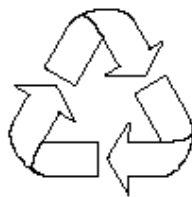# HP Notebook Projection Companion

Service Manual

100% Recycled Paper
Version: A
Date: 2009/12/14

Update History

Revision	Chapter	Changes	Date
Rev. A		Initial version	14th Dec.2009

DLP and DLP® logo are trademarks of TEXAS INSTRUMENTS INCORPORATED.

Conventions

The following conventions are used in this manual .

Screen Messages	Denote actual messages that appear on screen.
Note	Give bits and pieces of additional information related to the current topic.
Warning	Alert you any damage that might result form doing or not doing specific actions.
Caution	Give precautionary measures to avoid possible hardware or software problems.
Important	Remind you doing specific actions relevant to the accomplishment of procedures.

Table of Contents

1 System Introduction

1.1 Technical Specification

The following tables list the specifications for the projector.

	Metric
Dimensions	
Height	4.0 cm
Width	11.1 cm
Depth	9.3 cm
Weight	<1lb(390g)
Contrast ratio	800:1
Brightness	100 lumens
Light source	Red/green/blue LED module
Resolution	SVGA(858×600)
Zoom focus	Fixed zoom/manual focus
Display technology	0.45-inch DLP
Projection screen	15.0 to 60-inch
Projection distance	8.5 feet (2.6m)
Noise	32dB
Power consumption	58 W
I/O connectors	30-pin CEA connector

Designs and specifications are subject to change without notice.

1.2 Location of features, Controls, and I/O

Top components

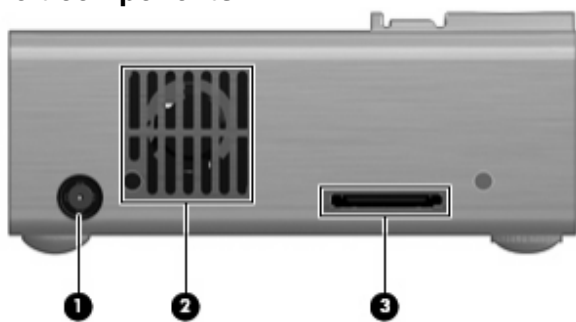| Component		Description
(1)	Focus ring	Move the ring to the left or right to adjust the focus of the projector.
(2)	Temperature light	When the light is on, Indicates that temperature is over 47.5 ℃ and that the projector will automatically shut down. NOTE: Excessive temperature may indicate that the vents are blocked. To maintain optimal temperature, be sure the vents are not blocked. Also, allow the projector to cool down after it turns off.
(3)	Status light	Blinks when the projector is powering on or if one of the projector's fans has failed. NOTE: Once the projector is on, the status light stops blinking and remains on while the projector is in use.
(4)	4-way	Press to select and adjust on-screen settings.
(5)	Power button	Press to turn the projector on and off.
(6)	Enter button	Allows you to select a function in the on-screen display.
(7)	Menu button	Press to activate and navigate through the on-screen display.

Front components

Component		Description
(1)	Vent	Enables airflow to cool internal components.
(2)	Lens	Projects images onto screen.

Left components

Component		Description
(1)	Power connector	Connects an AC adapter.
(2)	Vents	Enables airflow to cool internal components.
(3)	Video cable connector	Connects the video cable.

Back components
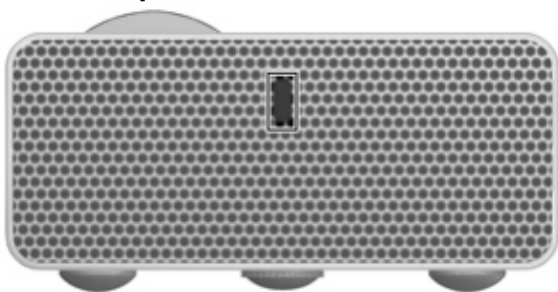
Component	Description
Security cable slot	Attaches an optional security cable to the projecto r. NOTE: The security cable is designed to act as a deterrent, but it may not prevent the projector from being mishandled or stolen.

Right components

Component	Description
Vents	Enables airflow to cool internal components.

Bottom components
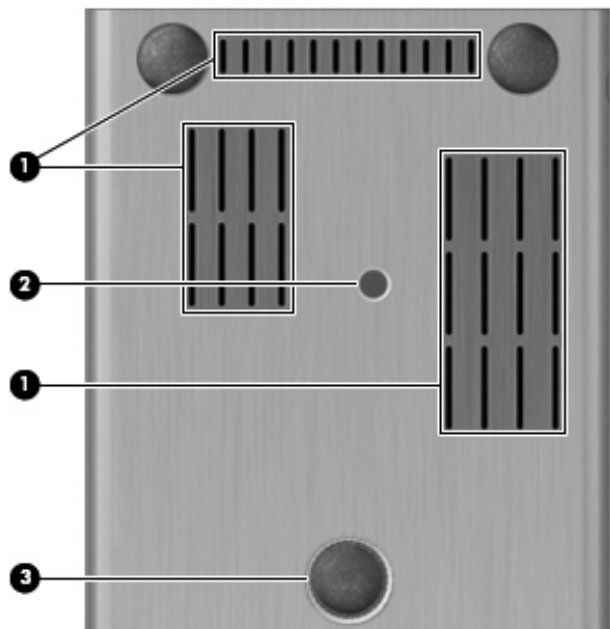
Component	Description
(1) Vents	Enable airflow to cool internal components.
(2) Tripod connector	Connects the tripod to the projector.
(3) Adjustable foot	Allows you to adjust the height of the projector for optimum viewing.

1.3 System Block Diagram

MAIN Board

CEA 30 pin

EDID 24LC21
VGA IN1 CN
ADC TVP7002 — 27bit → Port1
VIDEO CN
Video Decoder TVP5150 — 8bit → BT656
USB CN → USB

FLASH MX29LV320DB — 16
XDR DRAM EDX5116ACES — 8
Synthesizer CDCDLP223
XDR clock Gen CDCD5704

DDP2230

I2C

Temperature Sensor TMP75
EEPROM CAT24C32
16 pairs
Gsensor MXD2020
Comparator LM393
Light Sensor TSL250R

SPI
GPIO
GPIO

Sub-CPU MSP430
DC JACK

DC/DC
TPS54386
TPS54312 | TPS74801
TPS40210 | TPS65051
1V2 1V8 2V5 3V3 5V 13V 17.5V 20.5V

FPC CON
FAN Driver G994
FAN Driver G994

FPC con
KEYPAD Board
FAN CON
FAN
FAN CON
FAN

100~240VAC
AC line → 19.5V **Adaptor**

TYPE X DMD
B to B con
Driver & Reset DAD1000
DMD Board

LED B
LED G
LED R

5

2 Firmware Upgraded Flow

This chapter provides the information regarding relevant eq uipments and upgrading procedure for firmware upgrade.

Note:

Firmware upgrade process is not necessary. Please check the firmware and composer version before any procedures. During firmware download period, please do not shut down PC or projector, this will cause flash memory's damage. And need to return the unit to manufacturer for flash memory recovery.

2.1 Setup Tool/Equipment
1. Computer
2. USB upgrading cable
3. Power Cord and AC Adaptor
4. DLP Composer Lite

2.2 Upgrading Procedure

Installing [DLP Composer (TM) Lite]

1. Double-click **[DLP Composer Lite v7.1 Setup.exe].**

2. Installation starts. Click **[Next]** to continue the installation process.

3. On the **[License Agreement]** screen, move the scroll bar on the right to the bottom, select **[I accept and agree to be bound by all the terms and conditions of this License Agreement]**, and click Next to continue the installation process.
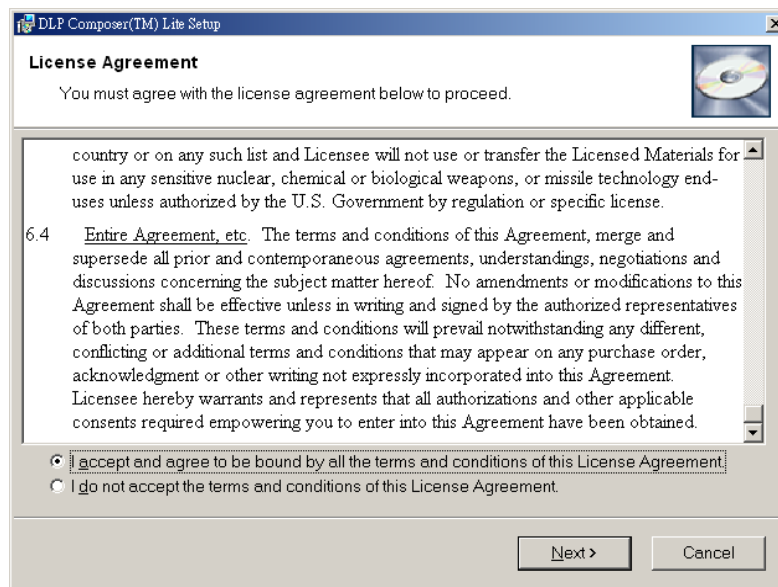

4. On the Select **[Installation Type]** screen, select **[ALL]** and click **[Next]** to continue the installation process.

5. When the installation is finished, click [Finish] and reboot the PC. (A shortcut to DLP Composer(TM) Lite is created on the desktop.)
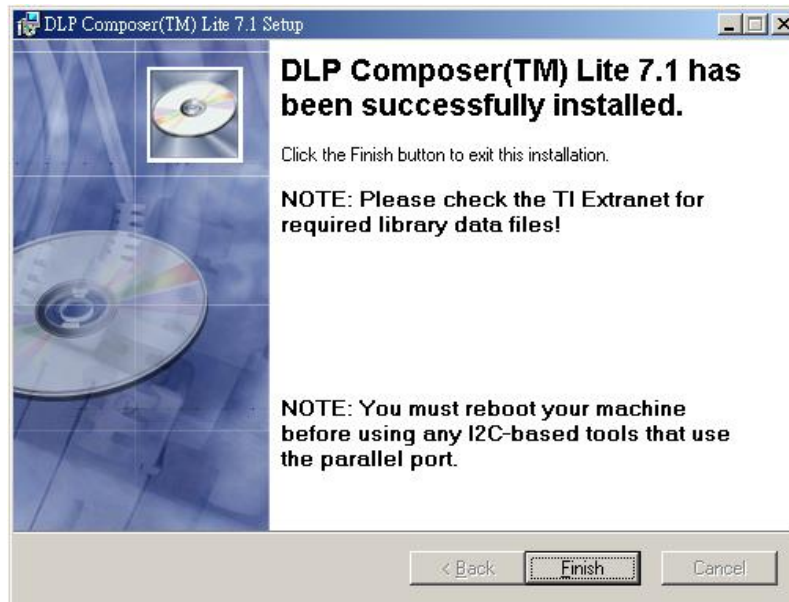
USB Support - Installation (All Platforms)

This release includes support for a USB communications interface to DDP2000-based projectors. The   setup   program   includes the   files needed   to   install USB support   (for Windows 98/Me/2000/XP only --- Win95 and WinNT are not supported). After DLP Composer™ Lite is installed, to install the USB support, choose the "Install DDP2000 USB Driver" icon under "DLP Composer™ Lite" in your Start menu.
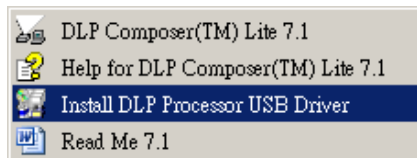
Follow the instruction on the screen to press any key and wait for the installation done.
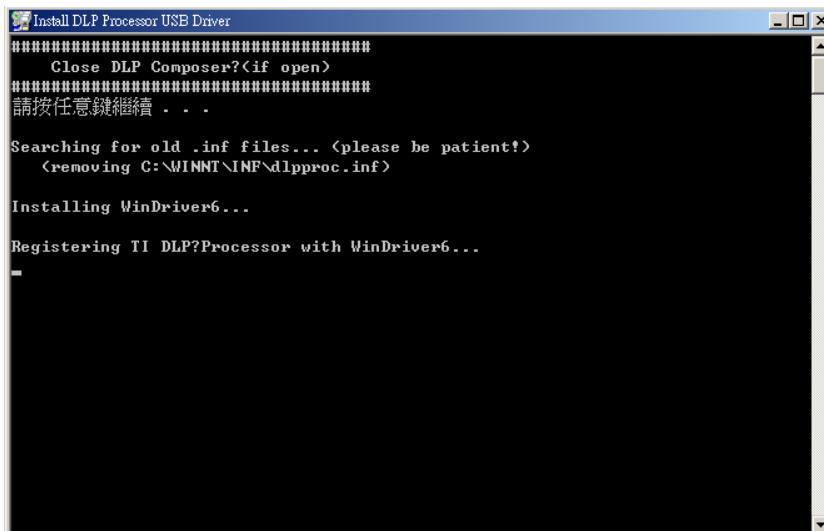
And copy the file "FlashDeviceParameters.txt" into the C: \ Program Files\ DLP Composer Lite X.X
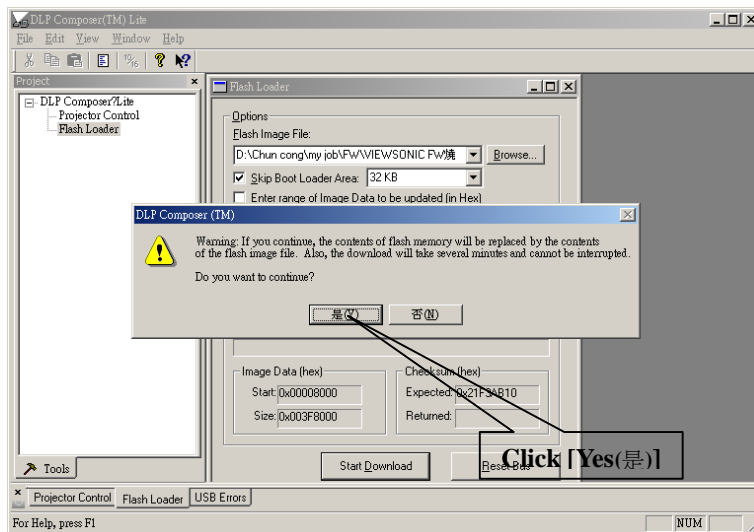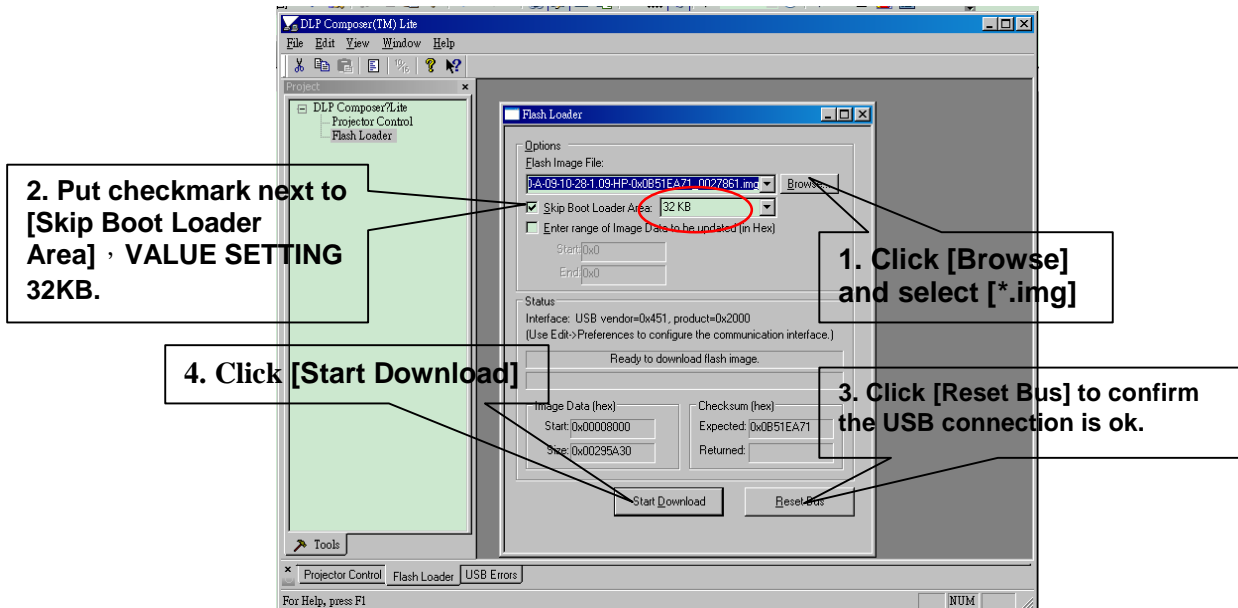
7

Operating procedure

1. Connect the Projector and PC via USB cable.

2. Double-click **[DLP Composer (TM) Lite].** The following screen will appear.

3. Select **[Edit]/[Preferences]/[Communications]** to check **USB** in **[Projector Interface]**.
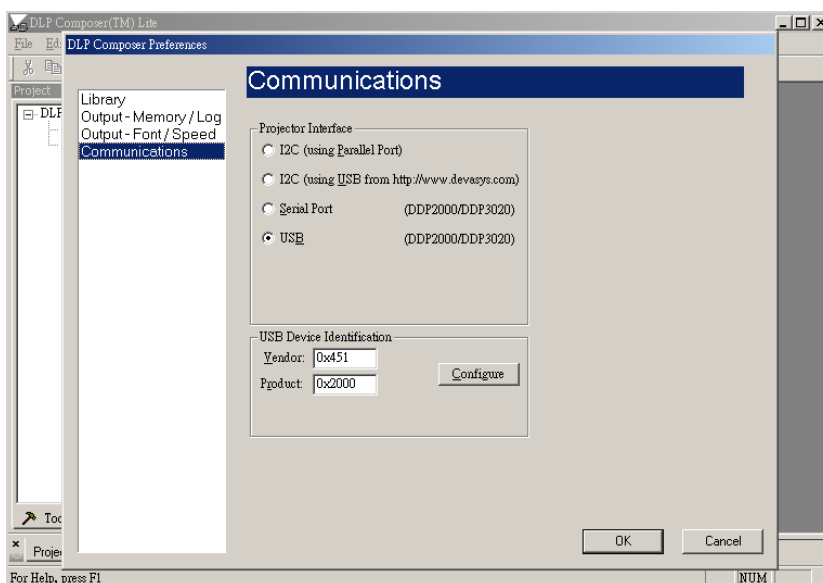
4. Click **[USB Device Identification].**
5. Set the items on the **[Vendor 0x451, Product 0x2000].**
6. Click **[OK]**
7. Move the cursor to **[Flash Loader]** on the Project window of **[DLP Composer Lite]**. (The **[Flash Loader]** screen will appear.)
8. Click **[Browse]** and select where the firmware **[xxxxxxxxx.img]** is for download.

9. Make sure **[Skip Boot Loader Area]** is with a check.

10. Press Menu and Power buttons constantly within ten seconds after insert the USB Burning Cable and power Cord. TEMP LED will become Red. That indicates the projector is in the download mode. At this moment, you can release these two buttons.

11. Click **[Reset Bus]** firstly to check if USB connects well.

12. Click **[Start Download]**. When the dialog box is displayed, click **[Yes]**.

2. Put checkmark next to [Skip Boot Loader Area]，VALUE SETTING 32KB.

1. Click [Browse] and select [*.img]

4. Click [Start Download]

3. Click [Reset Bus] to confirm the USB connection is ok.

Click [Yes(是)]

12. Wait for the Completion of upgrading, and then remove AC Adapter, Power Cord and upgrading cable.

9
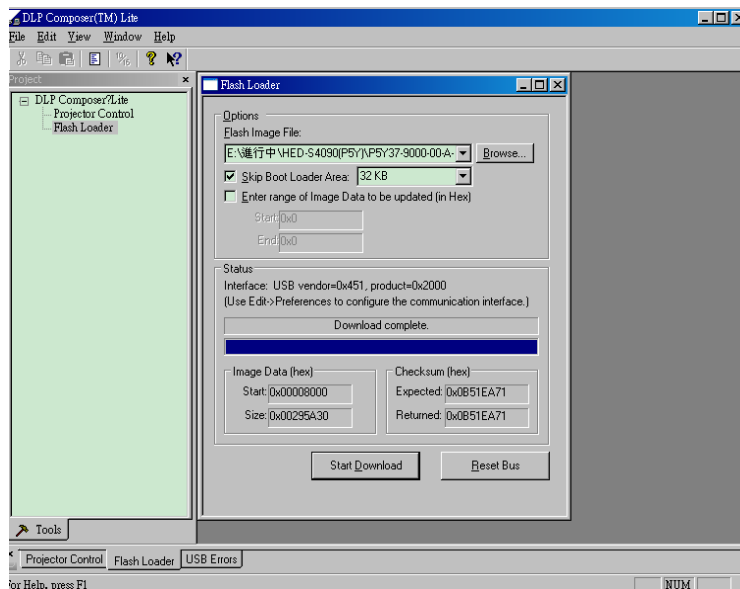
3 Machine Disassembly and Replacement

3.1 Tools
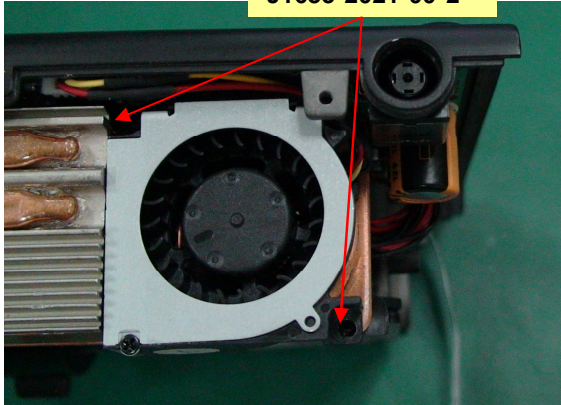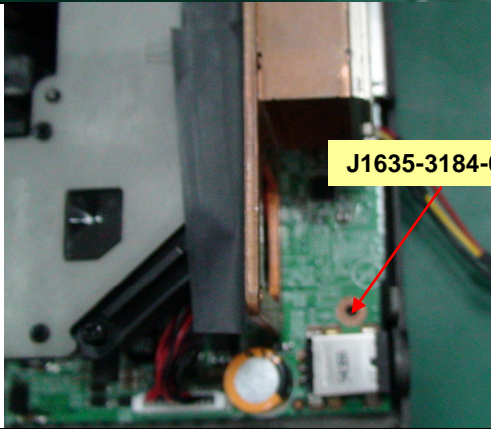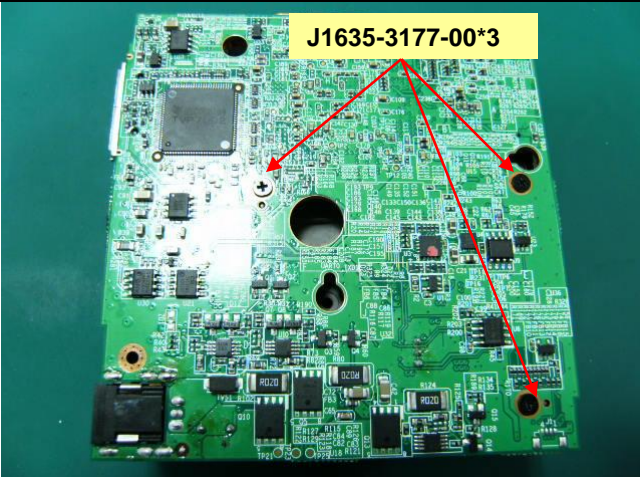
Item	Photo
Long Nose Nipper	
Nipper	
Screw Bit(+):2*5*40 Screw Bit(+):2*4*60	
Anti-static wrist strap	
Anti-static wrist gloves	
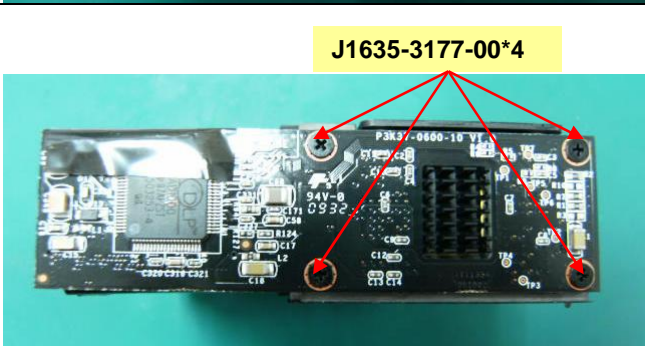
3.2 Disassembly Procedure

Warning

♦ Put on the Static Electricity Ring when starting for repair.

♦ Repair Environment suggest in Clean-room class 10000. Do not remove Optical Engine or DMD panel outside the clean room.
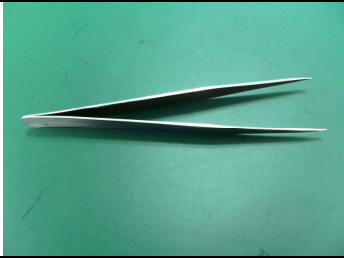
♦ While screwing or unscrewing screws, please keep the screwdriver straight. Keeping screwdriver inclined will damage the screw holes.

♦ Please turn off the power before replacing any parts.

♦

Step	Figure	Description
1		1. Press the power button to shutdown the projector and disconnect the AC Adapter and power cord.
2	**J1635-2684-00*2** **J1635-2684-00*2**	Loosen the screws J1635-2684-00*4 as shown.
3	**FFC Cable**	Raise the top cover gently and disconnect the keypad FFC between the top cover and main board.

4	**J1635-3177-00*3**	Loosen the three screws J1635-3177-00*3 for moving Bottom Cover.
5	**J1635-2021-00*2**	Loosen the three screws J1635-2021-00*2 to remove the DC Fan J2394-0103-00.
6	**J1635-3184-00*1**	Loosen J1635-3184-00*1.
7	**J1635-3177-00*3**	1. Loosen J1635-3177-00*3. 2. Remove all the wires on the Main board. 3. Remove Main board.

8	J1635-2687-00*2	Loosen screws J1635-2687-00*2 to remove the Focus-ring.
9	J1635-3177-00*4	Loosen the four screws J1635-3177-00*4 to remove the DMD board.

3.3 Mechanical Drawing

1. Front Cover

2. Top Cover

3. Back Cover

4. Focus Ring

6. Optical Engine

7. Fan

5. DMD Board

8. OE Fan

9. Main Board

10. Bottom Cover

11. Rear Foot
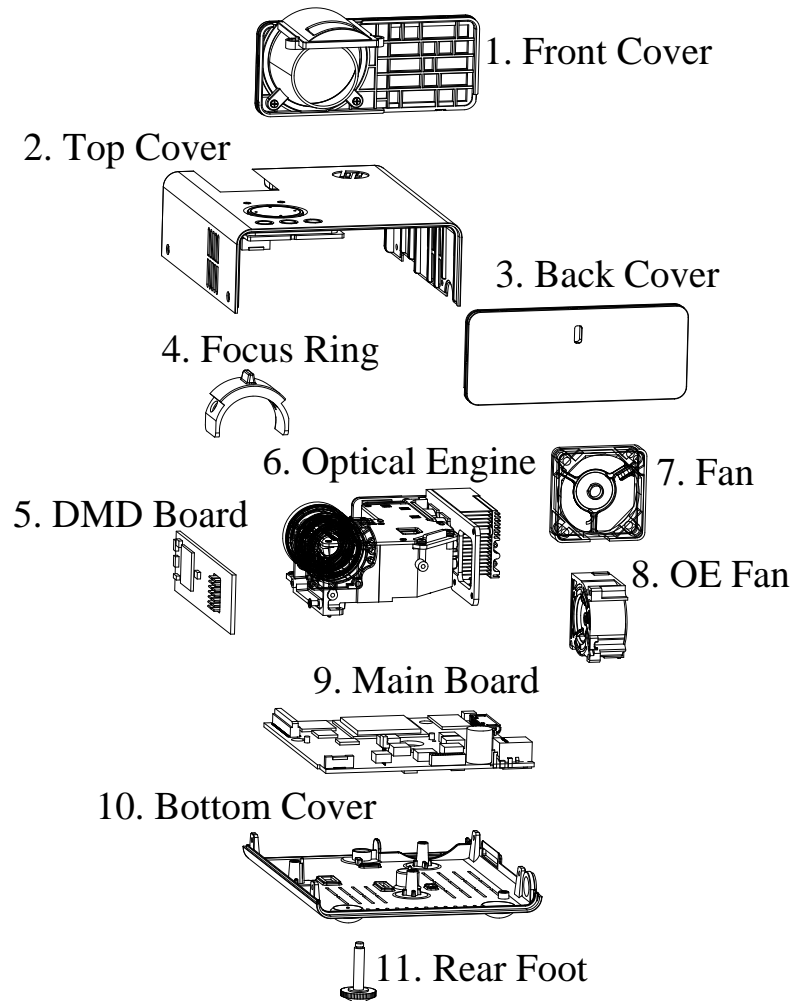
4 Troubleshooting and Verifying the Repair

This chapter provides technicians and people who have an electronic background a primary description about maintaining the product.   Moreover, you can get the appropriate operation to solve some complicated problems of component repairing and professional problems.

4.1 Troubleshooting
Warning:

Do not directly look into the lens to avoid eyesight damages.

The projector is equipped with ventilation holes (intake) and ventilation holes (exhaust). Do not block or place anything near these slots. Or internal heat build-up may cause picture degradation or damaging the projector.

Confirm Software and hardware

(1) Confirm FW version.
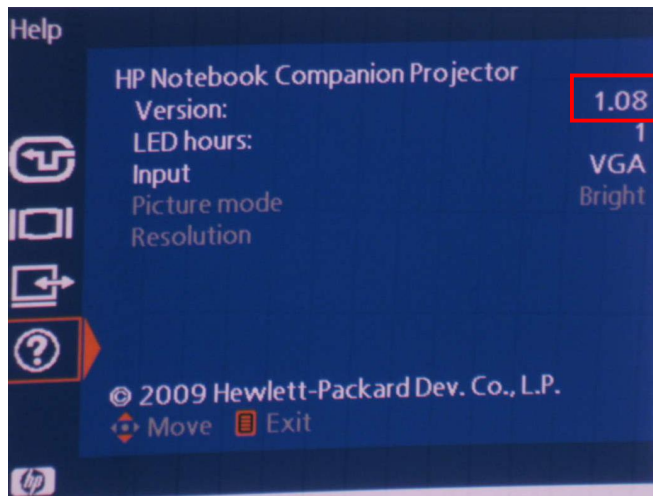
Note: This FW version is just for reference.

(2) Confirm LED indicator.

Status / Problems	LED indicators	
	STATUS	**TEMP**
Standby	Green flash	Off
Power on	Green	Off
Cooling	Green flash	Off
Fan 1 error	Green flash	Red flash
Fan 2 error	Green flash	Red flash
Over Temperature error	Green flash	Red

(3) Confirm cable connection well.

Power Source Troubleshooting

No Power Source after turning on

↓

Check AC socket and connector —NG→ Replace AC socket

OK ↓

Check LED and keypad FPC —NG→ Replace keypad PFC

OK ↓

Check Main board and power cable —NG→ Replace power cable

OK ↓

Replace Main board

Fan failure after turning on

↓

Check Fan connection —NG→ Reconnect fan

OK ↓

Check Fan —NG→ Replace fan

OK ↓

Check Main board —NG→ Replace Main board
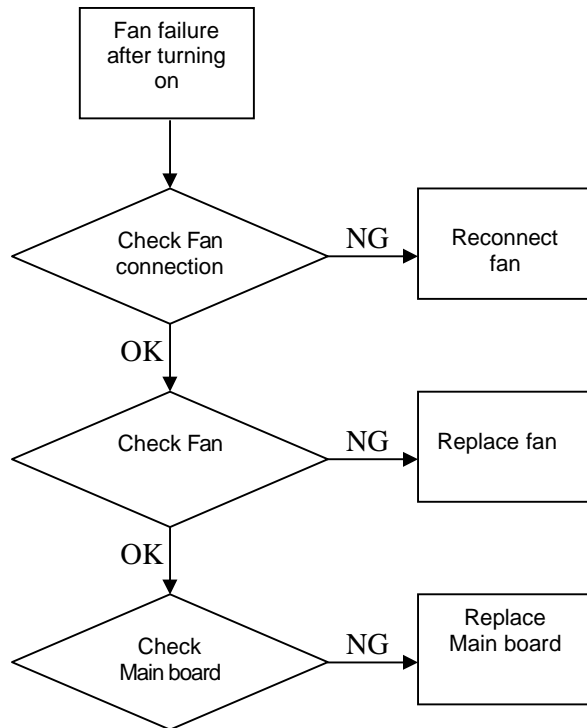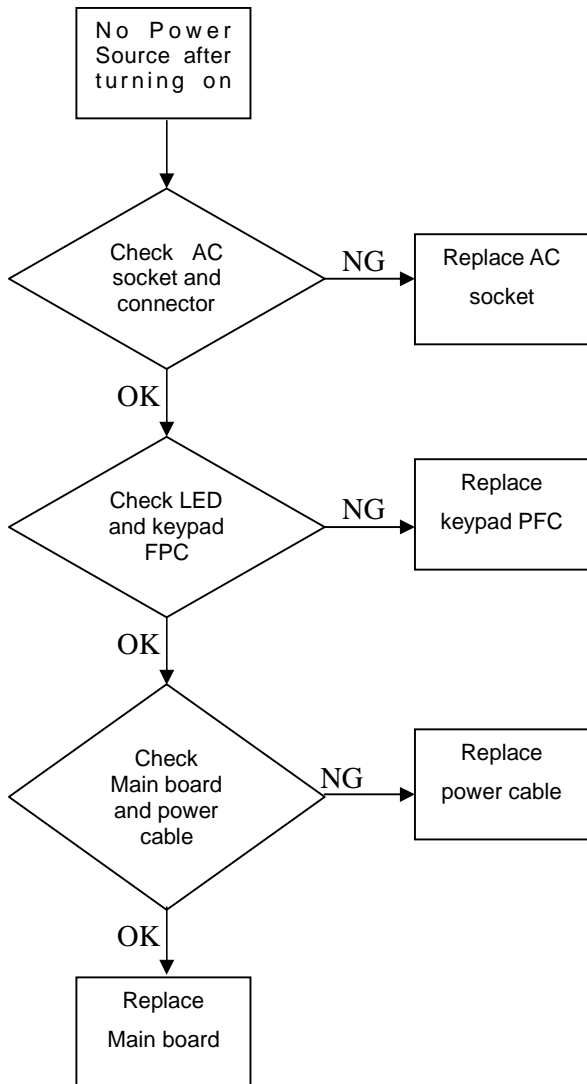
Video Signal Troubleshooting

Left flowchart:

Computer No Signal
↓
Check Source → NG → Turn on source
↓ OK
Check Cable → NG → Replace Cable
↓ OK
Check DMD board → NG → Replace DMD board
↓ OK
Check Main board → NG → Replace Main board
↓ OK
Check Optical Engine → NG → Replace Optical Engine

Right flowchart:

Video No Signal
↓
Check Source → NG → Turn on source
↓ OK
Check Cable → NG → Replace Cable
↓ OK
Check DMD board → NG → Replace DMD board
↓ OK
Check Main board → NG → Replace Main board
↓ OK
Check Optical Engine → NG → Replace Optical Engine

```
┌──────────┐                                    ┌──────────┐
│  Image   │                                    │  Color   │
│ abnormal │                                    │ abnormal │
└────┬─────┘                                    └────┬─────┘
     │                                               │
     ▼                                               ▼
  ╱────────╲                                     ╱────────╲        ┌──────────┐
 ╱ Power on ╲                                   ╱ Check    ╲  NG   │ Adjust   │
╱  again and ╲                                 ╱ input cable ╲────▶│  Input   │
╲ reset OSD  ╱                                 ╲ and signal  ╱     │  Signal  │
 ╲          ╱                                   ╲  setting   ╱     └──────────┘
  ╲────────╱                                     ╲────────╱
     │ OK                                            │ OK
     ▼                                               ▼
  ╱────────╲        ┌──────────┐                 ╱────────╲        ┌──────────┐
 ╱ Check    ╲  NG   │ Adjust   │                ╱ Check    ╲  NG   │ Replace  │
╱ input cable╲────▶│  Input   │               ╱  DMD board ╲────▶│ DMD board│
╲ and signal ╱      │  Signal  │               ╲           ╱      └──────────┘
 ╲  setting  ╱      └──────────┘                ╲────────╱
  ╲────────╱                                        │
     │ OK                                           ▼
     ▼                                          ╱────────╲        ┌──────────┐
  ╱────────╲        ┌──────────┐               ╱ Check    ╲  NG   │ Replace  │
 ╱ Check    ╲  NG   │ Replace  │              ╱ Main board ╲────▶│Main board│
╱ DMD board  ╲────▶│ DMD board│              ╲           ╱      └──────────┘
╲           ╱       └──────────┘               ╲────────╱
 ╲────────╱                                         │ OK
     │ OK                                           ▼
     ▼                                          ╱────────╲        ┌──────────┐
  ╱────────╲        ┌──────────┐               ╱ Check    ╲  NG   │ Replace  │
 ╱ Check    ╲  NG   │ Replace  │              ╱  Optical   ╲────▶│ Optical  │
╱ Main board ╲────▶│Main board│              ╲   engine   ╱      │  engine  │
╲           ╱       └──────────┘               ╲────────╱        └──────────┘
 ╲────────╱
     │ OK
     ▼
  ╱────────╲        ┌──────────┐
 ╱ Check    ╲  NG   │ Replace  │
╱  Optical   ╲────▶│ Optical  │
╲   engine   ╱      │  engine  │
 ╲────────╱         └──────────┘
```

Operation Function Troubleshooting

```
                    ┌─────────────┐
                    │   Button    │
                    │   Failure   │
                    └──────┬──────┘
                           │
                           ▼
                    ╱───────────╲          ┌─────────────┐
                   ╱   Check      ╲   NG    │  Replace    │
                  ╱  Keypad and    ╲───────▶│ Keypad and  │
                   ╲     FFC       ╱        │    FFC      │
                    ╲─────┬───────╱         └─────────────┘
                    OK    │
                          ▼
                    ╱───────────╲          ┌─────────────┐
                   ╱   Check      ╲   NG    │  Replace    │
                  ╱               ╲────────▶│             │
                   ╲  Main board  ╱         │  Main board │
                    ╲───────────╱           └─────────────┘
```
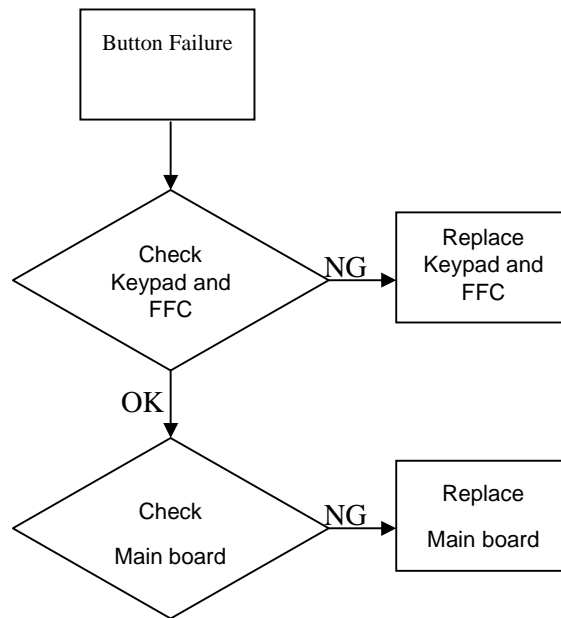
4.2 Verifying the Repair

After repairing projector (Dissembling and assembling projector), Repair center should verify

the quality of repaired unit. Here is a general guide for all repaired model. That means if the

projector is without S-Video port, repair center can skip the portion of S-Video verification.

(1) Signal test (Each I/O can function normally)

Connect all connector to the jacks one after the other to check whether each channel can project

normally.

I/O port	Monitor In (VGA)
Test Equipment	Standard Pattern generator (Ex. Quantum data)
Signal format	800*600 60Hz

I/O port	Video
Test Equipment	Standard Pattern generator (Ex. Quantum data) or DVD player
Signal format	NTSC

(2) Operation test

Button description	Test criteria
Power	1. Mechanical motion (Up & Down) should be free from getting stuck when pressing the button. 2. Press "power" button and projector will switch on.
Menu &Enter	1. Mechanical motion (Up & Down) should be free from getting stuck when pressing the button. 2. Press Menu &Enter button can make projector function normally.
4-way button (Auto/Source)	1. Mechanical motion (Up & Down) should be free from getting stuck when pressing the 4-way button. 2. Press Menu/Enter button can make projector function normally.

Focus ring

Ring	Test criteria
Focus ring	The feeling of rotating Focus ring to the end of right and left by hand should free from seizing.

(3) Image Quality
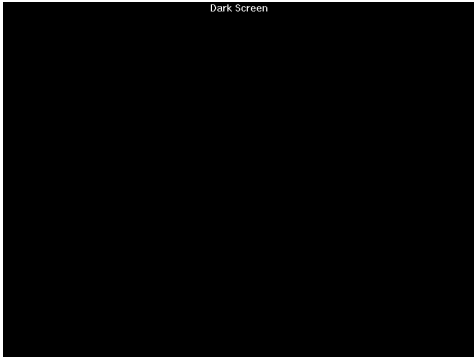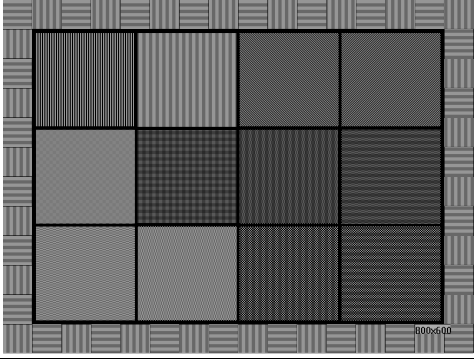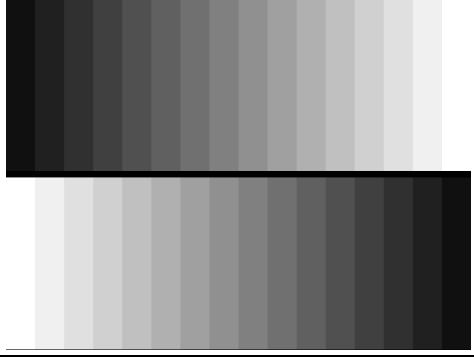
Operate in a dark room (don't allow any impurity light.)< 0.5lux.

Set Keystone to "0" (OFF)

VGA

I/O port	Monitor In (VGA)
Test Equipment	Standard Pattern generator (Ex. Quantum data)
Signal format	800*600 60Hz
Projected image size	30" in diagonal length

Test Pattern	Test criteria
	Full white Apparent color strip, bend and streak corner on the projected image are not allowable.

Dark Screen	**Full darkness** Light leak in active area and colorific light leak in inactive area are not allowable.
	Twelve Grids Press "AUTO" button, more than three twinkling grids are not allowable. (It allows to press "AUTO" less than four times.)
	16 Gray Level 16 level of gray level color should be distinguishable and no defection.
	Gray 10 1. The quantity of blemish in the active area should be less than four pieces and the diameter of it should be less than 1.5"(about 3.81cm). 2. Any bright pixel is not allowable in the active area,but one bright pixel in the POM(Pond of Mirror) area is acceptable. 3. Can't see any leak pixel in the active area.
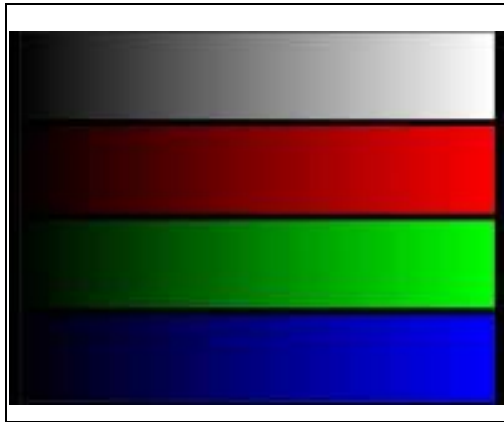
	256 level RGB --256 level of RGB color should be distinguishable, at least Red color scales should be. -- For each RGB 256 levels, Noise or color deviation in R, G, and B single level respectively are acceptable.

Video

I/O port	Video
Test Equipment	Standard Pattern generator (Ex. Quantum data)&DVD player
Criteria	No apparent color deviation on the projected image

(4) Resolution

I/O port	VGA
Test Equipment	PC
Test Method	1. Rotate Zoom ring to wide mode (Maximum projected image) 2. Fix projector to set diagonal length of projected image to 25". 3. Adjust focus ring to make resolution of 4 corners and center are balanced. 4. Check he characters should be recognized easily. 5. Rotate Zoom ring to tele mode (Minimum projected image) 6. Adjust focus ring to make resolution of 4 corners and center are balanced. 7. Check the characters should be recognized easily.

5   Color Temperature Calibration

Warning:

①   Operate LED Calibration in a dark room (don't allow any light.)<0.5lux

②   Projected image size: 30 inches.

③   The CL-200 is $1.2\pm0.1m$ far from projector. And the drop for measurement is the center of projected screen.

④   Computer for operation must be Window XP or more advanced.

5.1 Setup Tool/Equipment

1. Computer

2. USB upgrading cable and extended USB cable
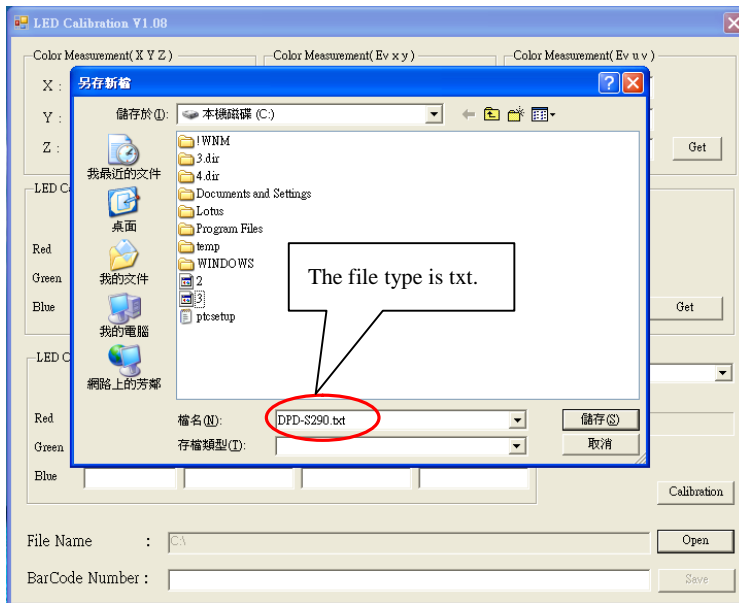
3. Power Cord and AC Adaptor

4. CL-200

5.2 Upgrading Procedure

1. Turn on Projector more than 10 minutes.

2. Connect the Projector and Computer via USB upgrading cable. Connect CL-200 and Computer via RS-232 cable.

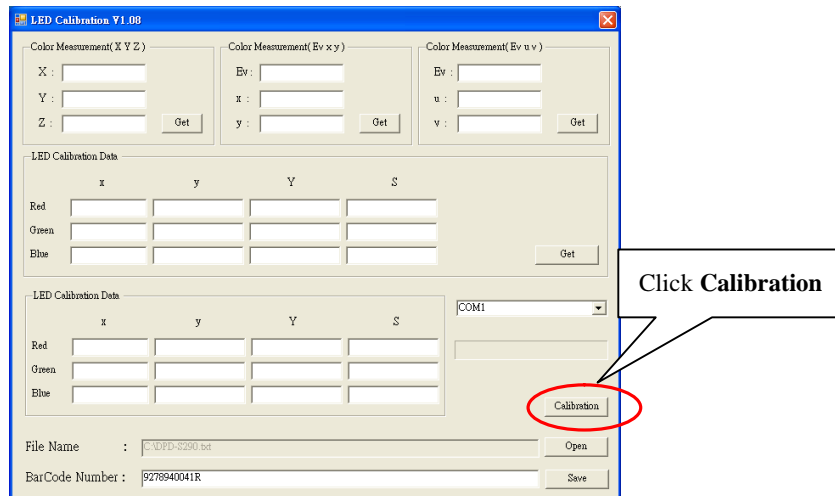3. Double-click **[LED Calibration]**. The following screen will appear.

4. Press **[Open]** to set the saving path and saving file for calibration d ata.
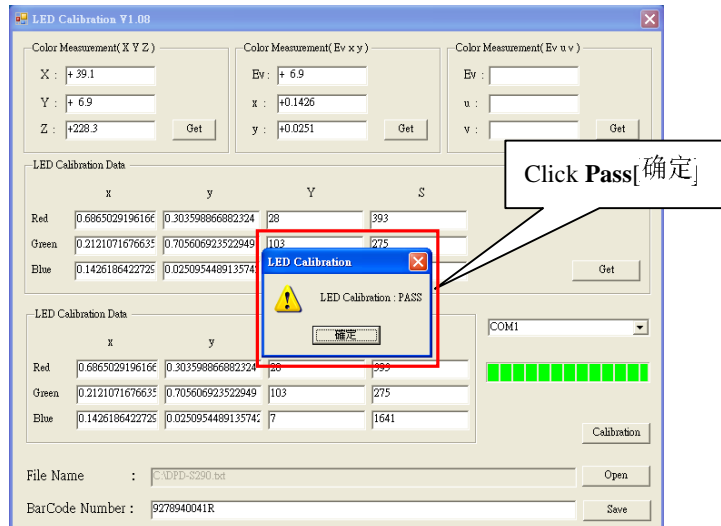
The file type is txt.

5. Input the Bar Code number of projector, then click **[Calibration]** to start Color Temperature Calibration automatically.

Click **Calibration**

6. The dialog box as below indicates calibration has completed.

Click **Pass**[确定]

7. Click **Pass[**确定].

8. Ensure the data of calibration is as same as the projector 's. If not, please calibrate again.
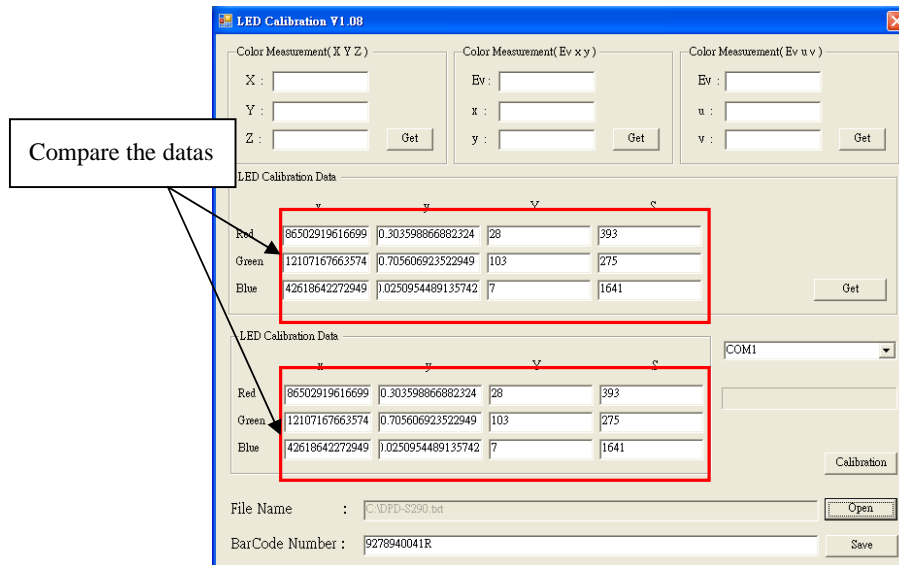
9. Turn off the projector normally. Don 't cut off the power until it goes out.

6 Connector Information

This section provides each connector location on boards and function of each board. They will be useful for your detecting the defective boards.

6.1 Main Board

Connector	Description
J2	DC-IN
J4	Fan 2
J5	Fan 1
J6	FFC Cable (to keypad)
J8	DMD board
P1	I/O port

7 Spare Parts list

Introduction

   This section is a list of all the FRU removal. Following the FRU table of contents is an enlarged view of the entire projector, which shows the primary FRUs in the projector.
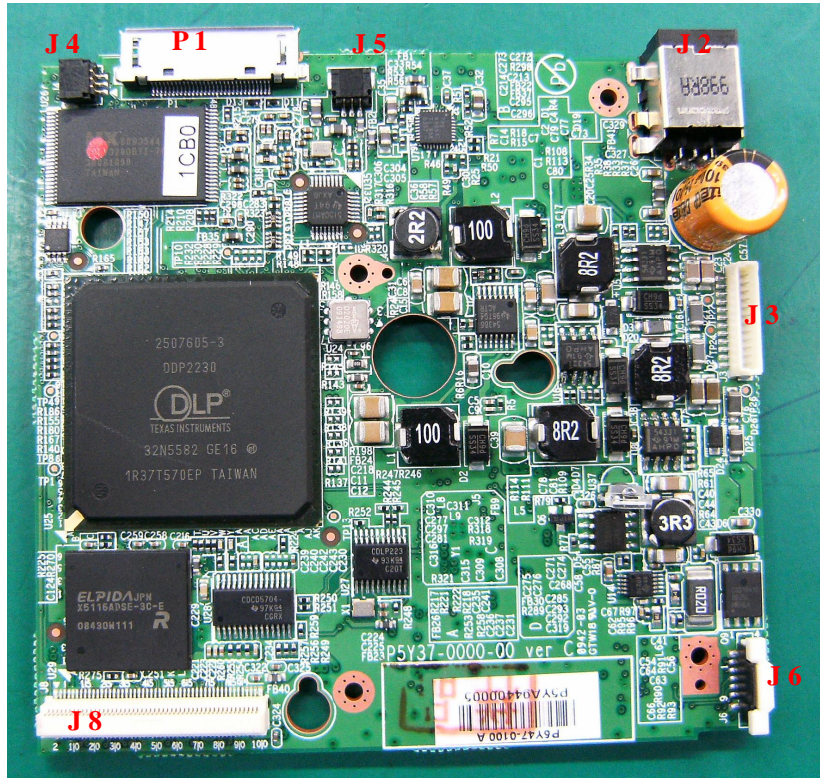
   When working on the projector, use appropriate anti-static precautions such as anti-static mats, wrist straps and grounded work surfaces. Failure to do this can destroy static-sensitive components and make the product inoperable.

7.1 Board/Module

P/N	Desc.
P5Y84-7100	MAIN_DIP_PCB_ASY_SPARE PARTS_HED-S4090_ROHS
P5Y84-7200	DMD BOARD_DIP_PCB_ASY_SPARE PARTS_HED -S4090_ROHS
P5Y84-7400	KEYPAD BOARD_DIP_PCB_ASY_SPARE PARTS_HED -S4090_ROHS

7.2 Case/Cover/Bracket Assembly

P/N	Desc.
P5Y84-4500	TOP COVER SPARE PARTS_HED -S4090_ROHS
P5Y84-4510	BOTTOM COVER SPARE PARTS_HED -S4090_ROHS
P5Y84-4520	FRONT COVER SPARE PARTS_HED -S4090_ROHS
P5Y84-4530	BACK COVER SPARE PARTS_HED -S4090_ROHS
P5Y34-4520-00	FOCUS-RING_HED-S4090_DEFAULT_NO PAINTING_ROHS

7.3 Optical Device

P/N	Desc.
P5Y84-2200	OPTICAL ENGINE MODULE_WITH LED_SPARE PARTS_HED -S4090_ROHS
P5Y84-6200	LENS ASY_SPARE PARTS_HED -S4090_ROHS

7.4 Fans

P/N	Desc.
J2394-0133-00	DC FAN_1004KL-04W-BX0-B50 (L=30MM)_NMB_ROHS
J2394-0134-00	DC FAN_BFB0312HB-8A89(R00)(L=45MM)_DELTA_ROHS

7.5 Wire

P/N	Desc.
J2591-0094-00	FFC CABLE_A10110C3344NB_ENTERY_0.5PITCH_10PIN_L110MM_ROHS
J2595-0455-00	WIRE ASSY_CON-CON_1102003-275_MSK_ROHS

Appendix A: Computer Compatibility

Mode	Resolution	fH (kHz)	fV (Hz)
VGA	640 x 480	31.47 kHz	59.94 Hz
VGA	640 x 480	37.86 kHz	72.81 Hz
VGA	640 x 480	37.50 kHz	75.00 Hz
VGA	640 x 480	43.27 kHz	85.01 Hz
SVGA	800 x 600	35.16 kHz	56.25 Hz
SVGA	800 x 600	37.88 kHz	60.32 Hz
SVGA	800 x 600	48.08 kHz	72.19 Hz
SVGA	800 x 600	46.88 kHz	75.00 Hz
SVGA	800 x 600	53.67 kHz	85.06 Hz
XGA	1024 x 768	48.36 kHz	60.00 Hz
XGA	1024 x 768	56.48 kHz	70.07 Hz
XGA	1024 x 768	60.02 kHz	75.03 Hz
XGA	1024 x 768	68.68 kHz	85.00 Hz
SXGA	1152 x 864	63.85 kHz	70.01 Hz
SXGA	1152 x 864	67.50 kHz	75.00 Hz
SXGA	1280 x 960	60.00 kHz	60.00 Hz
SXGA	1280 x 1024	63.98 kHz	60.02 Hz

Appendix B: Video Compatibility

NTSC-M, NTSC-4.43
· PAL-M,N,B,D,G,H,I
· SECAM

Signal	Horizontal Frequency (kHz)	Vertical Frequency (Hz)
480i	15.734 kHz	60 Hz
480p	31.469 kHz	60 Hz
576i	15.625 kHz	50 Hz
576p	31.25 kHz	50 Hz
720p	45.0 kHz	60 Hz
720p	37.5 kHz	50 Hz
1080i	33.75 kHz	60 Hz
1080i	28.125 kHz	50 Hz