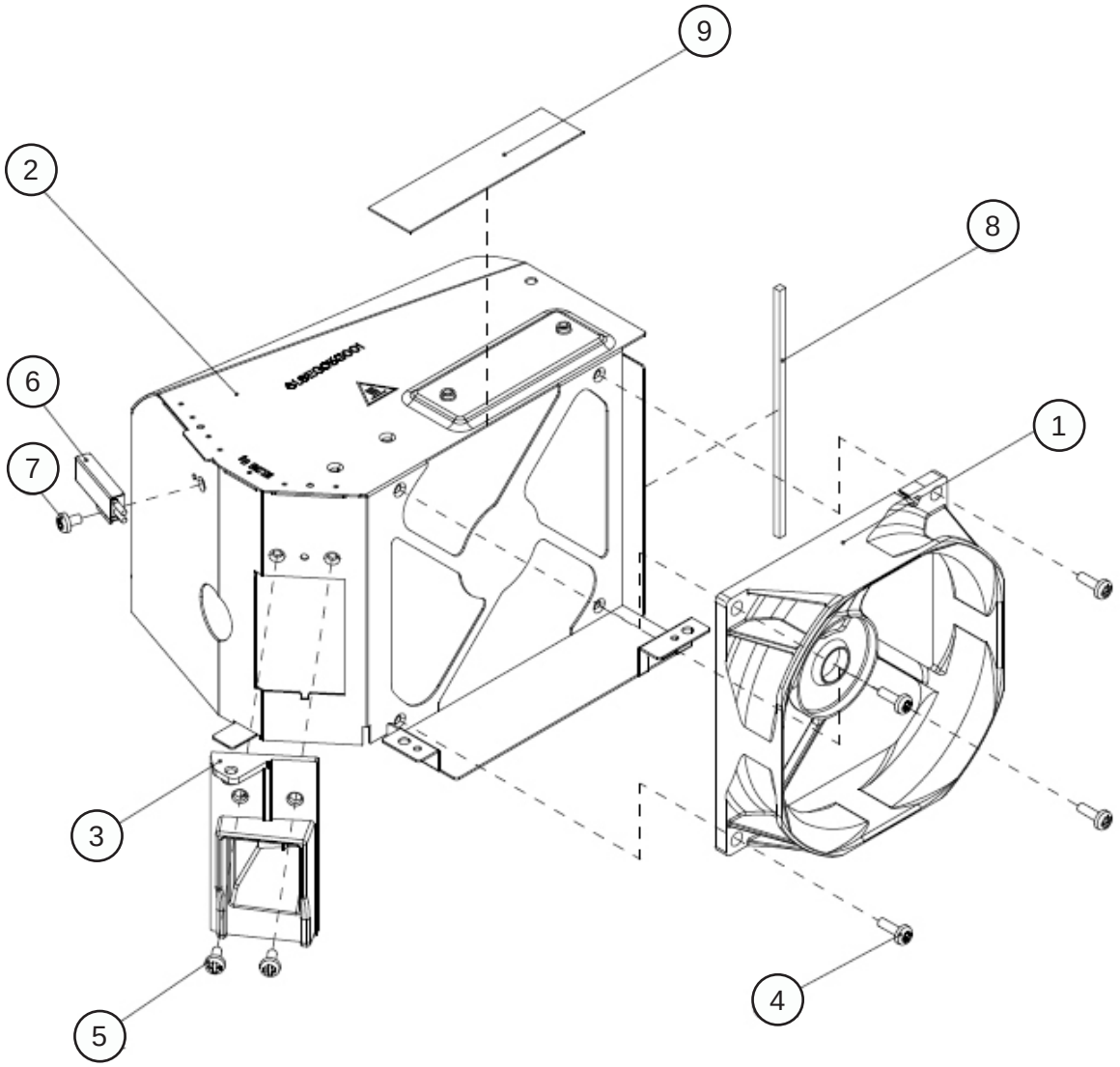
Item	P/N	Description	Parts Supply
	70.8EG33GR01	ASSY PCBA MAIN BD MODULE FOR HD20 (SERVICE)	V
	70.8HW01GR01	ASSY PCBA MAIN BD MODULE FOR HD20LV (SERVICE)	V
	80.8MQ01G001	PCBA MAIN BOARD FOR HD21 PROJECTOR	V
	80.8NJ01G001	PCBA MAIN BOARD FOR HD23 PROJECTOR	V
1	80.8EG01G003	PCBA MAIN BD HD20	
2	61.8EG02G001	MAIN BOARD SHIELDING HD20	
	70.8EG39GR01	ASSY IO COVER MODULE FOR HD20(SERVICE)	V
3	51.8EG10G001	IO COVER HD20	
4	85.WA123G060	SCREW PAN TAP M3*6 Ni	
5	85.005AGG408	SCREW HEX I/O #4-40 H4*L8 NI NYLOK	
6	85.1A123G050	SCREW PAN MECH M3*5 Ni	

Assy 4520 Blower Module



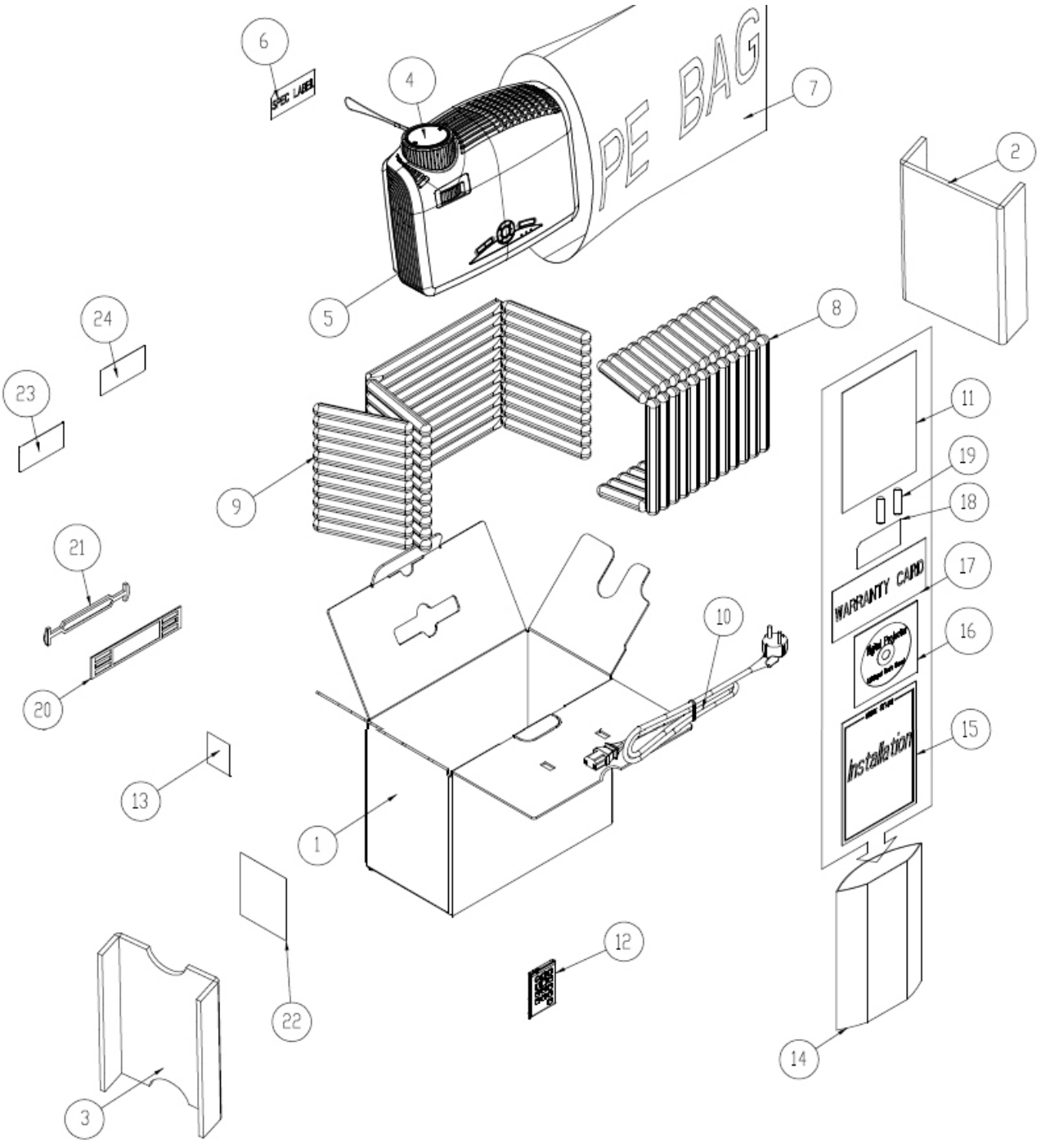
Item	P/N	Description	Parts Supply
1	49.8EF04G001	SUNON 45*20mm GB1245PKVX-8 F-TYPE BLOWER	V
2	52.89T01G001	BLOWER AIR TIGHT F12 H5350	
3	52.82G08G001	BLOWER 4520 RUBBER EP7190	

Assy 8525 Fan Shoelding Module



Item	P/N	Description	Parts Supply
1	49.8EF03G001	SUNON KDE1285PTV1 AXIAL FAN-LOW COST	V
2	61.8EG05G001	8525 FAN SHIELDING HD20	
3	61.8EG11G001	LAMP BLOWER DUCT HD20	
4	85.1A123G080	PAN SCREW M3*8 FOR YM-64 FRONT CELL & SP	
5	85.1A123G060	SCREW PAN MECH M3*6 NI	
6	43.8EG17G001	THERMAL SWITCH WITH BRACKET (KLIXON YS11) HD20 100C	V
7	85.1A123G040	SCREW PAN MECH M3*4 Ni	
8	51.81540G001	TAPE 3M J350 17*60mm	
9	41.8EF01G001	EMI GASKET W5*H4*L80m	

Assy Packing Drawing



Item	P/N	Description	Parts Supply
1	55.8EG01G001	CARTON OUTSIDE BOX AB FLUTE HD20	V
2	55.8EG02G001	PARTITION PAPER RIGHT HD20	
3	55.8EG03G001	PARTITION PAPER LEFT HD20	
4	75.8EG02G001	LENS CAP ASSEMBLY	
5	DC.8EG01G001	D.C. HD20	
6	35.86301G001	SPEC LABEL BLANK PD120	
7	51.8EG37G001	PE BAG HD20	
8	56.8EG01G001	AIR BAG BOTTOM HD20	
9	56.8EG02G001	AIR BAG TOP HD20	
10	42.50115G001	CABLE POWER CORD 1.8M SP30+IS14 US	
11	36.8EG03G001	USER'S MANUAL FOR EMEA/USA OPTOMA HD20	
12	45.8EG01G001	INFRARED REMOTE CONTROL HD20	V
13	57.00001G001	PACK SIO2 DRIER 20g	
14	51.00027G003	PE BAG ZIPPER 33cm*25cm SIZE GREEN FOR OPTOMA	
15	36.8EG02G001	QUICK START CARD MULTILINGUAL OPTOMA HD20	
16	36.8EG01G001	USER'S GUIDE MULTILINGUAL (CD) OPTOMA HD20	V
17	36.00024G001	WARRANTY CARD US FOR LPP SERIES, 1 YEAR	
18	36.00018G001	EXTENDED WARRANTY ; REGISTRATION FORM,USA FOR LPP SERIES	
19	46.80S01G101	BATTERY #7 1.5V NOVACELL	
20	51.00200G001	HANDLE BAR 2. PE HD70	
21	51.00201G001	HANDLE BAR 1.PE HD70	
22	35.82001G111	AK LABEL 3"*3" BLANK	
23	35.00040G001	LABEL 30mm,GREEN	
24	35.52302G091	LABEL CARTON 108*92 BLANK	

Appendix B

I. Serial Number System Definition

Serial Number Format for Projector

Q	8EG	9	22	AAAAA	C	0001
①	②	③	④	⑤	⑥	⑦

① : **Q = Optoma**

② : **8EG = Project code**

③ : **9 = Last number of the year (ex:2009 = 9)**

④ : **22 = week of the year (ex:the twenty-second week of the year = 22)**

⑤ : **AAAAA = not-defined**

⑥ : **C = Manufacture factory (CPC)**

⑦ : **0001 = Serial code**

EX: Q8EG922AAAAAC0001

This label represents the serial number for HD20. It is produced at CPC on the twenty- second week of 2009. Its serial code is 0001.

II. PCBA Code Definition

PCBA Code for Projector

A	B	XXXXXXXXXX	C	XXX	EEEE
①	②	③	④	⑤	⑥

① : ID

② : Vendor Code

③ : P/N

④ : Revision

⑤ : Date Code

⑥ : S/N