TOSHIBA

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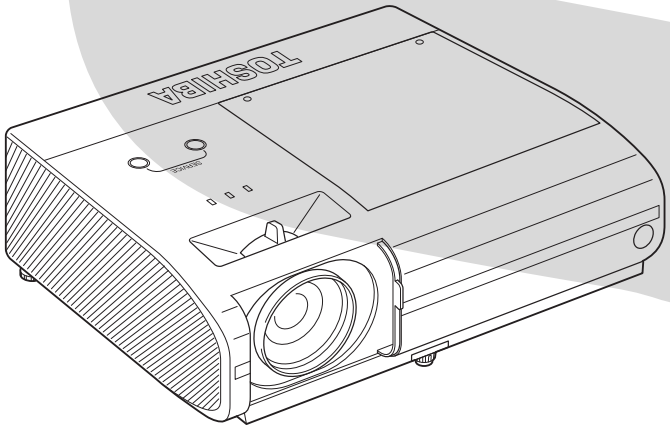
Rev.01

SERVICE MANUAL

DLP PROJECTOR

TDP-ST20E,TDP-ST20B



The above models are classified as green product (s) (*1), as indicated by the underlined serial number (s).
This Service Manual describes replacement parts for green product (s). When repairing any green product (s), use the parts described in this manual and lead-free solder (*2).
For (*1) and (*2) , see the next page.

Published in Japan, August 2007 GREEN

(*1) GREEN PRODUCT PROCUREMENT

The EC is actively promoting the WEEE & RoHS Directives that define standards for recycling and reuse of Waste Electrical and Electronic Equipment and for the Restriction of the use of certain Hazardous Substances. From July 1, 2006, the RoHS Directive will prohibit any marketing of new products containing the restricted substances.

Increasing attention is given to issues related to the global environmental. Toshiba Corporation recognizes environmental protection as a key management tasks, and is doing its utmost to enhance and improve the quality and scope of its environmental activities. In line with this, Toshiba proactively promotes Green Procurement, and seeks to purchase and use products, parts and materials that have low environmental impacts.

Green procurement of parts is not only confined to manufacture. The same green parts used in manufacture must also be used as replacement parts.

(*2) LEAD-FREE SOLDER

This product is manufactured using lead-free solder as a part of a movement within the consumer products industry at large to be environmentally responsible. Lead-free solder must be used in the servicing and repair of this product.

WARNING

This product is manufactured using lead free solder.

DO NOT USE LEAD BASED SOLDER TO REPAIR THIS PRODUCT !

The melting temperature of lead-free solder is higher than that of leaded solder by 86°F to 104°F (30°C to 40°C). Use of a soldering iron designed for lead-based solders to repair product made with lead-free solder may result in damage to the component and or PCB being soldered. Great care should be made to ensure high-quality soldering when servicing this product — especially when soldering large components, through-hole pins, and on PCBs — as the level of heat required to melt lead-free solder is high.

Table of Contents

Specifications

■ List of general specifications

Item		Specification
Consumption Power		385 W
Weight		4.2 kg
External Dimensions (including protruding parts)		338 × 127 × 268 mm (W × H × D)
Cabinet material		PC+ABS resin and ABS resin
Conditions for usage environment		Temp: 5°C to 35°C; relative humidity: 30% to 70%
Display pixels		1 DLP® chip
Picture elements		786,432 pixels (1024H × 768V)
Lens		F=2.63 f=8.37 mm
Lamp		High-pressure mercury lamp (275 W)
Projection screen size		40-100 inches
Projection distance		580 mm – 1501 mm
Connection terminal	COMPUTER IN terminal	Mini D sub 15 pin RGB / Y/PB/PR (dual use)
	S-VIDEO terminal	Mini DIN 4 pin
	VIDEO terminal	RCA Pin Jack, 1 V (p-p), 75Ω
	CONTROL terminal	D sub 9 pin (RS-232C)

Notes

- This model complies with the above specifications.
- Designs and specifications are subject to change without notice.
- This model may not be compatible with features and/or specifications that may be added in the future.

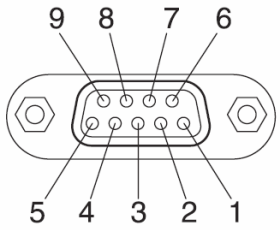
■ Separately sold product

Replacement Lamp for TDP-ST20 Model TLPLW15

Specifications (Continued)

■ CONTROL terminal

● Pin assignment



D sub 9 pin connector

Pin No.	Signal Name	Description
1	DCD	Data carrier detect
2	RXD	Receiving data
3	TXD	Sending data
4	DTR	Data terminal ready
5	GND	Signal ground
6	DSR	Data set ready
7	RTS	Request to send
8	CTS	Consent to send
9	RI	DC 9V OUTPUT

● Interface format

1 Communication method: RS-232C, 9600bps, No Parity, Data Length: 8 bits; Stop Bit Length: 1 bit

2 Communication format: STX (02h) | Command (3Byte) | ETX (03h)

Only 1 command valid per communication.

3 Data format: For input commands, only ASCII-compliant all-uppercase alphanumeric characters supported.

4 Replies

Acknowledge: ACK (06h) | CR (0Dh) | Data ... Normally ended

ACK (06h) | ESC (1Bh) ... Aborted

No acknowledge: NAK (15h)

If commands are to be sent consecutively, wait for the response from the projector before sending the next command.

● Main Commands

Item	Command
Power on	**PON**
Power off	**POF**
Icon display on	**MO0**
Icon display off	**MO1**
Auto setting (RGB input)	**PAT**
Status display on	**DON**
Status display off	**DOF**

Note

- Contact your dealer for control cable and other commands.

Using the Menus

You can call up on-screen menus, and conduct a number of adjustments and settings using the operation buttons on the remote control.

■ Setup using the Setting display

The menu shown below is for operation instructions purposes and might differ from the actual display.

1. Press the MENU button

Display the **Setting display** menu.

2. Select a Category

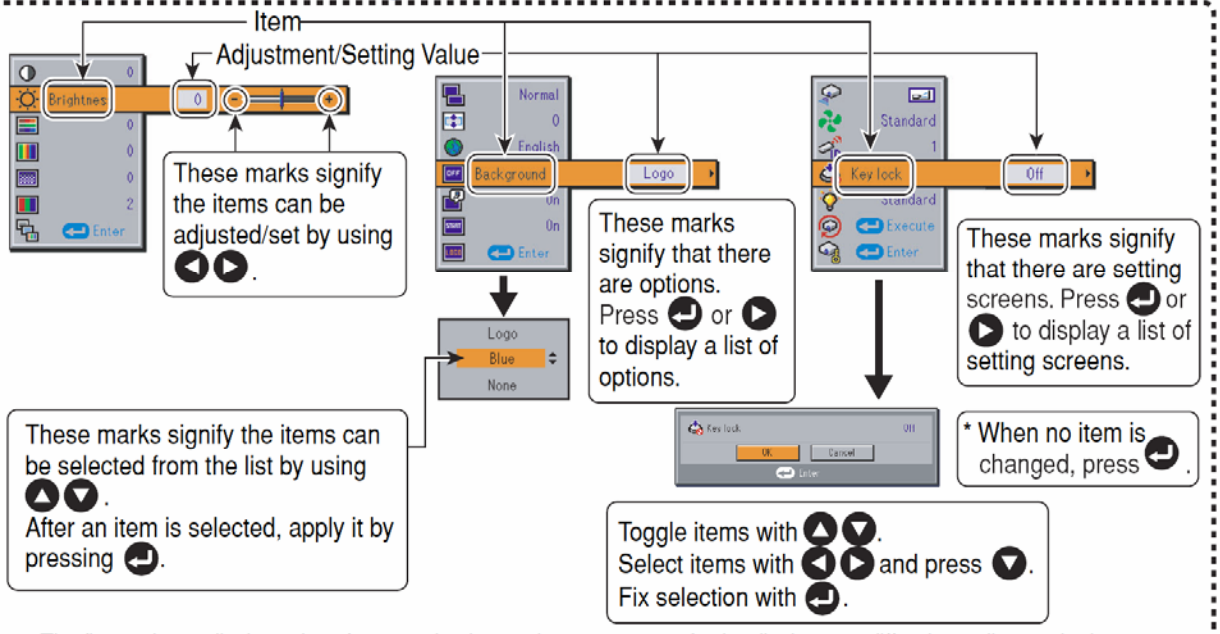
Select a category by using ◀▶.
There are following 6 categories:

- **Image adjustment** menu
- **Position adjustment** menu
- **Display setting** menu
- **Default setting 1** menu
- **Default setting 2** menu
- **Status display** menu

Displays the current adjustments and settings of selected category.
Item shown with gray cannot be adjusted with the current input source.

3. Adjustments & Settings

Press ↵ or ▼ to open the menu.

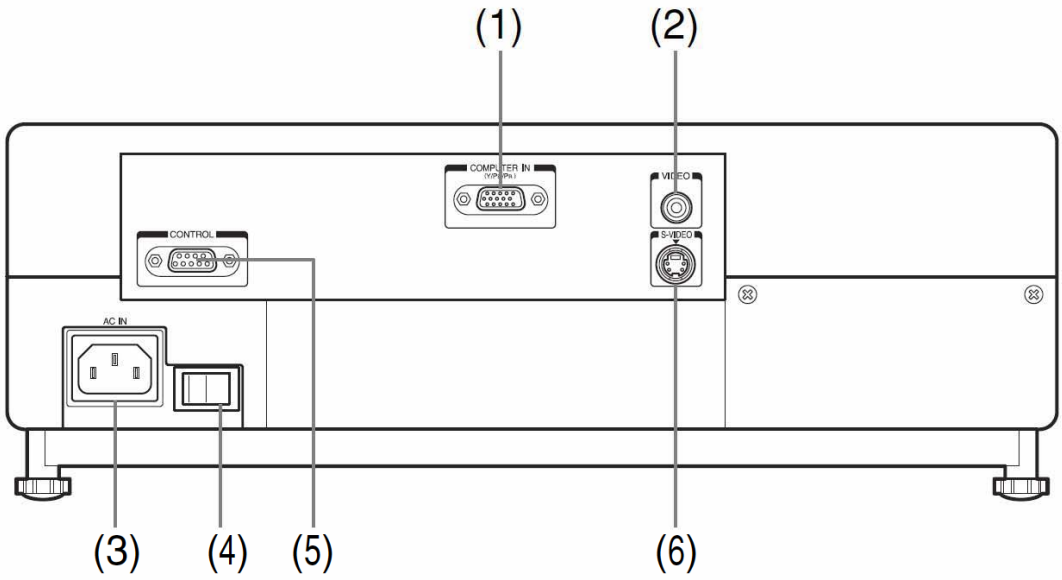


- The figure shows displays given for operation instructions purposes. As the display may differ depending on the item, use the following pages as a reference.
- To return to previous item, press the RETURN button.

4. End

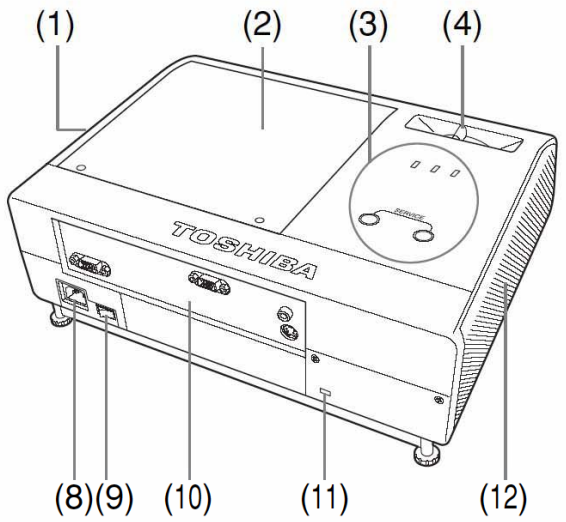
Press the MENU button once more.
(The menu will disappear automatically after 30 seconds, if no operation is conducted.)

Names of the Terminals on the Rear Panel

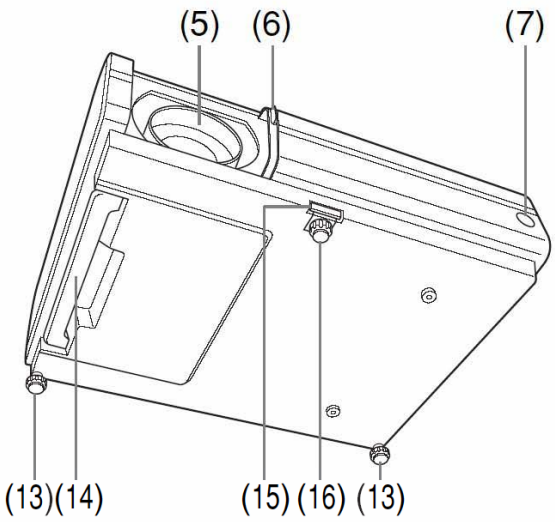


Name	: Main Function
1) COMPUTER IN terminal	: Input RGB signal from a computer or other source, or a component video signal (Y/P_B/P_R) from video equipment.
2) VIDEO terminal	: Input video signals from video equipment.
3) AC IN socket	: Connects the supplied power cord here.
4) Main power switch	: AC power line ON (standby)/OFF.
5) CONTROL terminal	: When operating the projector via a computer, connect this to the controlling computer's RS-232C port.
6) S-VIDEO terminal	: Input S video signals from video equipment.

Names of each part on the main unit



Back

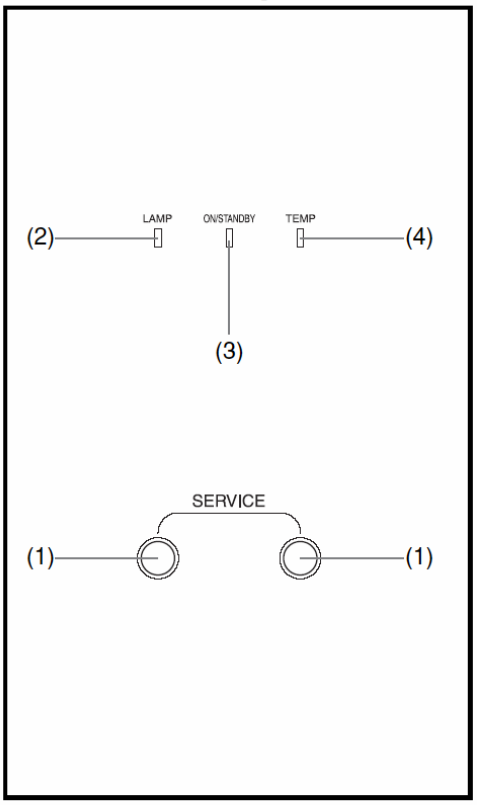


Front

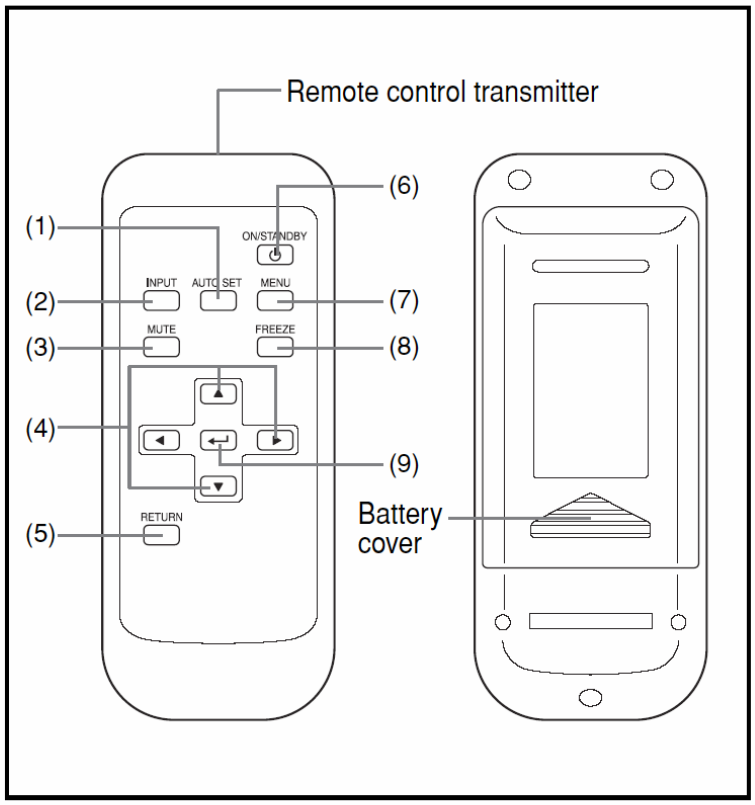
	Name	: Function
(1)	Air exhaust	: Expels air that has grown hot inside the projector.
(2)	Lamp cover	: Remove to replace lamp.
(3)	Control panel	: Consists of indicators and service buttons.
(4)	Focusing lever	: Adjusts screen focus.
(5)	Lens	: Projects expanded image.
(6)	Lens cover	: Slide shut when not using the projector to protect the lens.
(7)	Infrared remote sensor	: Senses commands from the remote control.
(8)	AC IN socket	: Connect the supplied power cord here.
(9)	Main power switch	: AC power line ON (standby)/OFF.
(10)	Terminals on the rear panel	: Connects external devices.
(11)	Antitheft lock hole	: Attach a safety cable or any other antitheft device.
(12)	Air intake	: Draws in air from outside the projector for internal cool down.
(13)	Tilt adjuster	: Adjusts the projector's horizontal tilt.
(14)	Handle	: Hold to carry the projector by pulling out.
(15)	Foot adjuster release button	: Press to set up or stow the foot adjuster.
(16)	Foot adjuster	: Adjusts the vertical projection angle.

Names of each part on the control panel and remote control

Control panel



Remote Control



Name	: Main Function

Control panel

(1)	SERVICE button	: Available only for service purpose.
(2)	LAMP indicator	: Displays lamp mode.
(3)	ON/STANDBY indicator	: Displays whether power is on or off (standby).
(4)	TEMP indicator	: Lights when internal temperature is too high.

Remote control

(1)	AUTO SET button	: Performs auto-adjustment of input signals from computer.
(2)	INPUT button	: Selects input.
(3)	MUTE button	: Cuts off the picture temporarily.
(4)	Selection button	: Menu selections and adjustments, etc.
(5)	RETURN button	: Goes back one screen.
(6)	ON/STANDBY button	: Turns the power on/off (standby).
(7)	MENU button	: Displays menus.
(8)	FREEZE button	: Pauses image.
(9)	ENTER button	: Accepts the selected mode.

Note

- For the remainder of this manual, buttons are referred to as follows:
  Selection buttons ⇒ ▲ ▼ ◀ ▶; ENTER button ⇒ ↵

List of Supported Signals

■ List of supported signals (RGB signals)

This projector supports the following RGB signals. Note, however, that depending on the computer model, the screen may show flicker or streaking. Please adjust the projector if this happens.

Resolution	Mode	Refresh rate (Hz)	H-frequency (kHz)	Clock (MHz)
720 x 400	720x400_85	85.039	37.927	35.500
640 x 480	VGA_60	59.940	31.469	25.175
	VGA_72	72.809	37.861	31.500
	VGA_75	75.000	37.500	31.500
	VGA_85	85.008	43.269	36.000
800 x 600	SVGA_56	56.250	35.156	36.000
	SVGA_60	60.317	37.879	40.000
	SVGA_72	72.188	48.077	50.000
	SVGA_75	75.000	46.875	49.500
	SVGA_85	85.061	53.674	56.250
832 x 624	MAC16"	74.550	49.725	57.283
1024 x 768	XGA_60	60.004	48.363	65.000
	XGA_70	70.069	56.476	75.000
	XGA_75	75.029	60.023	78.750
	XGA_85	84.997	68.667	94.500
	MAC19"	74.700	60.134	79.857
1152 x 864	SXGA1_75	75.000	67.500	108.000
1280 x 960	QuadVGA_60	60.000	60.000	108.000
	QuadVGA_85	85.002	85.938	148.500
1280 x 1024	SXGA3_60	60.020	63.981	108.000
	SXGA3_75	75.025	79.976	135.000
	SXGA3_85	85.024	91.146	157.500
1400 x 1050	SXGA+	59.978	65.317	121.750
1600 x 1200	UXGA_60	60.000	75.000	162.000
	UXGA_65	65.000	81.250	175.500
	UXGA_70	70.000	87.500	189.000
	UXGA_75	75.000	93.750	202.500
	UXGA_85	85.000	106.250	229.500

Note

- Signals whose resolution exceeds the native resolution (1024 × 768 pixels) will be compressed. For this reason, some information may be lost, or image quality may be affected.

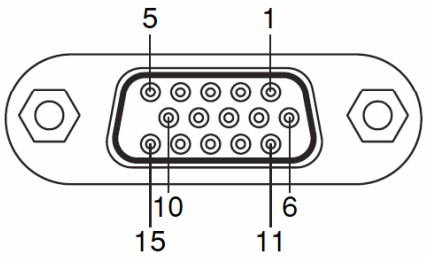
■ List of supported signals (Y/PB/PR signals)

Signal format	fh(kHz)	fv(Hz)
480i(525i)@60Hz	15.73	59.94
480p(525p)@60Hz	31.47	59.94
576i(625i)@50Hz	15.63	50.00
576p(625p)@50Hz	31.25	50.00
720p(750p)@60Hz	45.00	60.00
720p(750p)@50Hz	37.50	50.00
1080i(1125i)@60Hz	33.75	60.00
1080i(1125i)@50Hz	28.13	50.00
1080p(1125p)@60Hz	67.50	60.00
1080p(1125p)@50Hz	56.25	50.00

■ List of supported signals (Video, S-Video signals)

Video mode	fh(kHz)	fv(Hz)	fsc(MHz)
NTSC	15.73	60	3.58
PAL	15.63	50	4.43
SECAM	15.63	50	4.25 or 4.41
PAL-M	15.73	60	3.58
PAL-N	15.63	50	3.58
PAL-60	15.73	60	4.43
NTSC4.43	15.73	60	4.43

■ Pin assignment of COMPUTER IN terminal



Mini D sub 15 Pin connector

Input Signal
- RGB input
  RGB signals: 0.7V (p-p) 75 Ω
  Horizontal sync signal: TTL level (Pos/neg polarity)
  Vertical sync signal: TTL level (Pos/neg polarity)
- Y/PB/PR input
  Y signal: 1.0V (p-p) 75 Ω
  PB/PR signals: 0.7V (p-p) 75 Ω

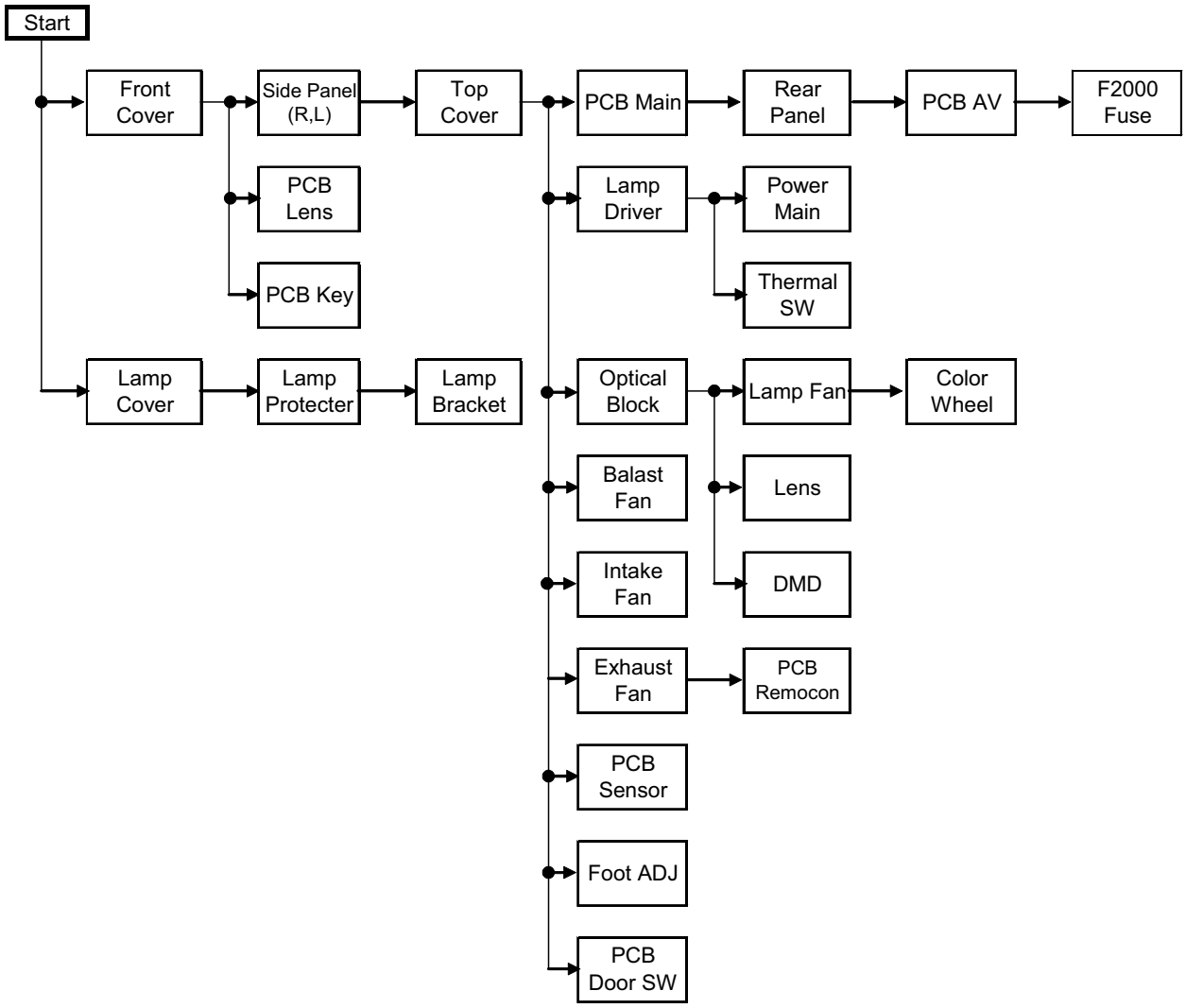
Pin No.	Pin description	
	During RGB input	During Y/PB/PR input
1	Video signal (R)	Color difference signal (PR)
2	Video signal (G)	Luminance signal (Y)
3	Video signal (B)	Color difference signal (PB)
4	GND	*
5	GND	*
6	GND (R)	GND (PR)
7	GND (G)	GND (Y)
8	GND (B)	GND (PB)
9	N.C	*
10	GND	*
11	GND	*
12	N.C	*
13	Horizontal sync signal	*
14	Vertical sync signal	*
15	N.C	*

* Do not connect anything.

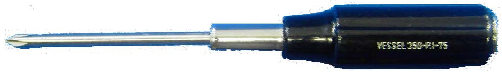
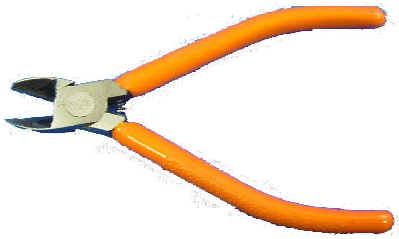
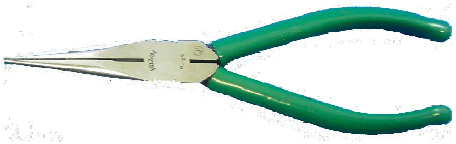
Replaceable Part Hierarchy

Replaceable Part Hierarchy

The flow chart below shows what parts must be removed to access each replaceable part in the projector.
The parts on the first level (Ex.Lamp cover) are accessible without removing any other parts.
The move levels down that a part is, the more parts you need to remove in order to access it.

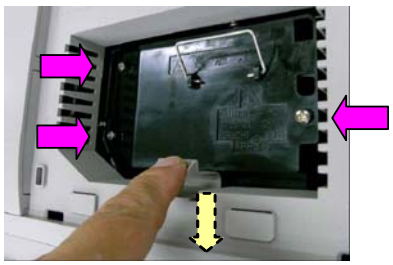


Required Tools

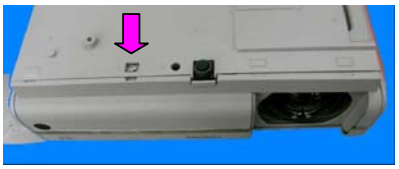
Item	Photo
Driver bit (+) No 2	
Box driver M3	
Driver bit (+) No 0	
Torque driver bit (+) No 2	
Nippers	
Cutting pliers	

Parts Replacement

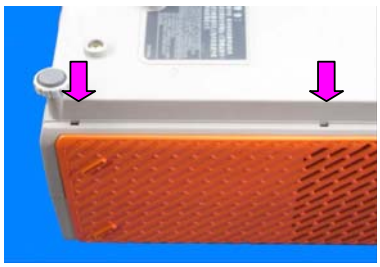
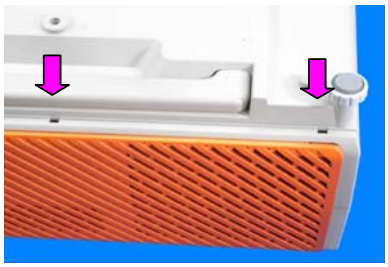
1.Lamp

No	Figure	Explanation
1		Remove two lamp cover screws.
2		Outer lamp cover is removed.
3		Remove a screw.
4		Inner lamp cover is removed.
5		Remove three lamp screws. Pull up the handle, and push the tab to remove the lamp.
6		Lamp is pulled out.

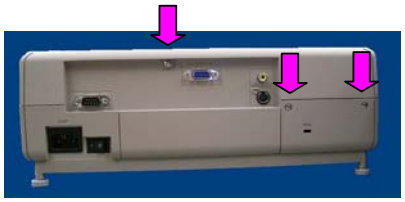
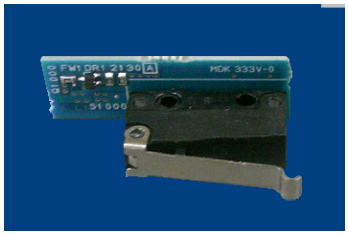
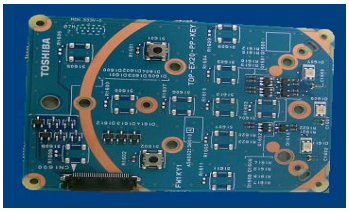
2.Front Cover

Step	Figure	Explanation
1		Remove a screw at the bottom.
2		Push these point, you will take off easy.
3		front cover is removed.
4	 	Front cover and Senser PCB are removed.

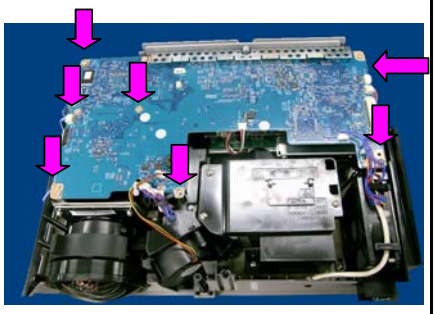
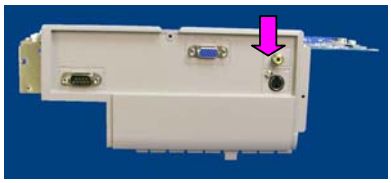
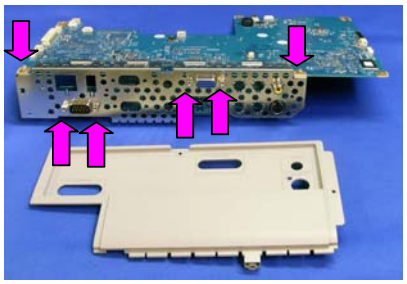
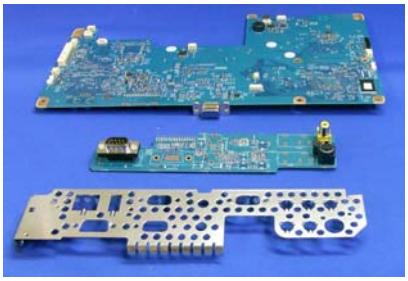
3.Side Cover

Step	Figure	Explanation
1		There are two small holes. Push the hook with minus driver.
2		Side Cover R is removed. [Note] Side Cover R is : There are 4 projections on the panel.
3		There are two small holes. Push the hook with minus driver.
4		Side Cover L is removed.

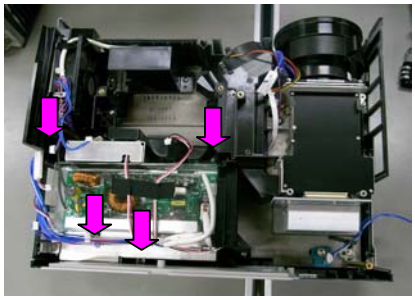
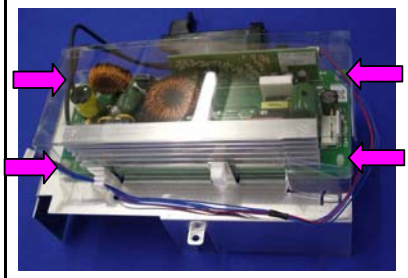
4.Top Cover

Step	Figure	Explanation
1		Remove three screws at the rear.
2	 	Remove two screws at the right side. Remove a screw at the left side.
3		Open the Top cover. [Note] Be careful of connection cabels.
4	  	Top cover is removed. Door switch is removed. Key PCB is removed.

5.Main Board

Step	Figure	Explanation
1		All the connectors on a main board unit are removed. Remove seven screws.
2		Main and AV PCBoard are removed with rear panel.
3		Remove a screw at the rear panel.
4		Rear panel is removed. Remove two screws on the main PCB. Remove four screws at the D-SUB connectors.
5		Main and AV PCBoard are removed.

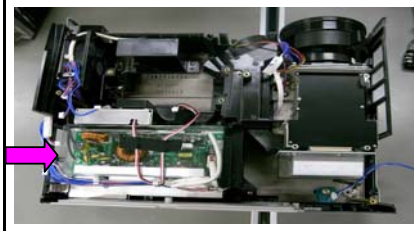
6.Balast Unit

Step	Figure	Explanation
1		Remove four screws.
2		Remove four plastic rivets.
3		
4		Balast is removed.

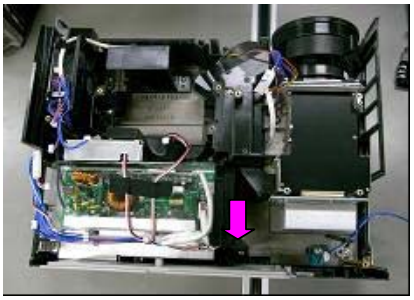
7.Main Power Unit

Step	Figure	Explanation
1		Remove two screws.
2		Main Power Unit is removed.

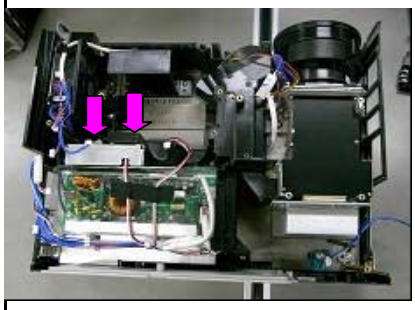
8.Exhaust Fan

1		Remove a screw.
2		
3		Remocon Reciever is removed.
4		Exhaust Fan is removed.

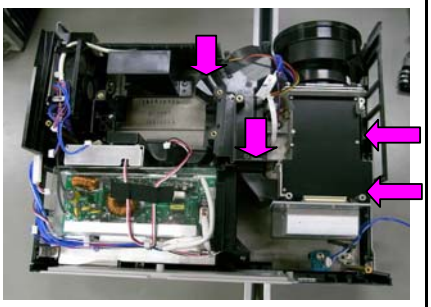
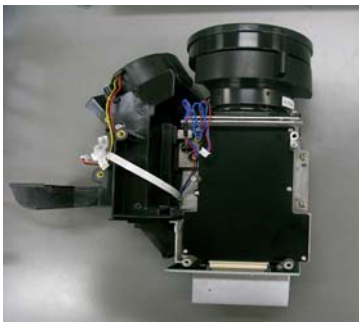
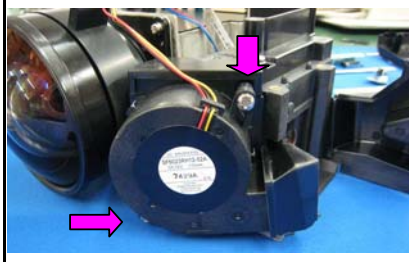
9.Intake Fan.

1		Remove a screw.
2		Intake Fan is removed.

10.Thermal Switch

Step	Figure	Explanation
1		Remove two screws.
2		Thermal Switch is removed.

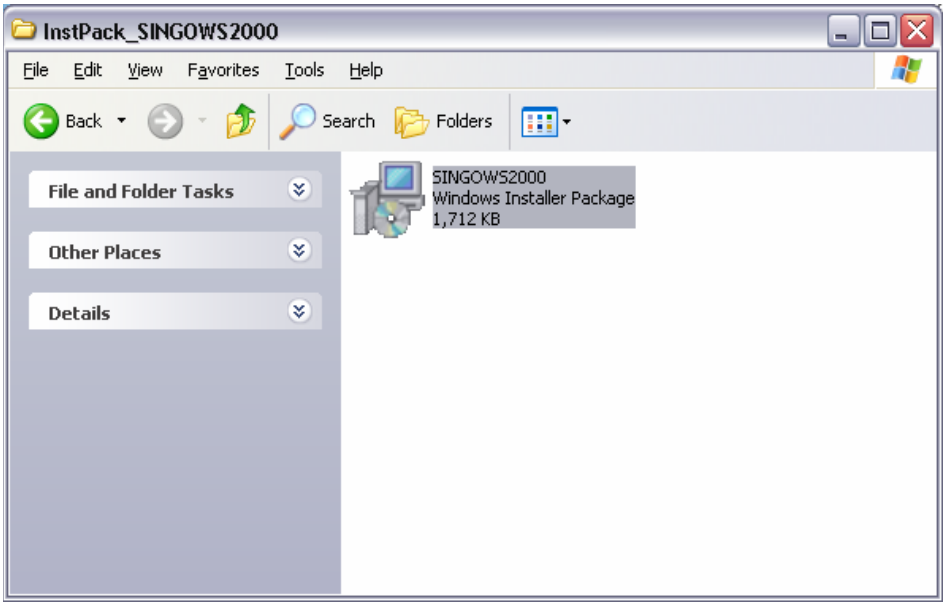
11.Optical Block

Step	Figure	Explanation
1		Remove four screws.
2		Optical Block is removed.
3		Remove two screws.
4		Lamp Fan is removed.

SINGOWS 2000

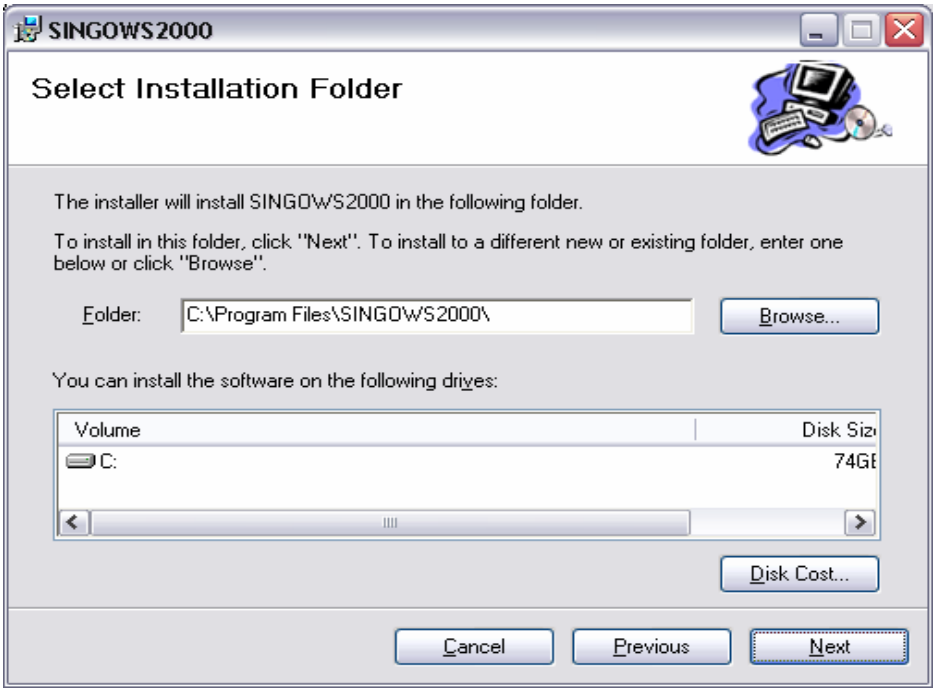
Install the Software on the Computer

The software you download is bundled into one .MSI file.
Double-click the file to install the signal generating software.

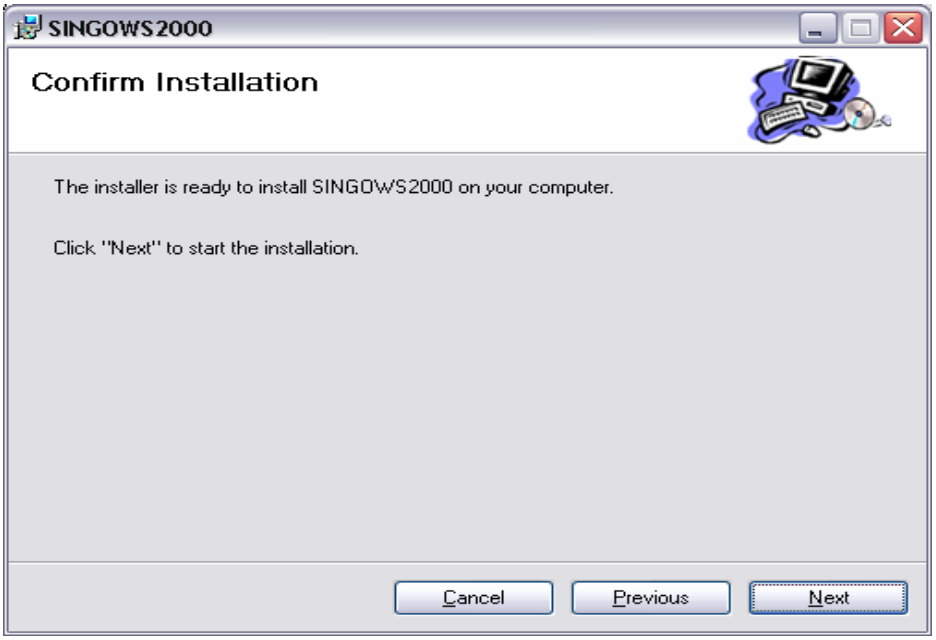


The Install Wizard appears,ready to begin the install process.
Click the next button.

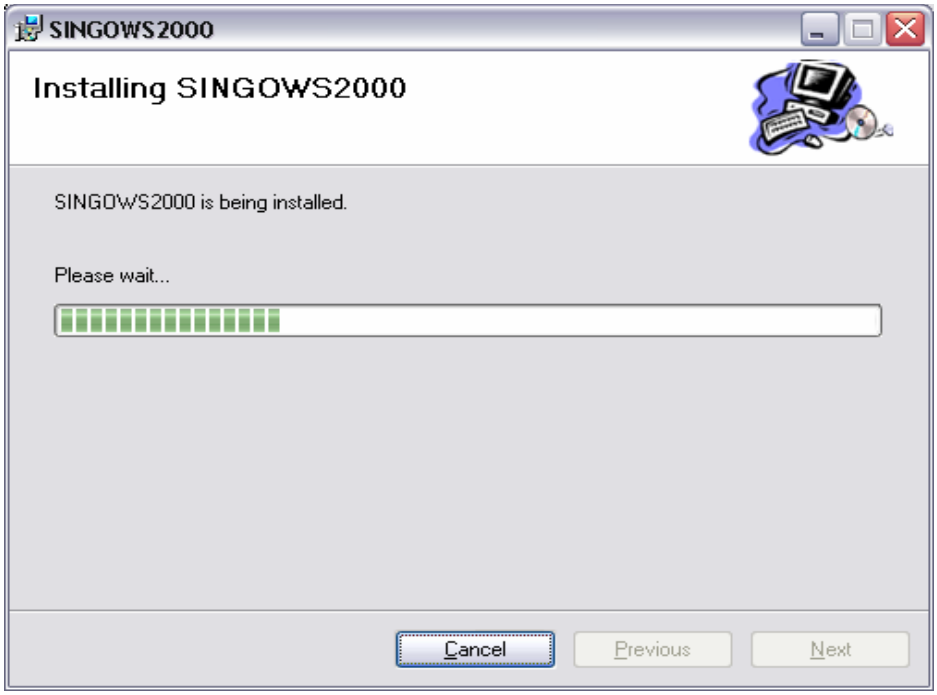
The Select Installation Folder dialog box appears.
Navigate to the location where you stored the software files.
Click the next button.



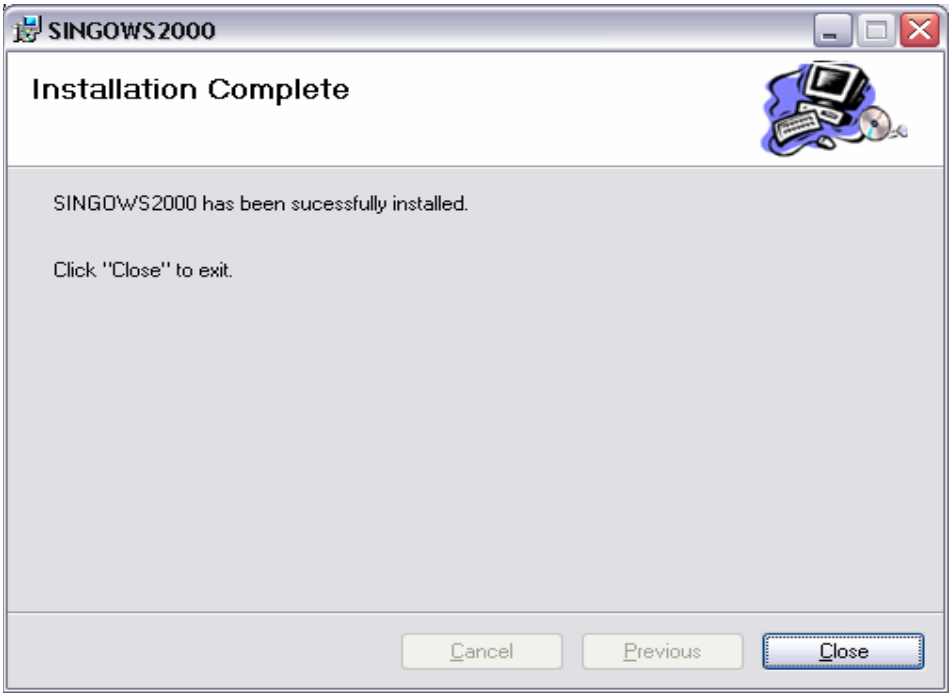
The confirm Installation dialog box appears.
Click the next button.



The Installing software dialog box appears.

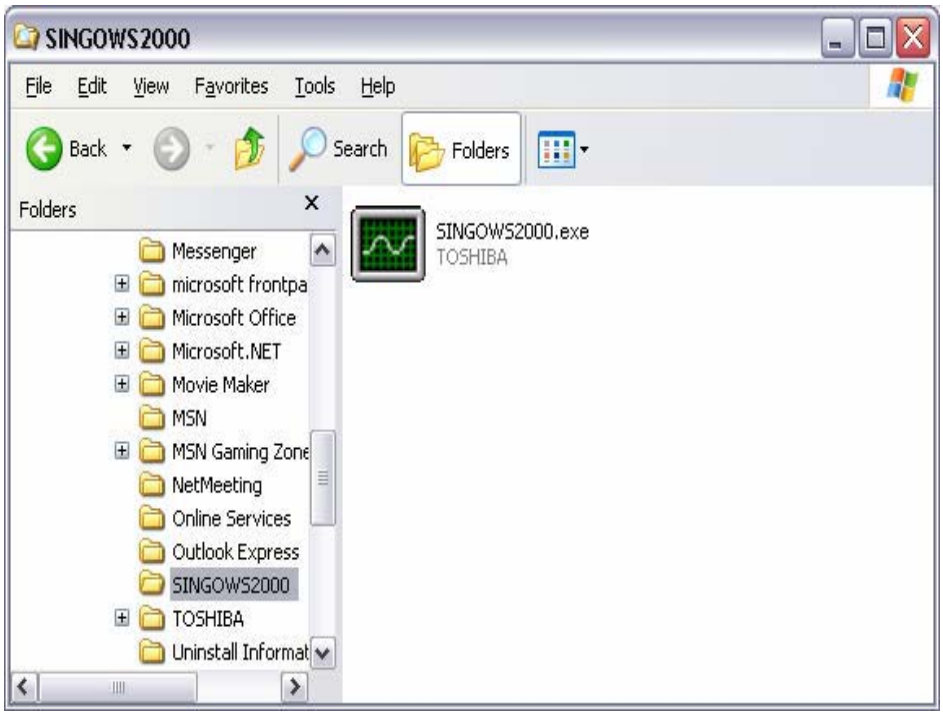


The Installation Complete dialog box appears.
Click the close button.

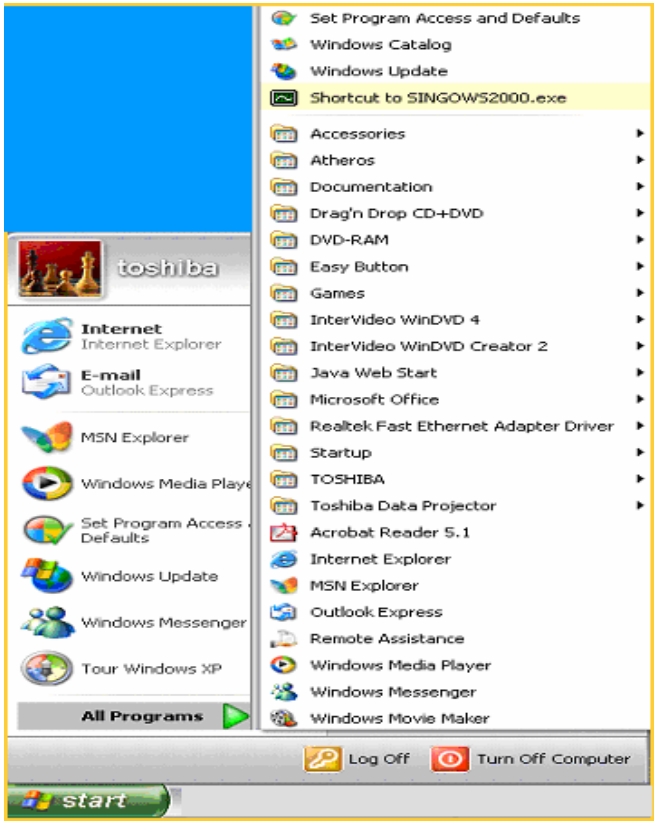


Startup the Software

Open Windows Exploler, navigate to the location where you stored the files, Then double click the **SINGOWS2000.EXE**.



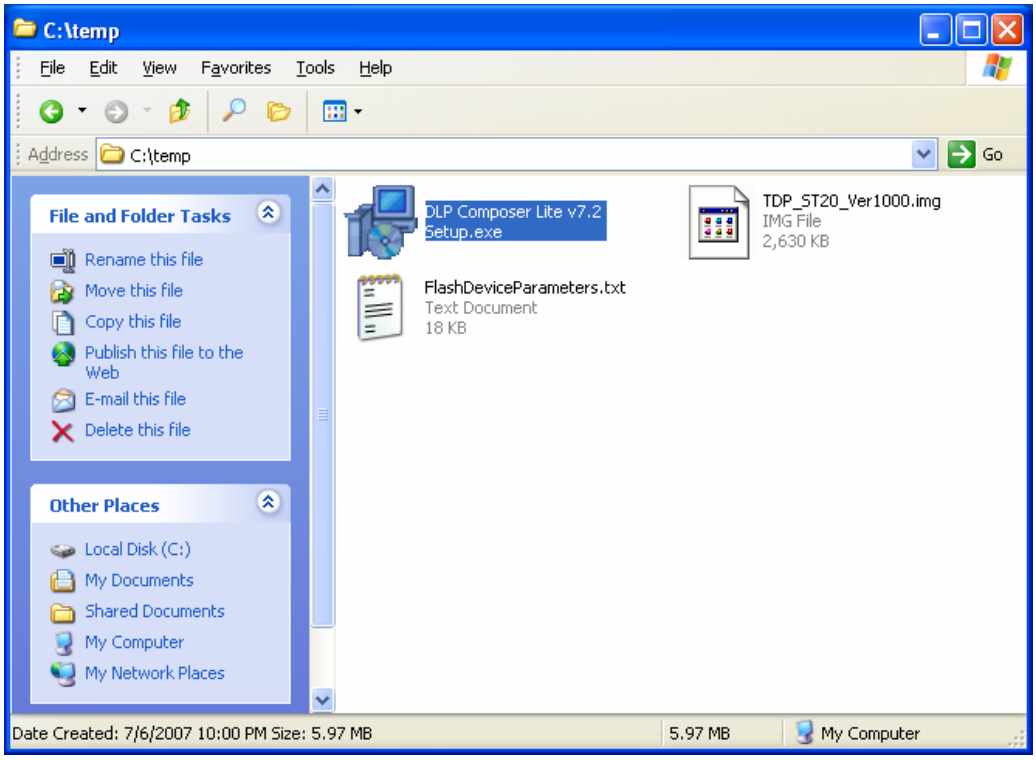
Moreover, even if it chooses the shortcut of the All programs of start, it can startup.



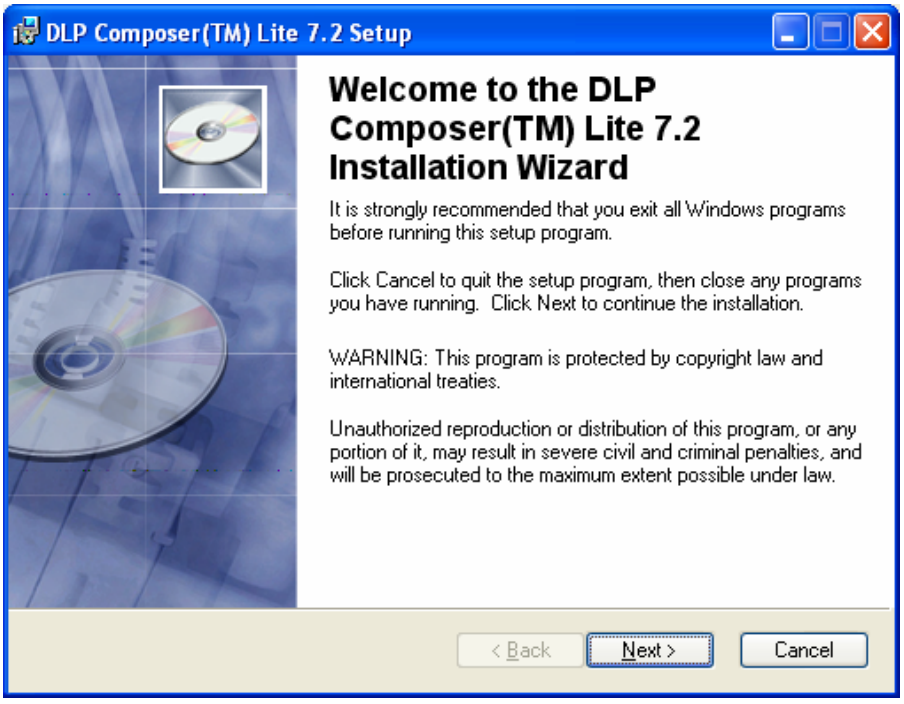
Firmware Upgrade

Install the Software on the Computer

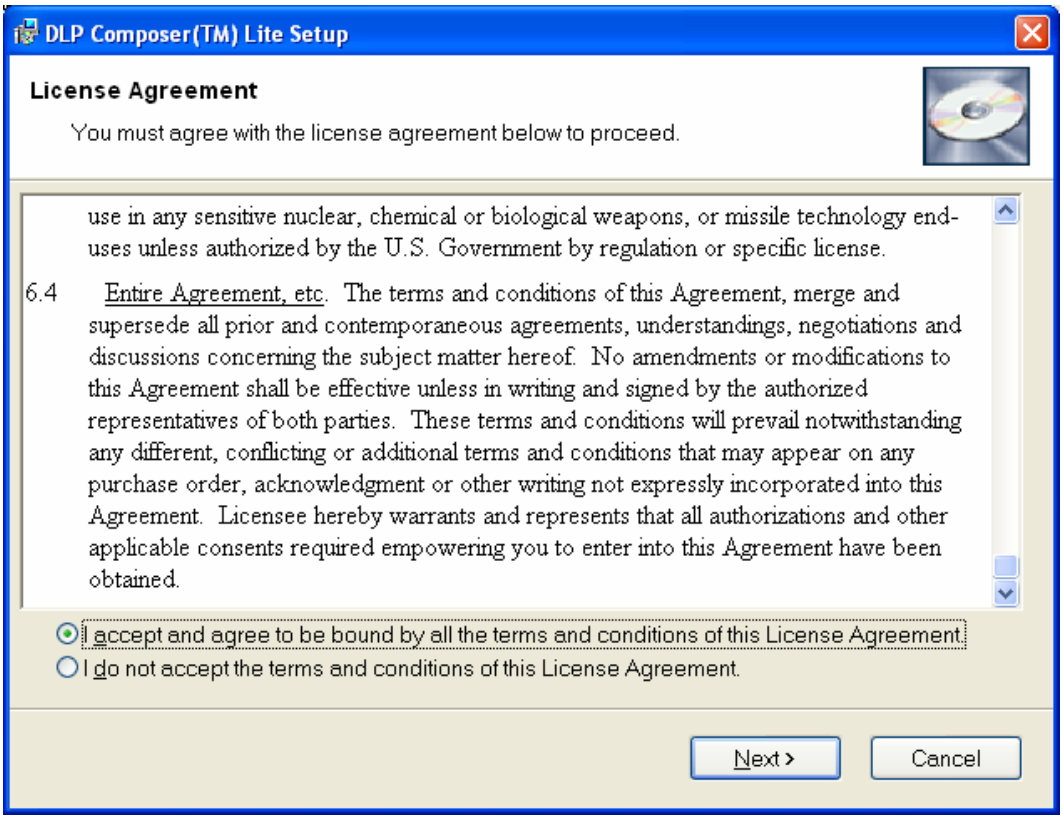
The software you download is bundled into setup.exe file.
Double-click the file to install the software.



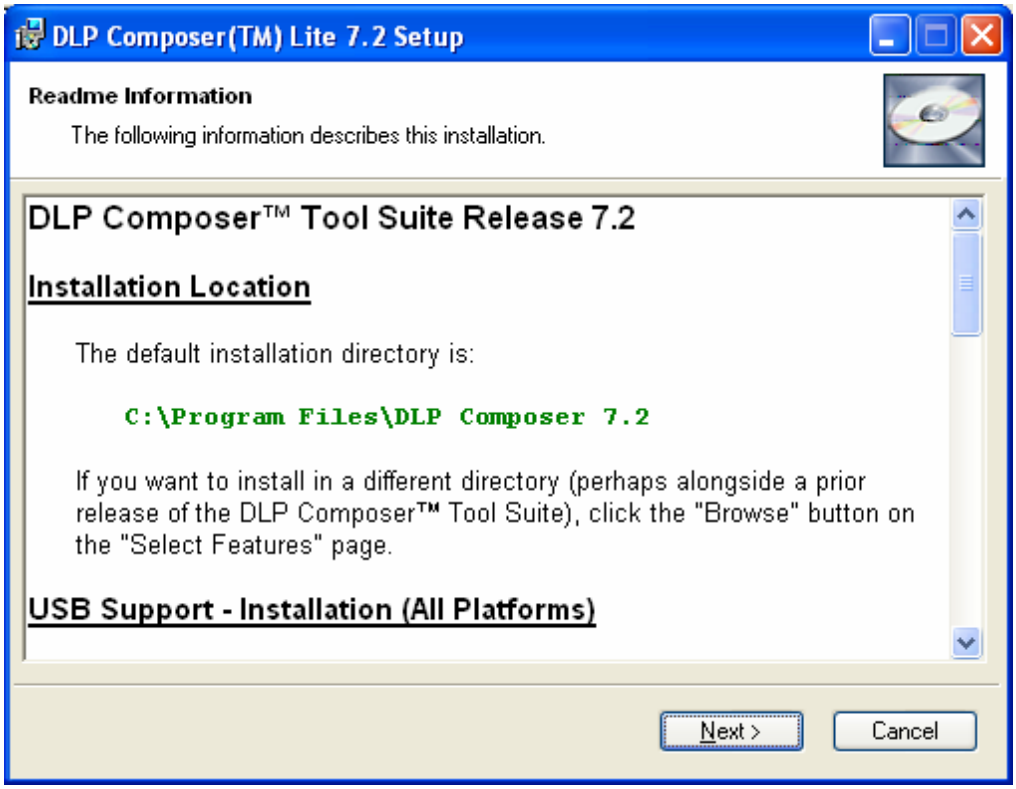
The Install Wizard appears, ready to begin the install process.
Click the next button.



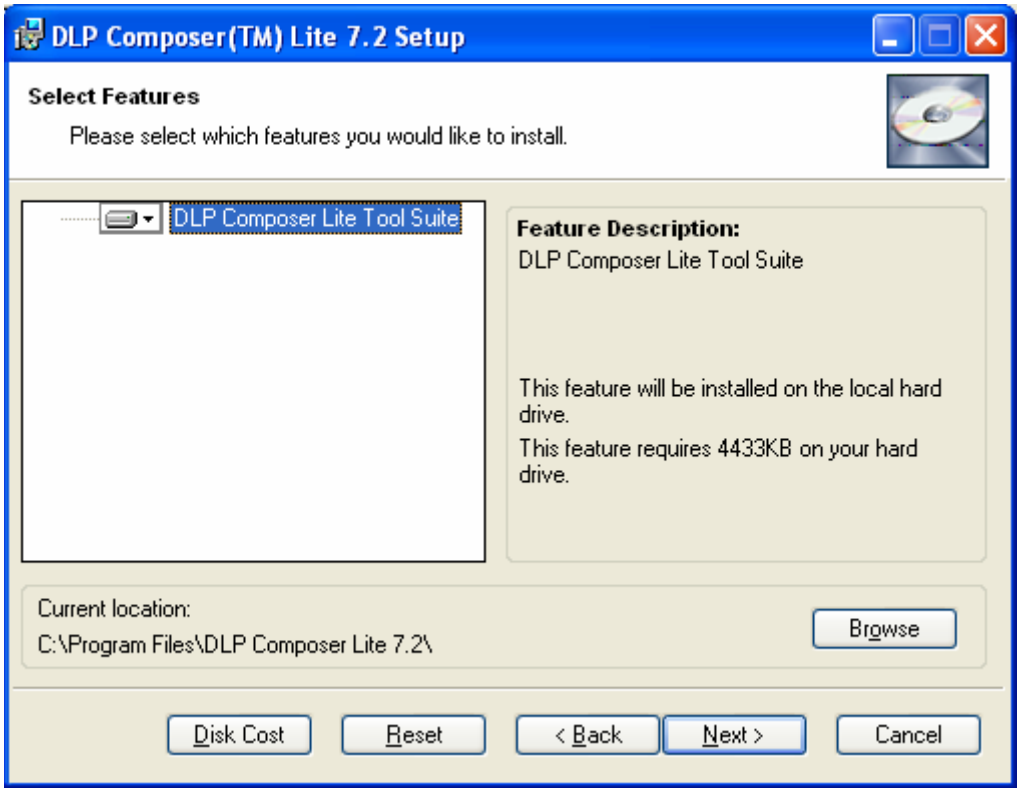
Read the License Agreement.
Choose the radio button of “I accept and agree to be…..”
Click the next button.



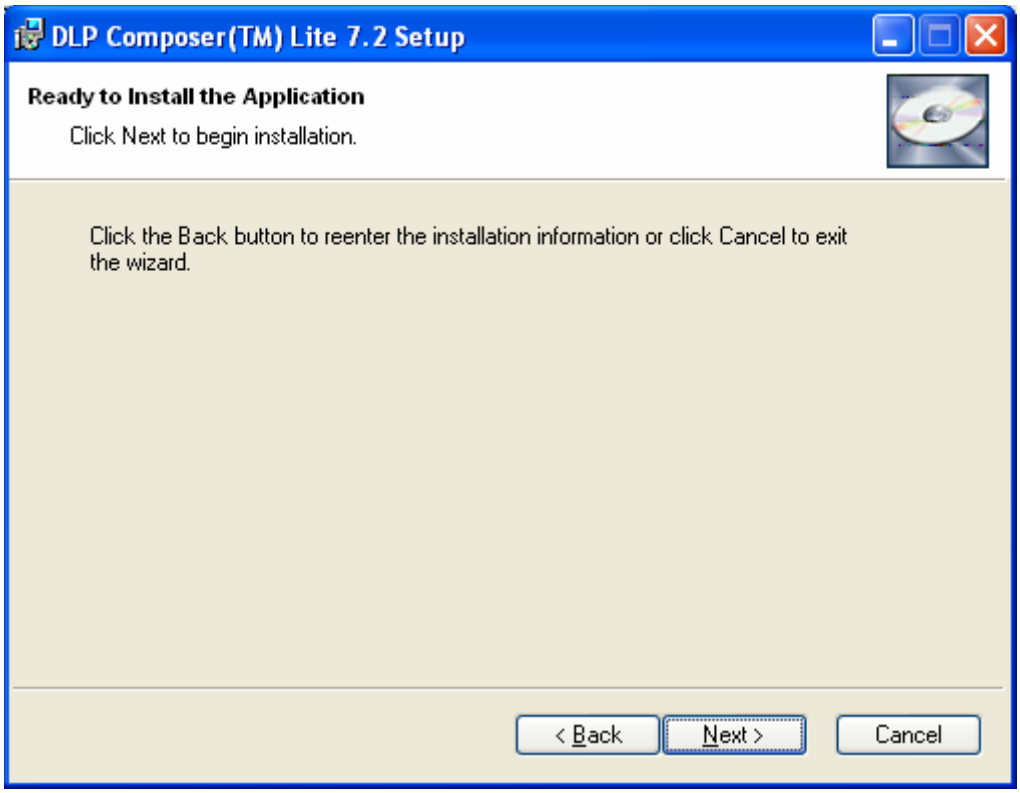
Click the next button.



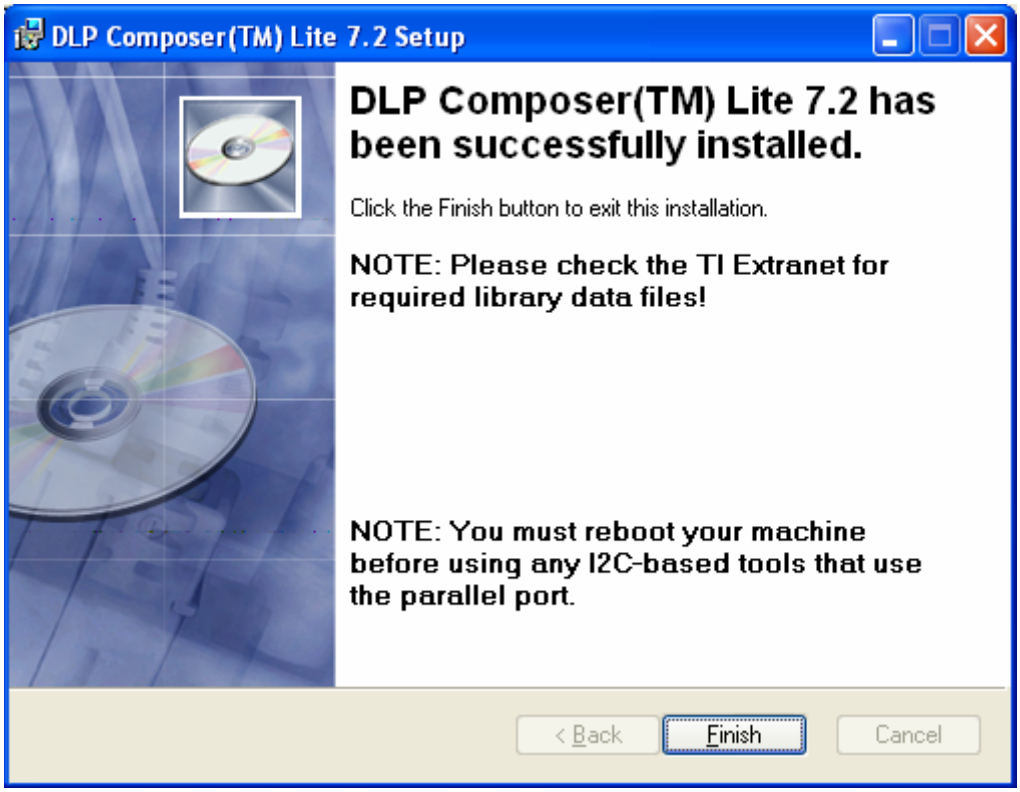
Click the next button.



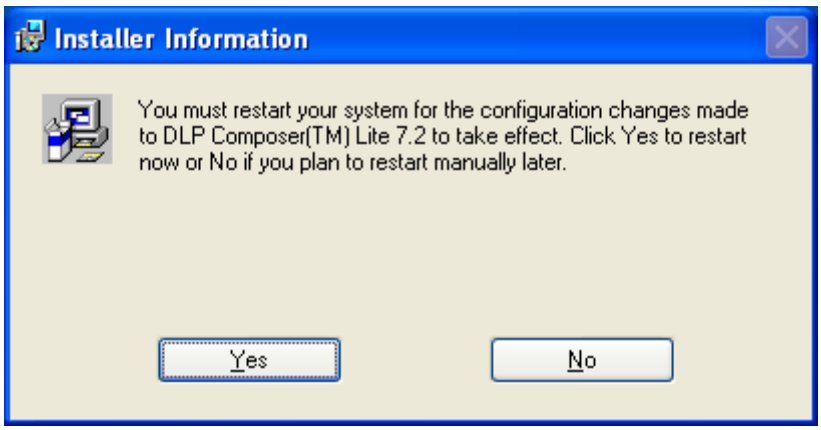
Click the next button.



Click the finish button.

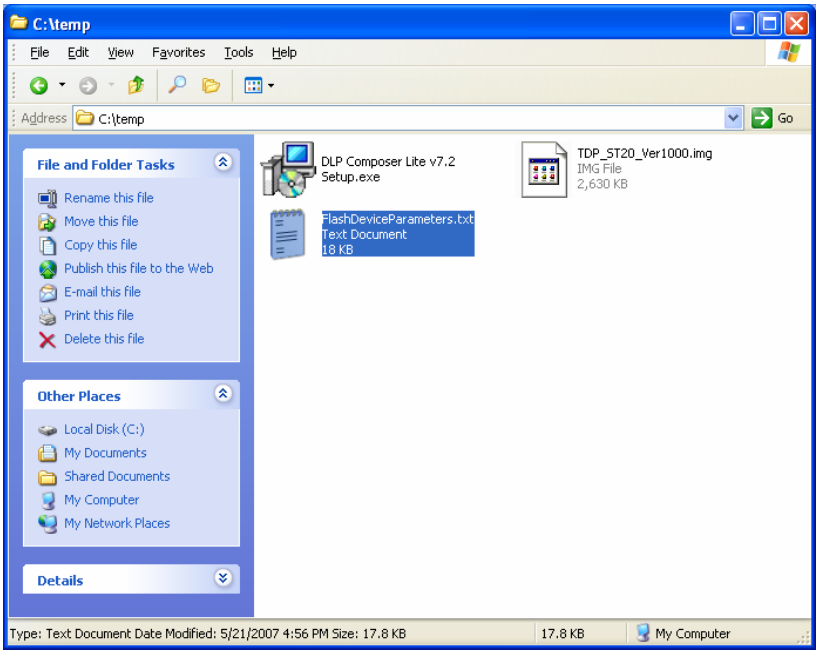


Click the Yes button to reboot.

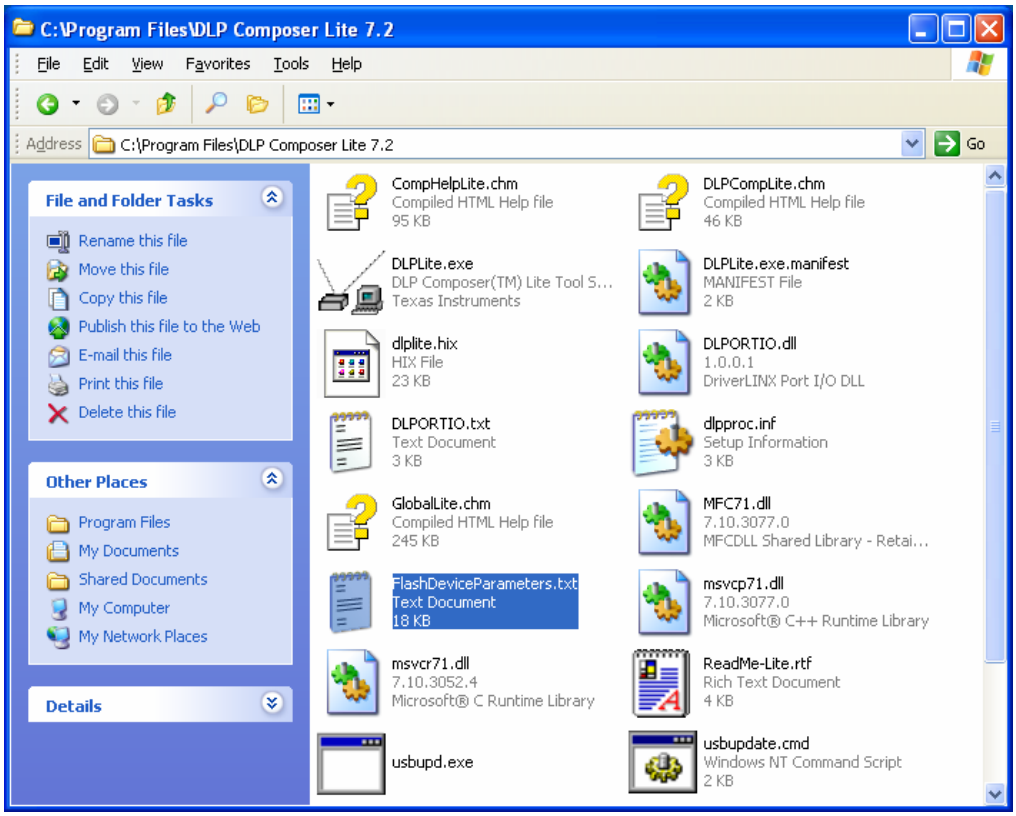


Upgrade the software

Connect the control cable (RS232C female – female) to the control terminal on the projector.
Then plug the RS232C connector on the other end of the cable into a RS232C port on the computer.
Open Windows Explorer navigate to the location where you stored
the FlashDeviceParameters.txt file.

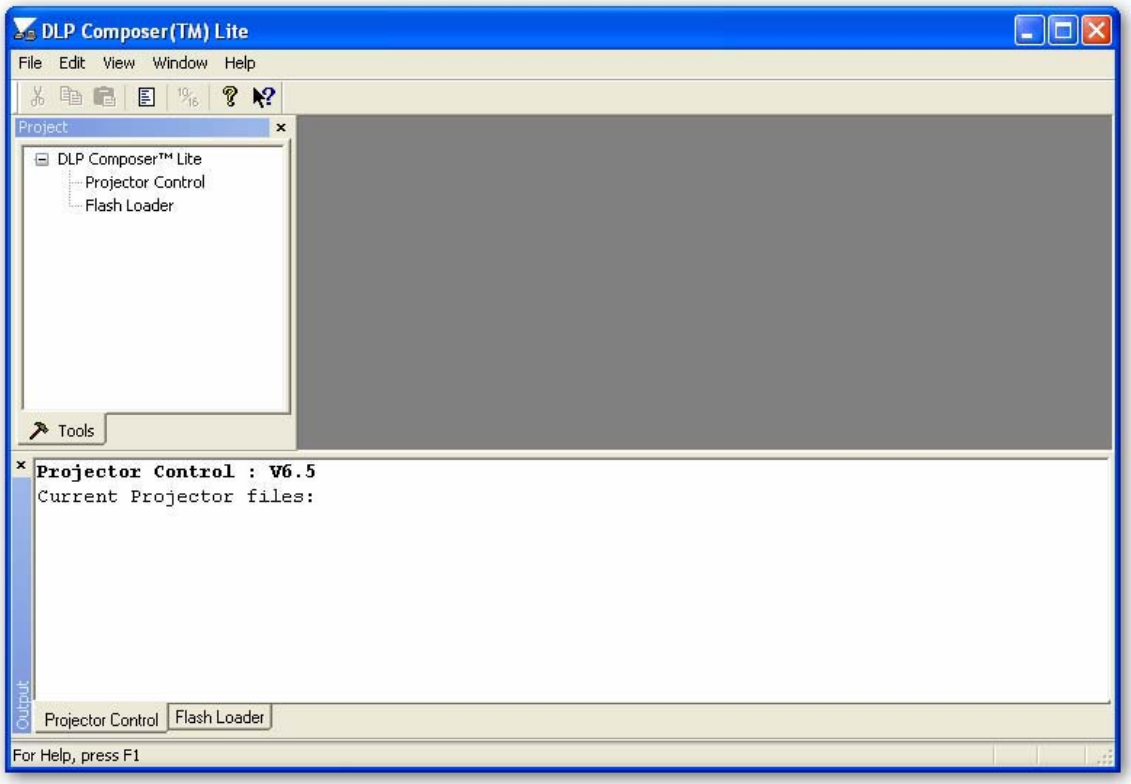


Copy to C:/Program Files/DLP composer Lite 7.2 folder

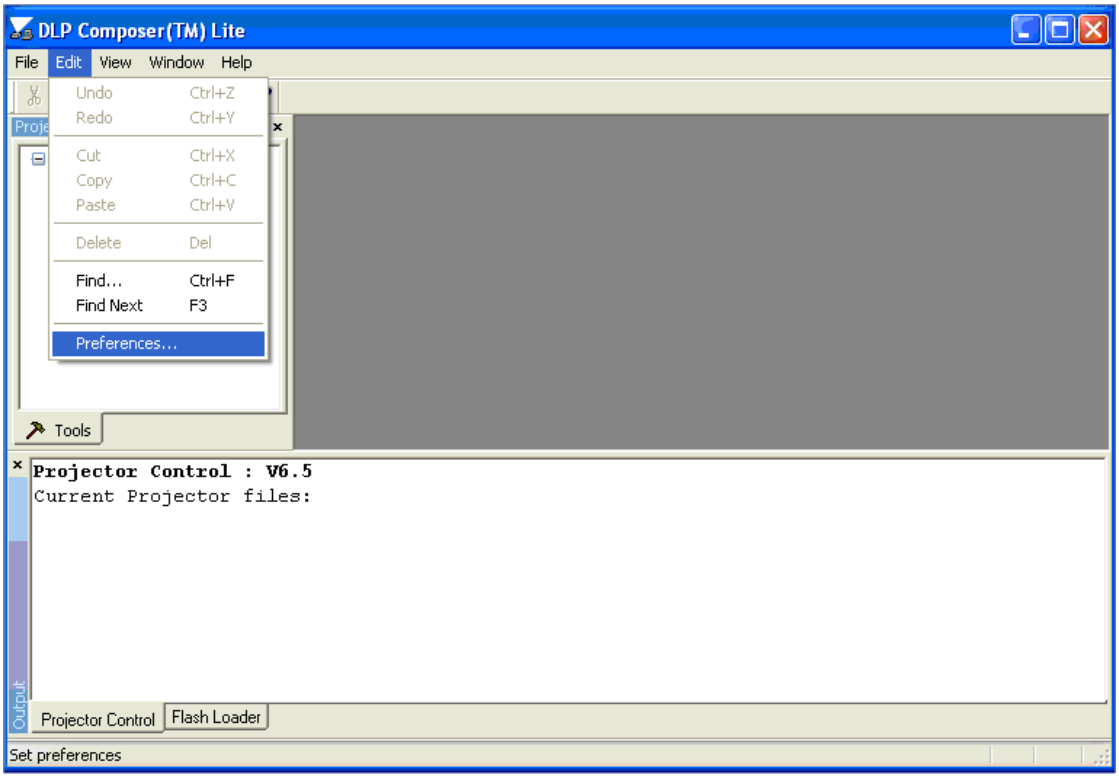


Double click (Execute) the icon of DLP Composer(TM) Lite 7.2.

The DLP Composer(TM) Lite 7.2 dialog box appears

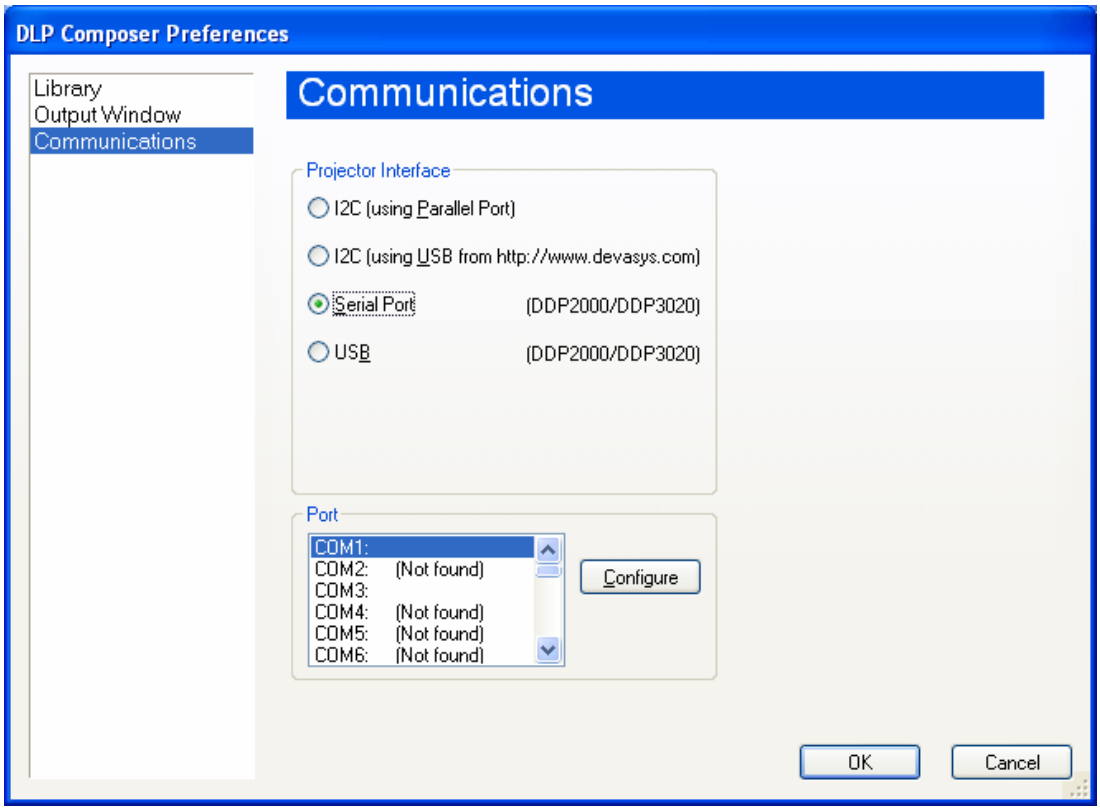


Click Edit and Preferences.

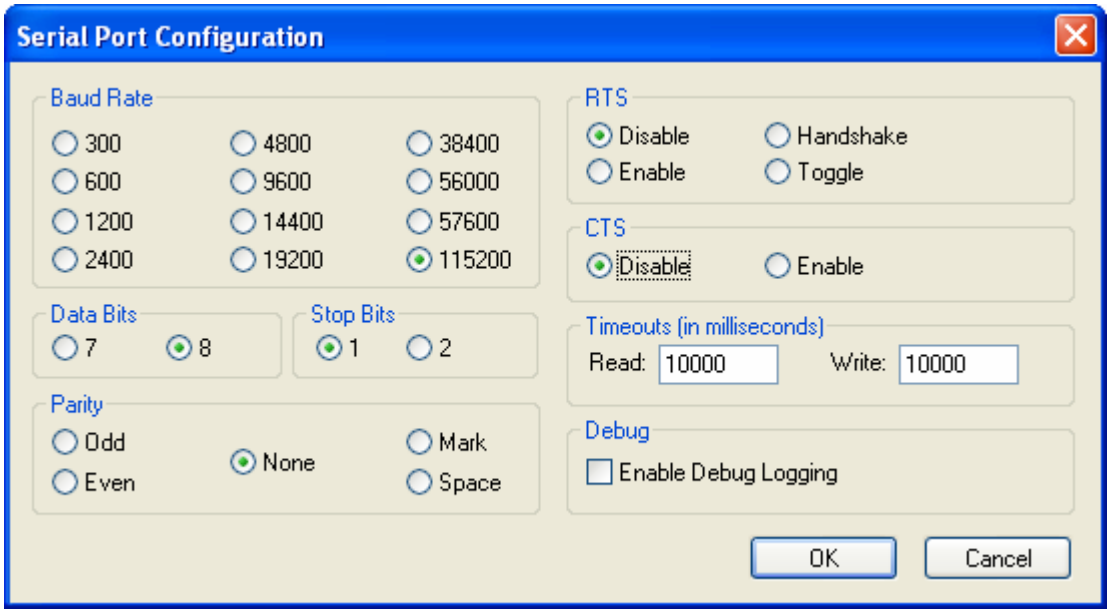


Select Communications and Serial Port.

Select COM1 (Select the port which you use).

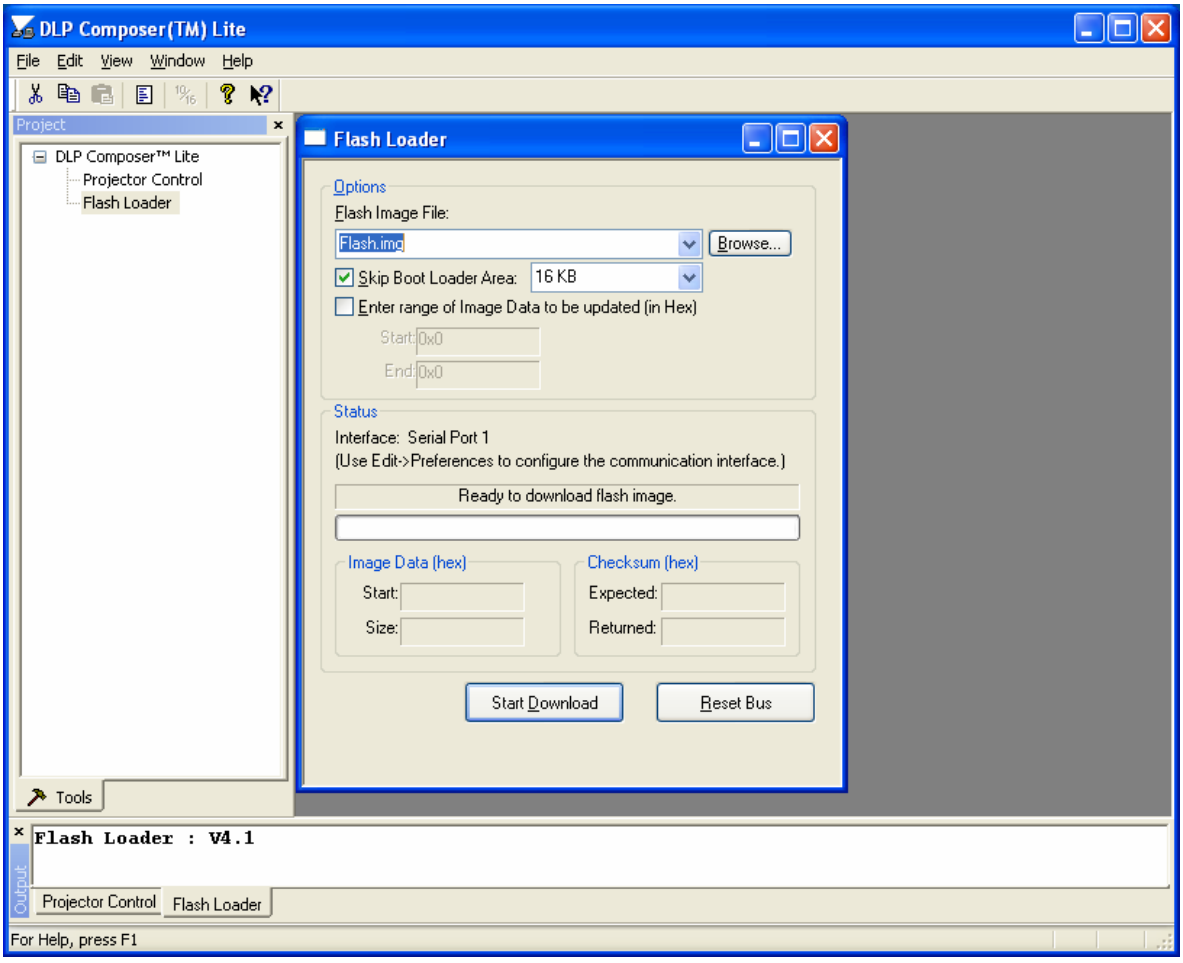


Click Configure button and change the “Timeouts” Read and Write values from 2000 to 10000.

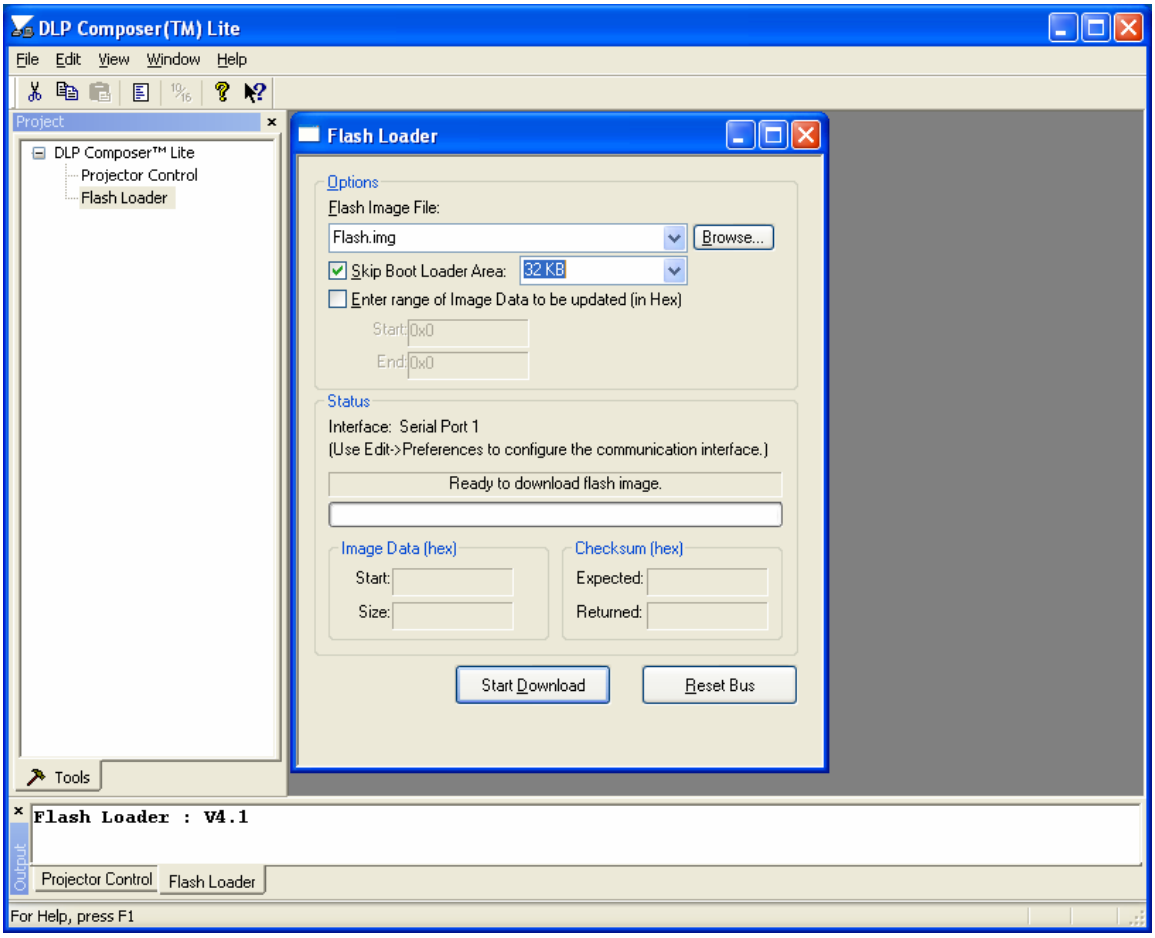


Click OK button.

Choose Flash Loader



Change the value “Skip Boot Loader Area” from 16KB to 32KB.
As for this operation, the data of “User Logo” is erased.

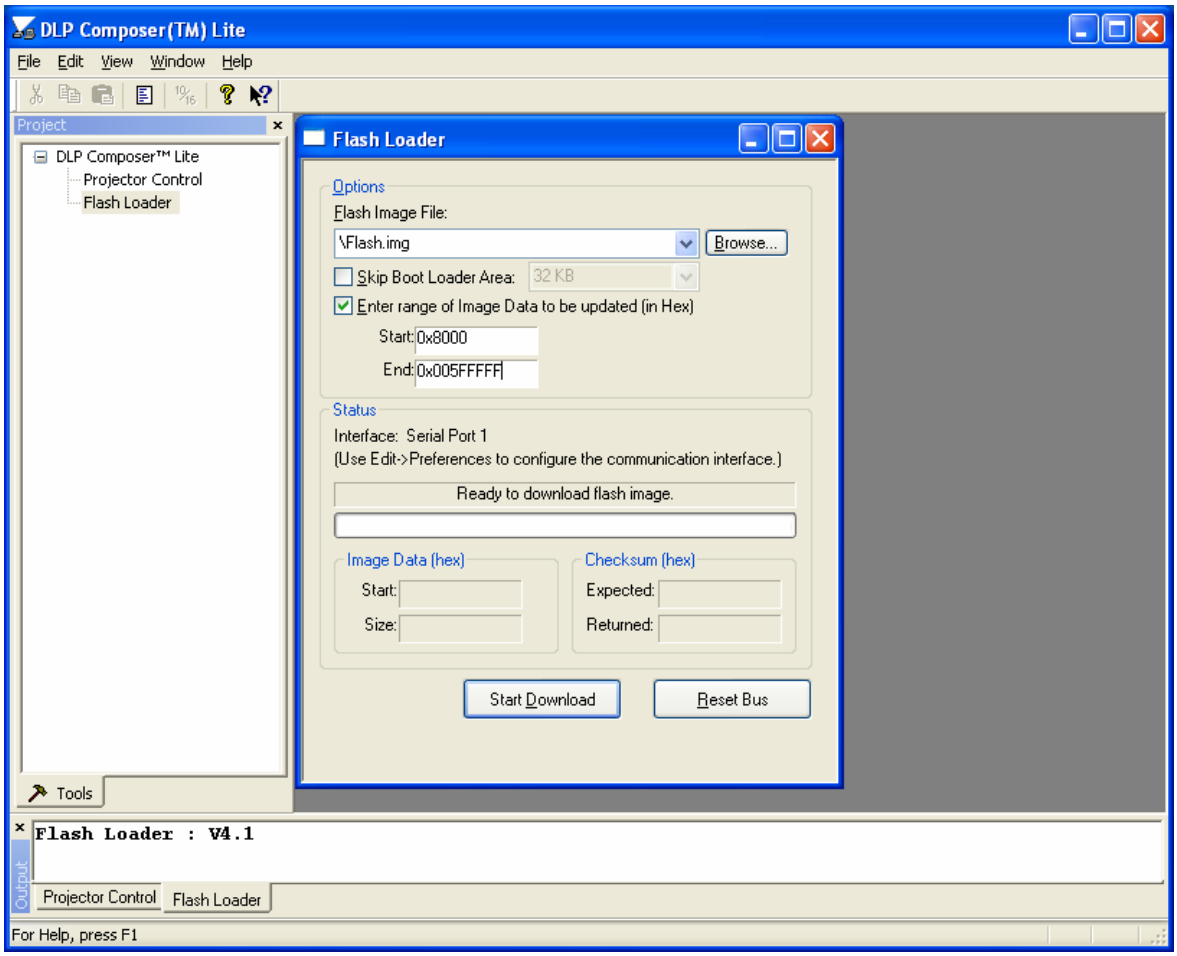


< Important matter >

If the value of “Skip Boot Loader Area” is not changed, the projector will not operate normally.

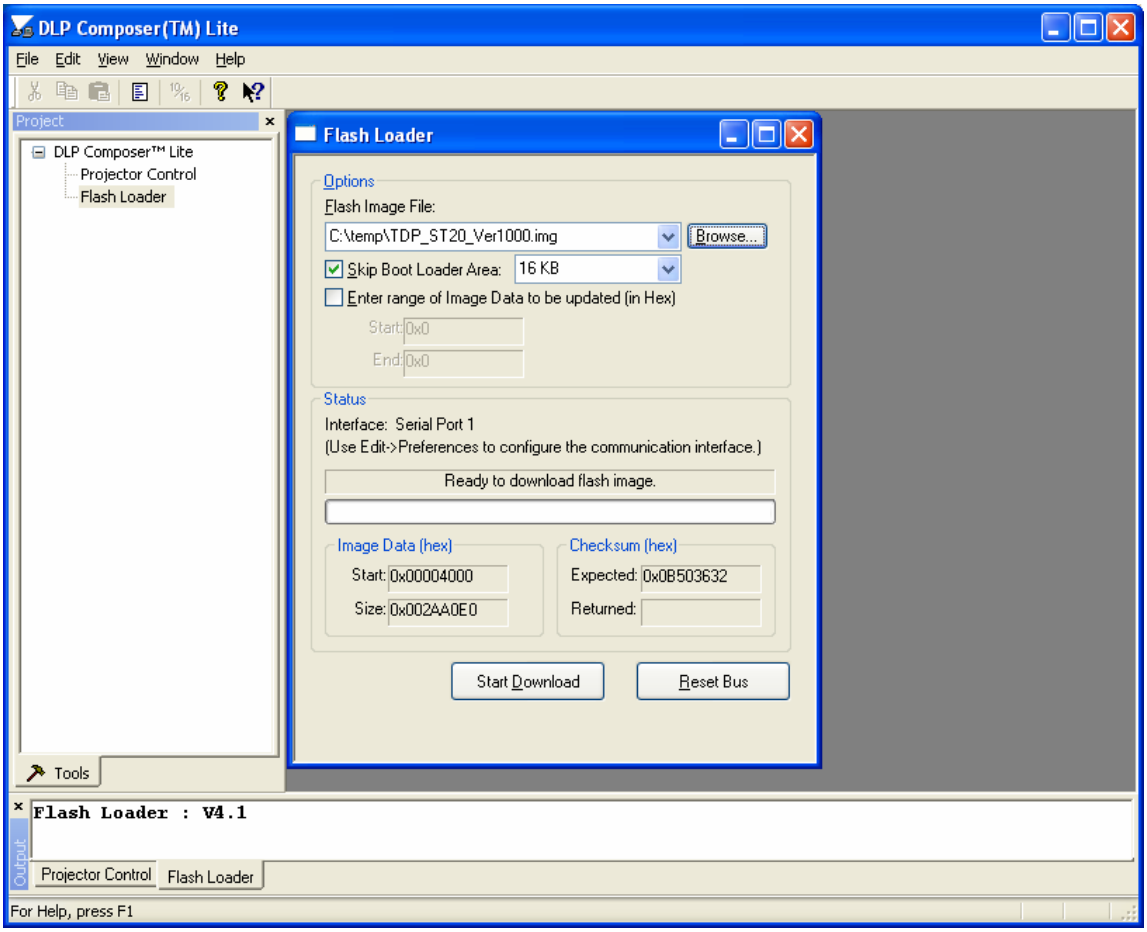
“Enter range of Image Data to be updated [in Hex]” is clicked when holding the data of “User Logo”.

And enter the values,
Start: 0x8000
End : 0X005FFFFF



Next operation is the same.

Click Browse button to select the firmware (*. img file)

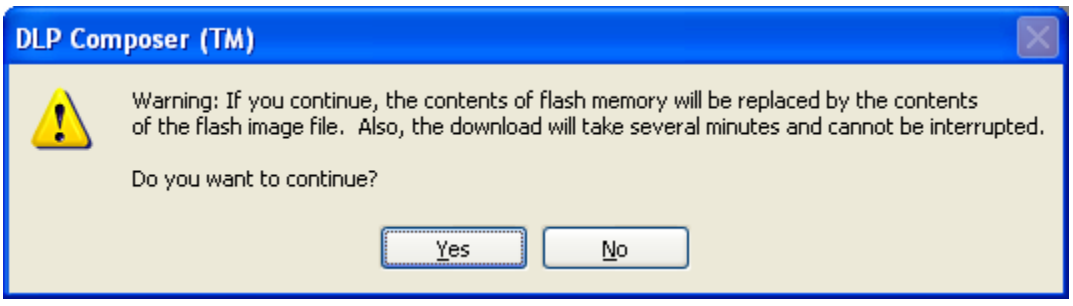


Press and hold the projector's **[Service] two** keys. (TDP-ST20)
Press and hold the projector's **[Keystone]** and **[Auto set]** keys. (TDP-EX20/EW25)

Then plug in the power cord and turn on power switch.

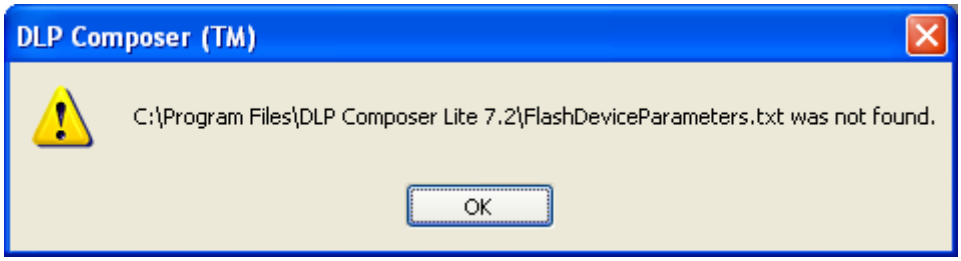
When the projector enters the firmware upgrade mode,
[LAMP], **[ON/Standby]** and **[TEMP]** LED blinks RED in order.

Click Start Download button.



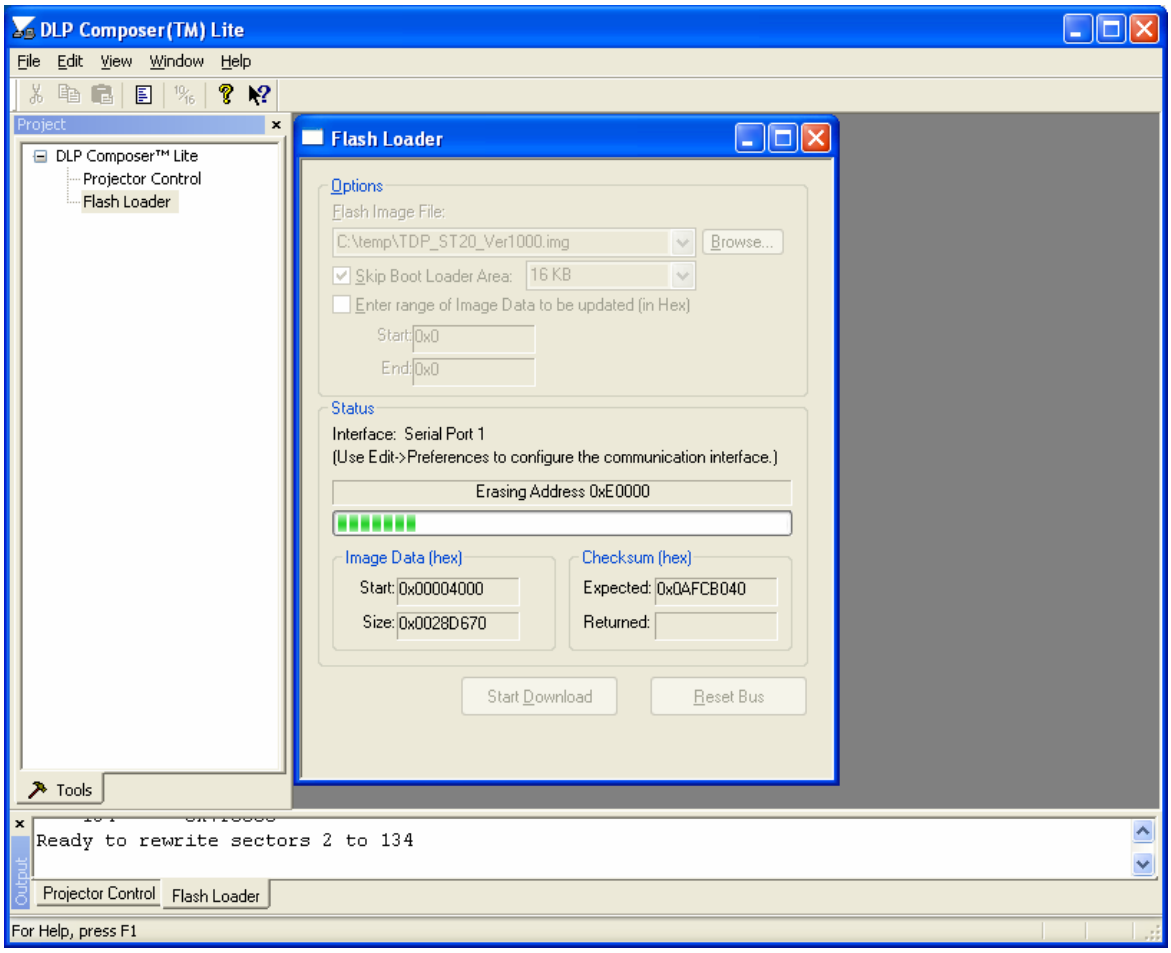
Click Yes button.

If FlashDeviceParameters.txt is not copied, the following dialog box will appear.

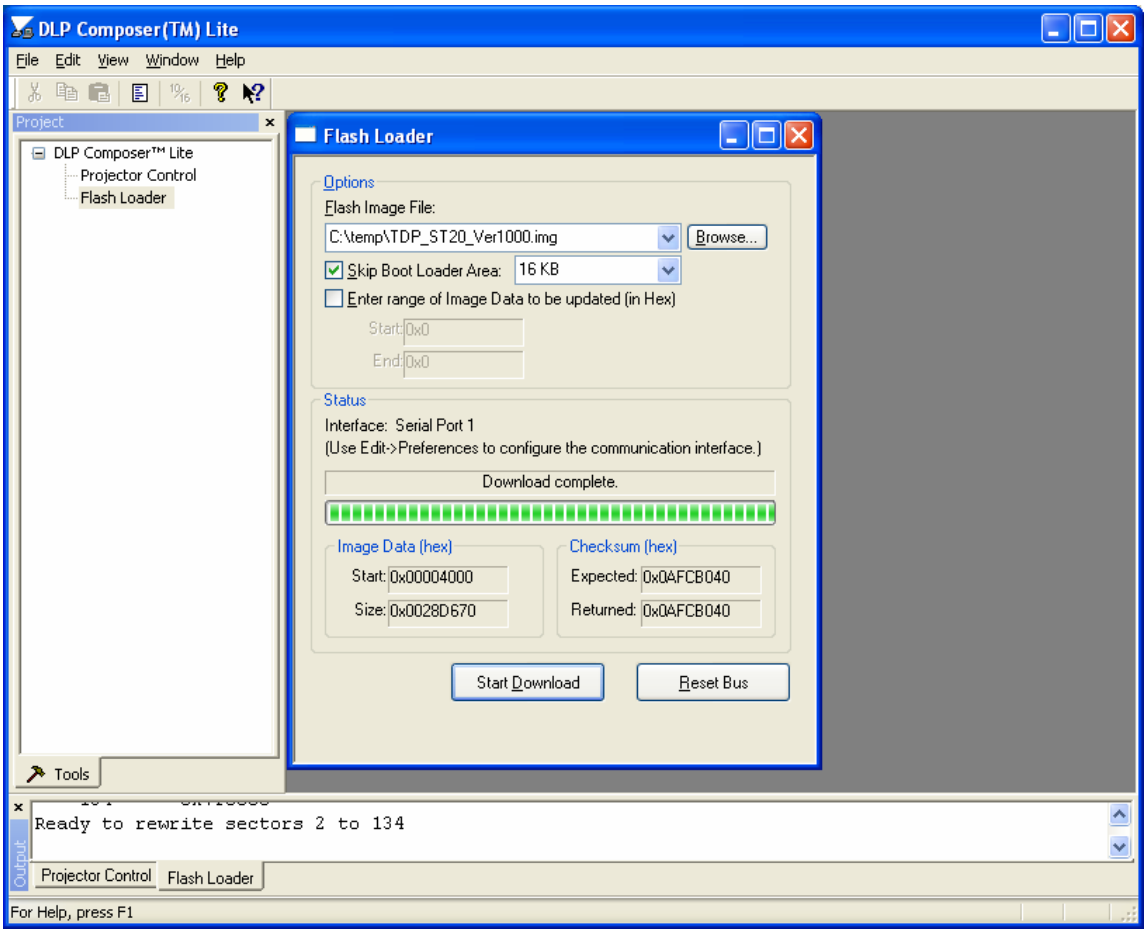


When a computer begins downloading the upgrade files to the projector,
the following status bar progresses.

When RS232C terminal of PC is used, the firmware upgrade will take about 20 minutes.



When the upgrade finishes normally, the following Download Complete message appears.

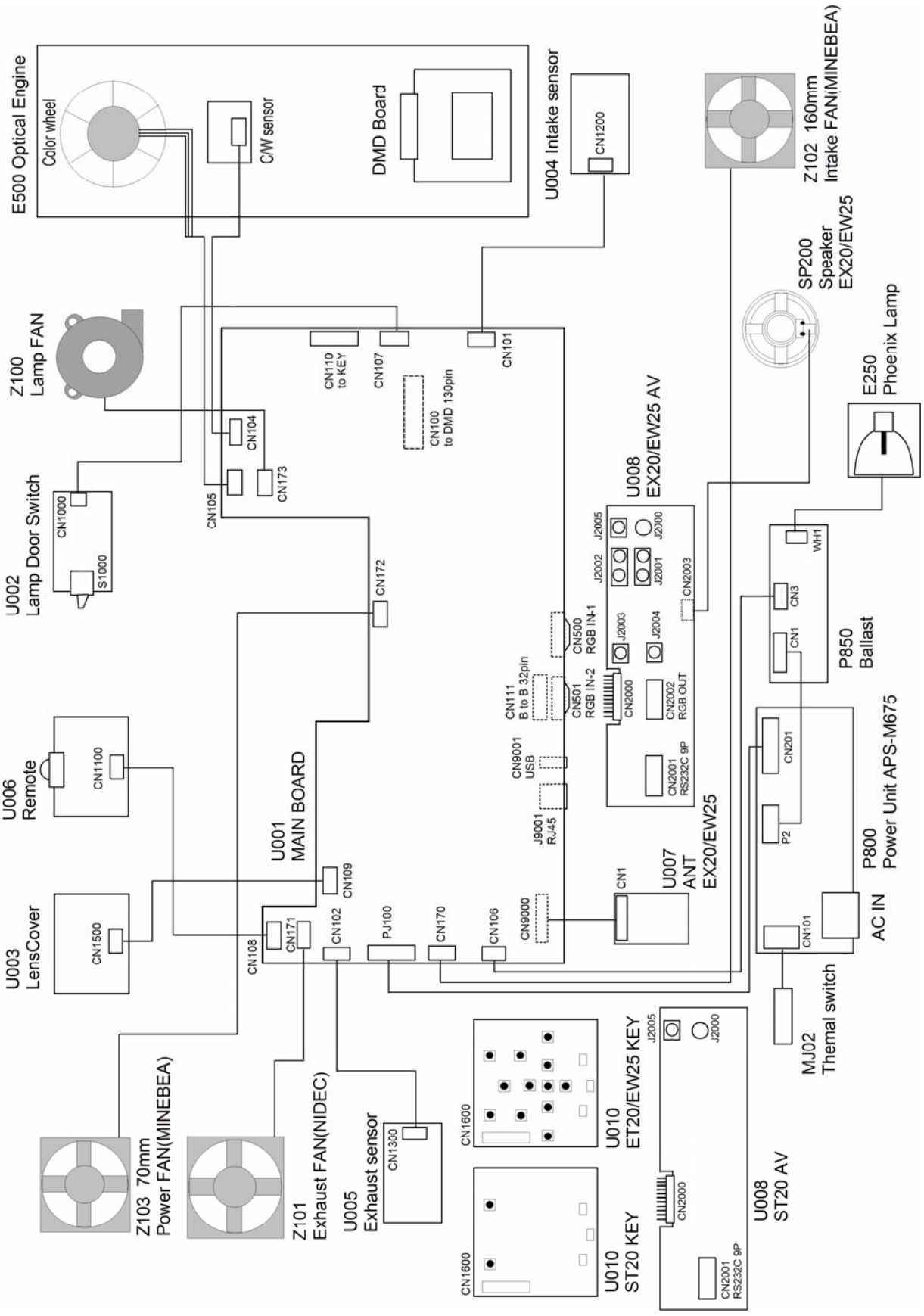


Click X button to finish.

Confirm the software upgrade

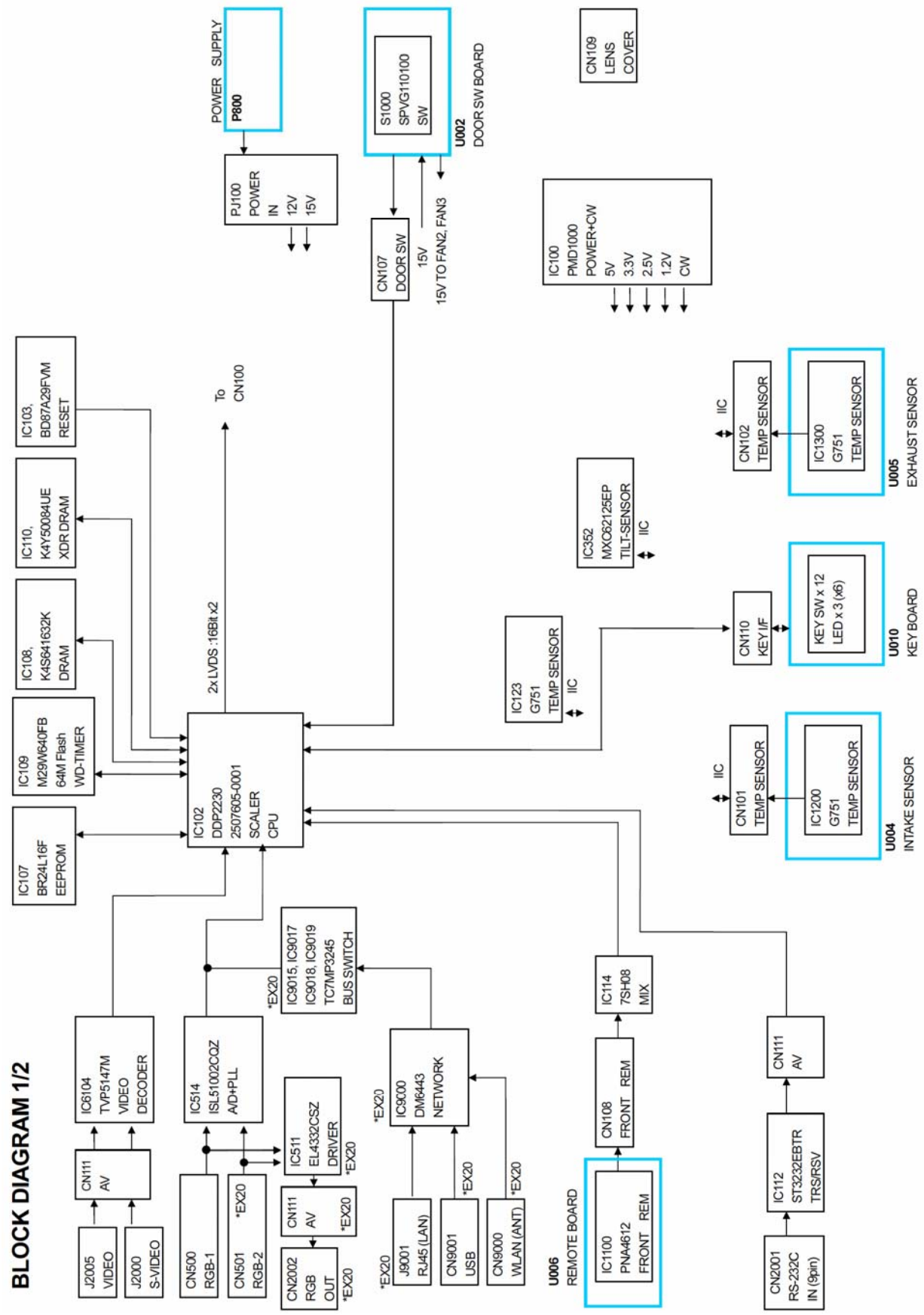
1. Power up the projector.
2. On the remote controller of projector, press the “MENU” key to display the menus.
3. Press button Right or Left arrow to highlight “Setting display”.
4. The “Setting display” dialog box display the software version.
   These should match the upgrade version you downloaded.

Wiring Diagram

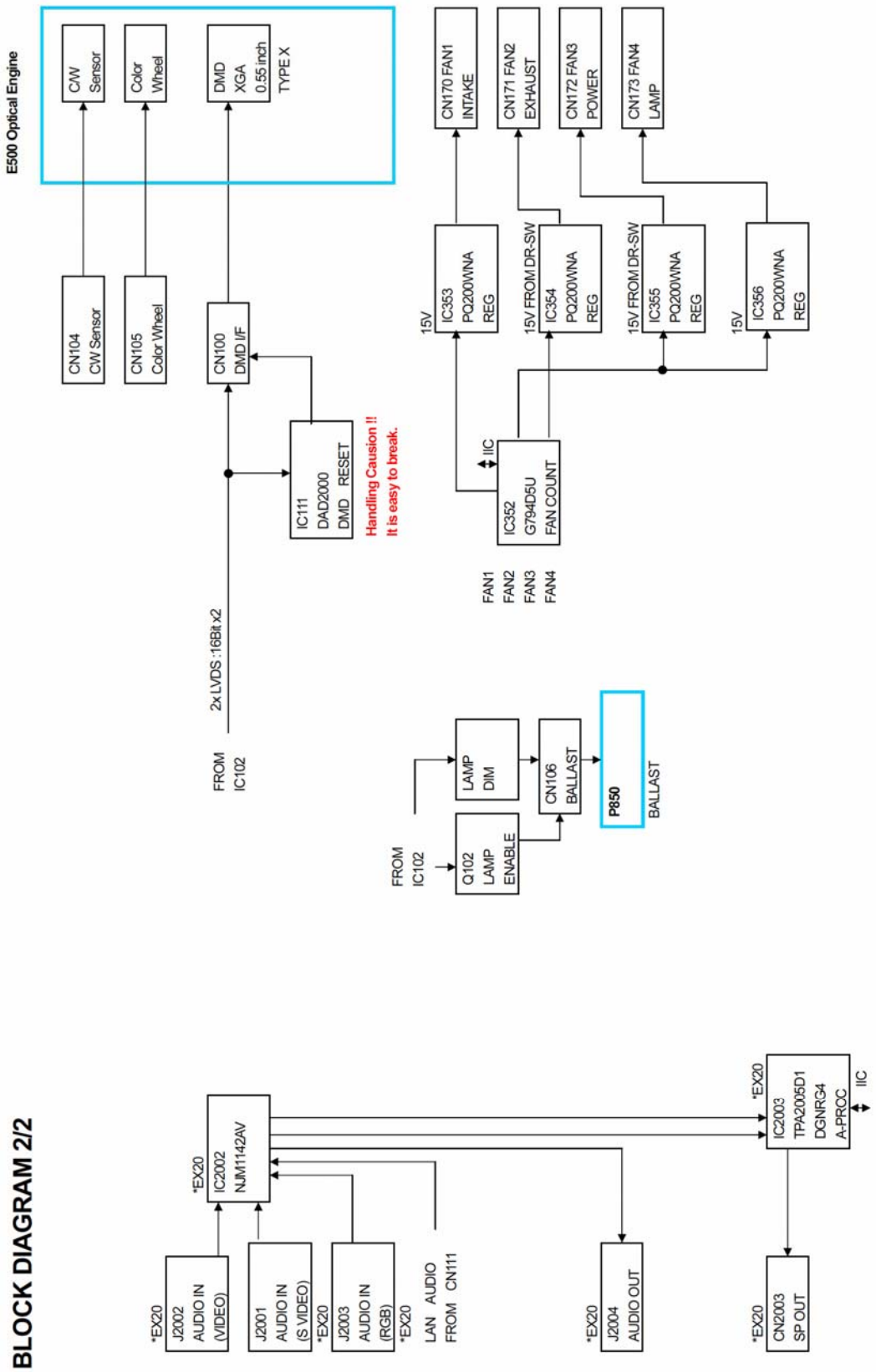


Block Diagram

BLOCK DIAGRAM 1/2



Block Diagram 2/2



BLOCK DIAGRAM 2/2

LED Display

LED Display (Problems Shown on LED Indicator Combination)

Error Code No.	Status of Indicator Lights	Trouble and Cause	Solution
-	L O T	**[Standby power is not on]** -> There's a problem with the power supply or the MAIN Board.	Check the power supply. Check the connector. Check the MAIN Board.
1	L O T	**[Lamp error]** Lamp went out during use,or won't come on. -> Lamp temperature is high or the lifetime of the lamp has ended or the projector is malfunctioning.	Unplug the power cord and wait for a short while, then turn the power back on. If the lamp burns out, replace it with a new one. Or it may have a trouble at ballast power supply. Or it may have a trouble at color wheel sensor or color wheel ribbon cable or MAIN Board.
2	L (ORANGE flashing) O T	**[Lamp cover error]** Power went out during use, or power won't come on. -> The lamp cover is not properly attached.	Unplug the power cord and reattach the lamp cover.
4 | 7	L O T (GREEN flashing)	**[Fan error]** Power went out during use. -> Problem with internal cooling fan or IC352(G794) don't reply to I2C commands or the MAIN Board does not read revolving pulse. <Error code> Distinction of "GREEN flashing" number of times 04:FAN1 Intake Fan (1time repeat) 05:FAN2 Exhaust Fan (2times repeat) 06:FAN3 Power Fan (3times repeat) 07:FAN4 Lamp Fan (4times repeat)	Check the each cooling Fan. Check the MAIN Board.
8 | 10	L O T (RED flashing)	**[Temperature error]** Power went out during use. -> Internal overheating, or the outside temperature is too high or temperature sensor doesn't reply to I2C commands. <Error code> Distinction of "RED flashing" number of times 08:Intake temperature sensor (1time repeat) 09:Exhaust temperature sensor (2times repeat) 10:Temperature 3 (3times repeat)	Place the projector so that the air intake and exhaust are not blocked. Unplug the power cord and wait for a short while, then turn the power back on. Check the each temperature sensor.
11 | 18	L O T	**[Device error]** Power went out during use. -> There are problems with the MAIN Board. <Error code> 11: IC107(BR24L16F) 12: IC2002(NJM1142AV) 13: IC6104(TVP5147M) 14: IC514(ISL51002CQZ) 15: IC352(MXC62125EP) 16: Color Wheel relation(E500) 17: DMD relation(E500) 18: IC102 relation(DDP2230, XDR)	Check the MAIN Board.
19	L O T	**[NETWORK error]** Power went out during use. -> There are problems with the NETWORK. <Error code> 19:NETWORK	Check the NETWORK.

<Notes>
When each error occurs, after about one minute of abnormal display, the projector turns to the standby state waiting for internal cool down.
[L] : LAMP, [O] : ON/Standby, [T] : TEMP

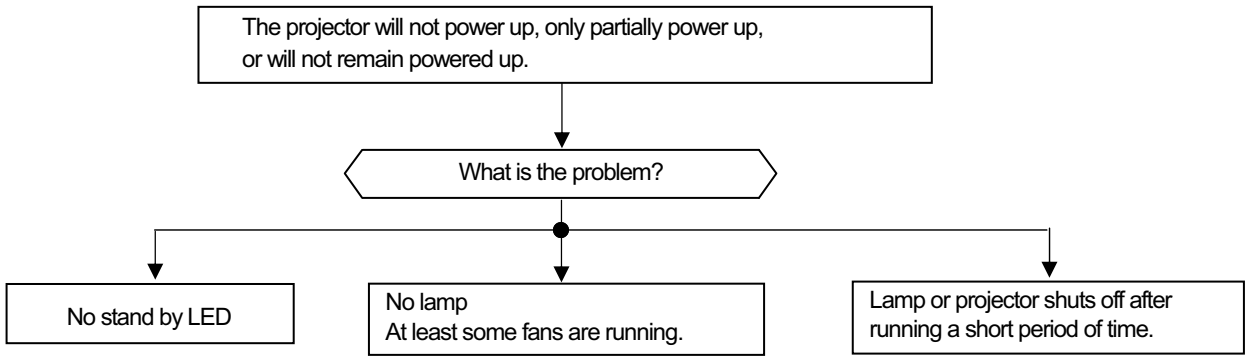
FAN1 -> Z102, FAN2 -> Z101, FAN2 -> Z102, FAN4 -> Z100

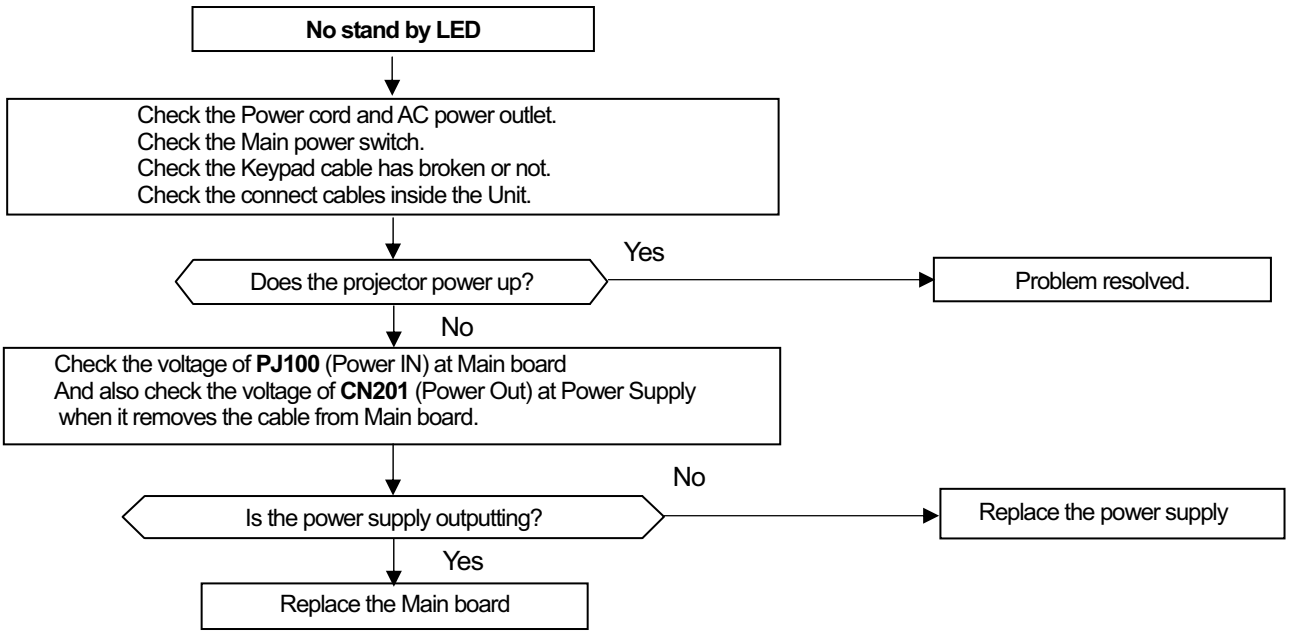
Troubleshooting

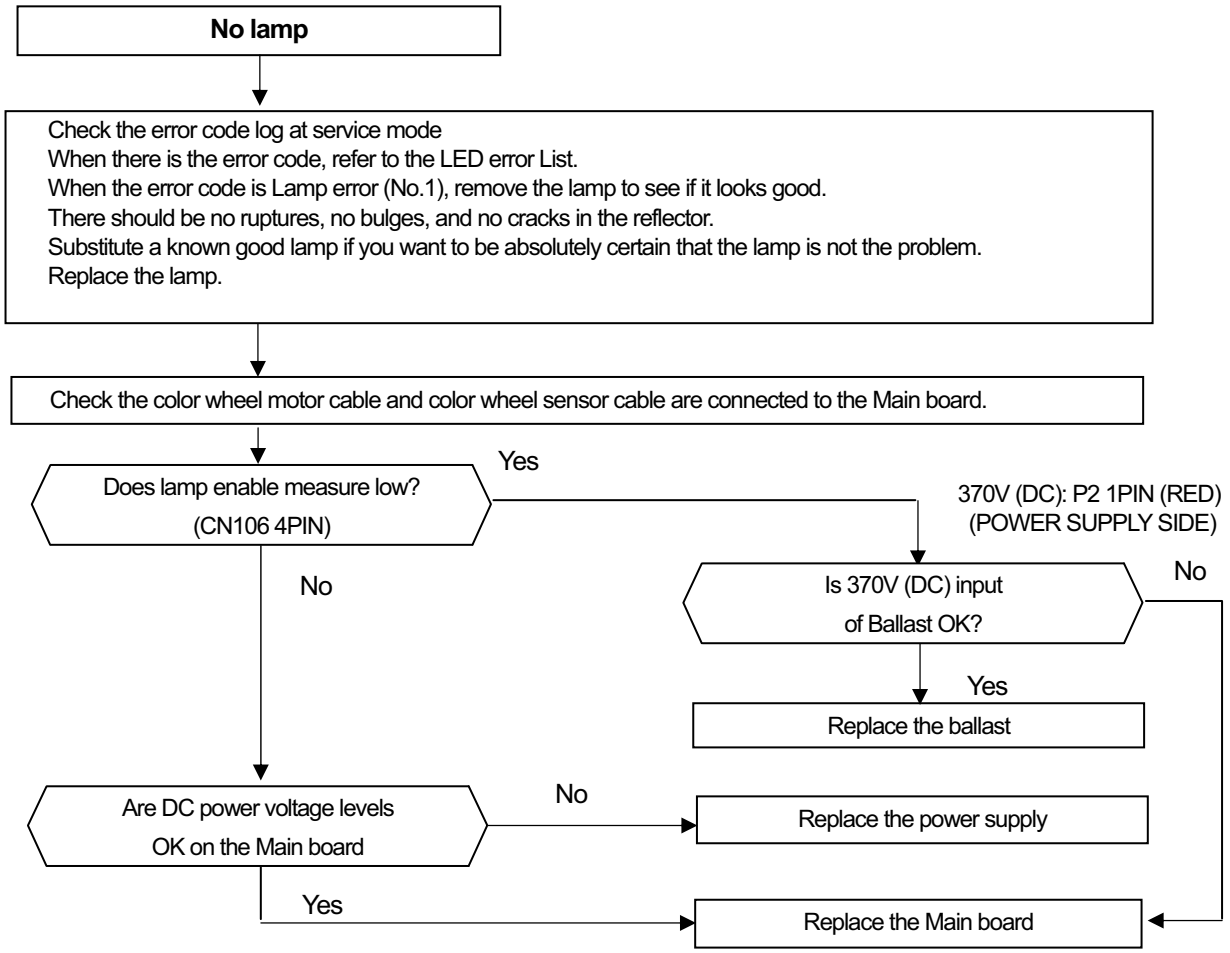
You use this section to diagnose problems with the projector. Choose the problem you are trying to diagnose from the list below. The Power, Image and Audio sections provide a variety of symptoms, while the other includes only one page.

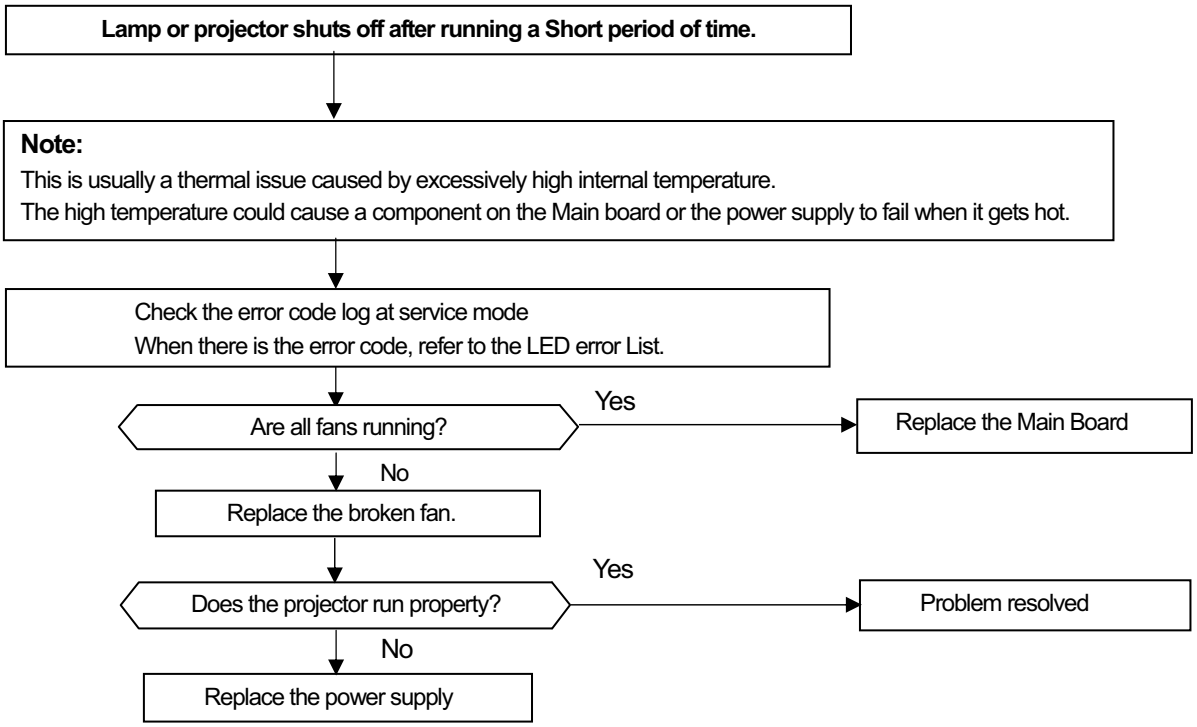
1. For Power problems
2. For Image problems
3. For Audio problems
4. For Remote Control
5. For Keypad problems
6. For Menu problems

Troubleshooting Power Problems

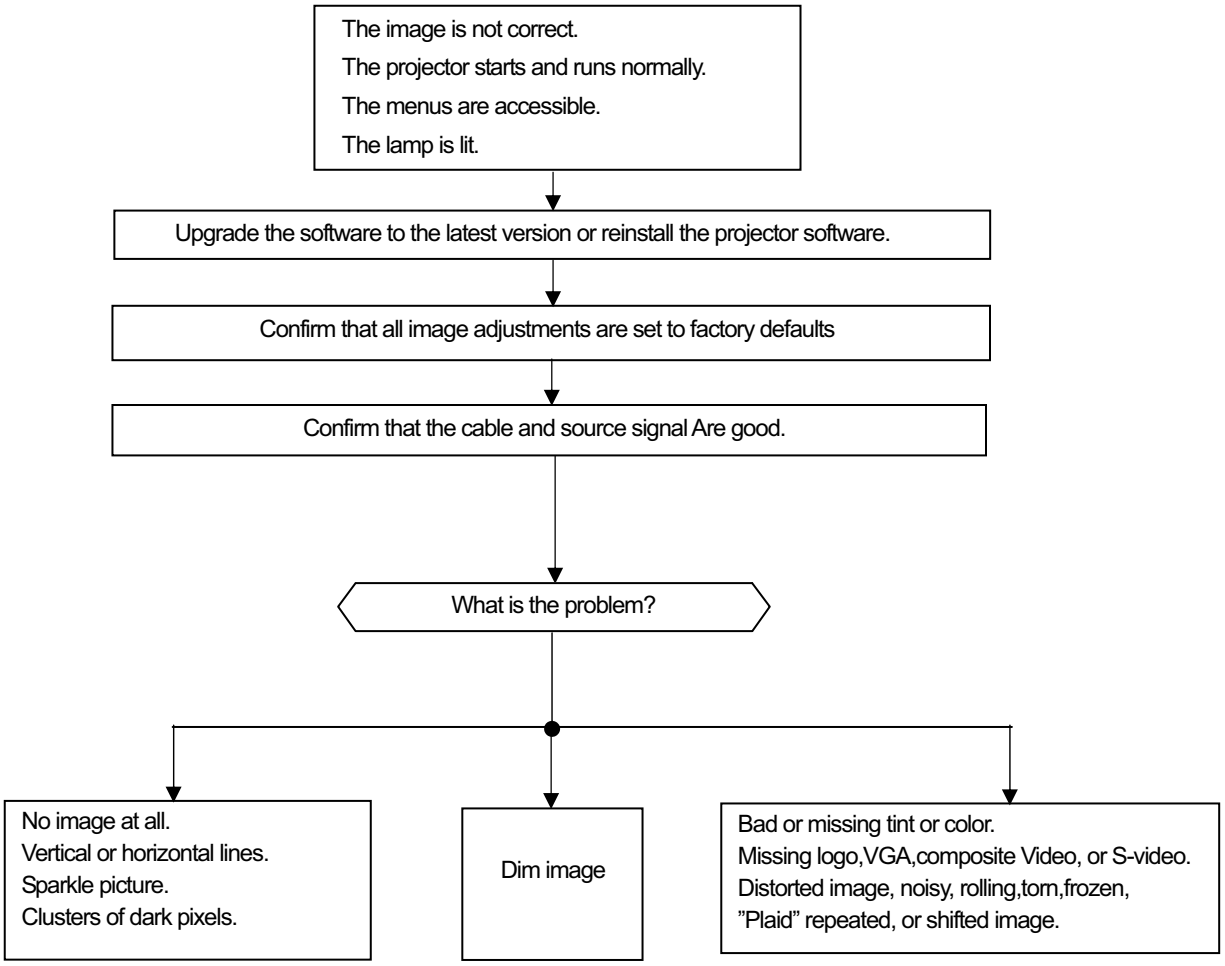


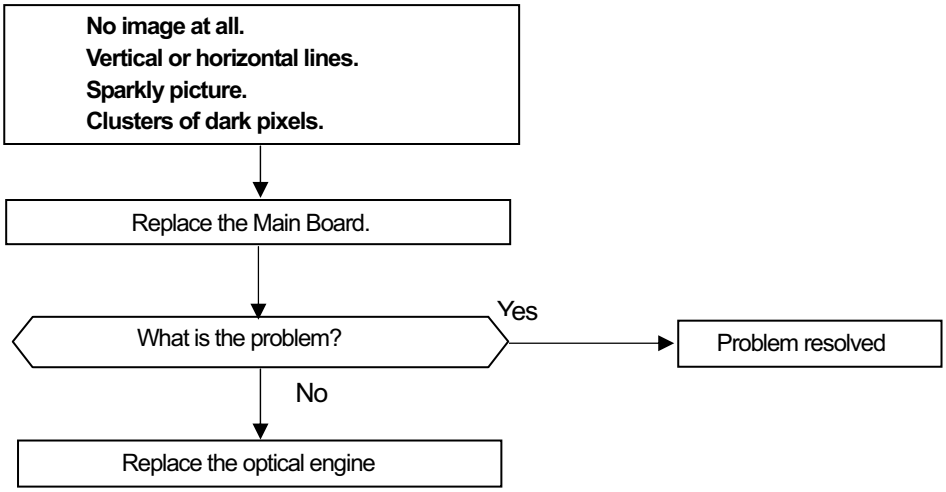


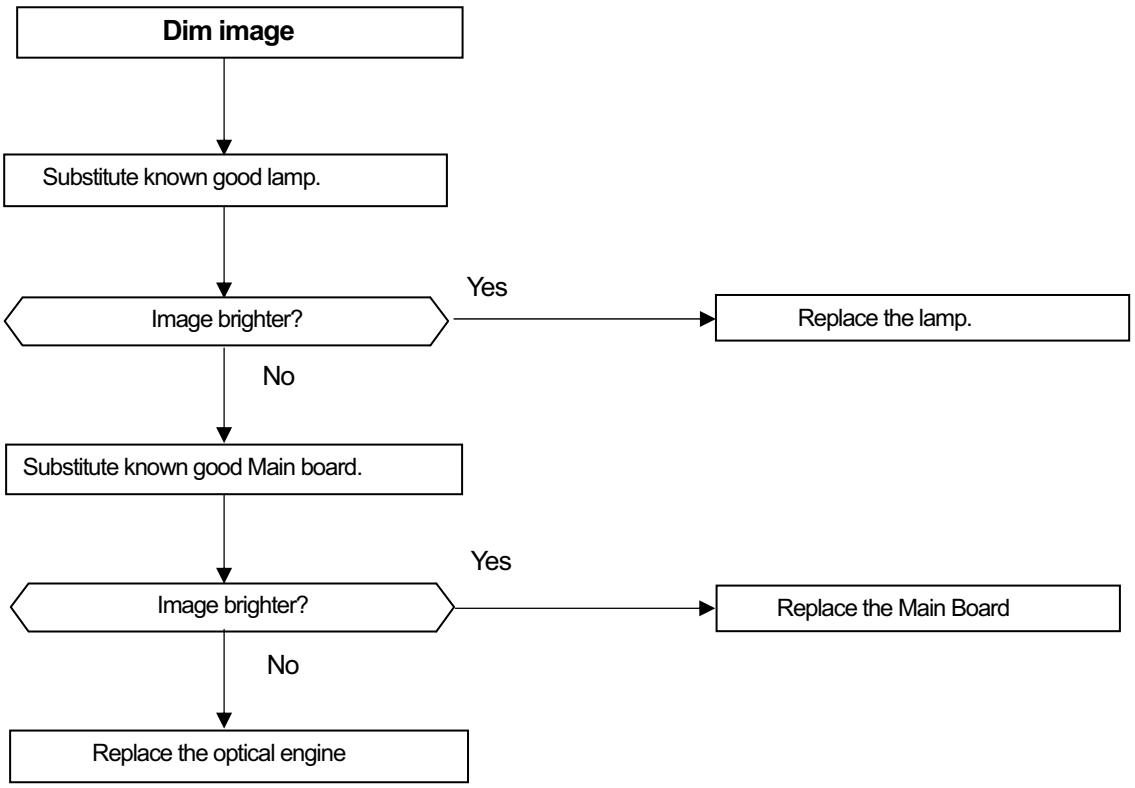

No lamp
Check the error code log at service mode
When there is the error code, refer to the LED error List.
When the error code is Lamp error (No.1), remove the lamp to see if it looks good.
There should be no ruptures, no bulges, and no cracks in the reflector.
Substitute a known good lamp if you want to be absolutely certain that the lamp is not the problem.
Replace the lamp.
Check the color wheel motor cable and color wheel sensor cable are connected to the Main board.
Does lamp enable measure low?
(CN106 4PIN)
Yes
No
370V (DC): P2 1PIN (RED)
(POWER SUPPLY SIDE)
Is 370V (DC) input
of Ballast OK?
No
Yes
Replace the ballast
Are DC power voltage levels
OK on the Main board
No
Replace the power supply
Yes
Replace the Main board

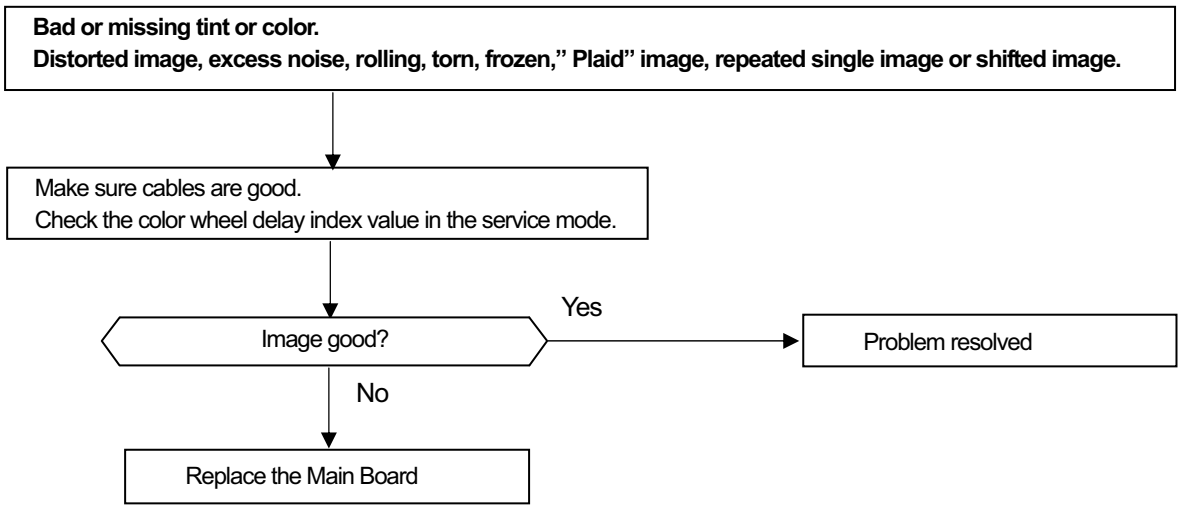

Lamp or projector shuts off after running a Short period of time.
Note:
This is usually a thermal issue caused by excessively high internal temperature.
The high temperature could cause a component on the Main board or the power supply to fail when it gets hot.
Check the error code log at service mode
When there is the error code, refer to the LED error List.
Are all fans running?
Yes
Replace the Main Board
No
Replace the broken fan.
Does the projector run property?
Yes
Problem resolved
No
Replace the power supply

Troubleshooting Image Problems

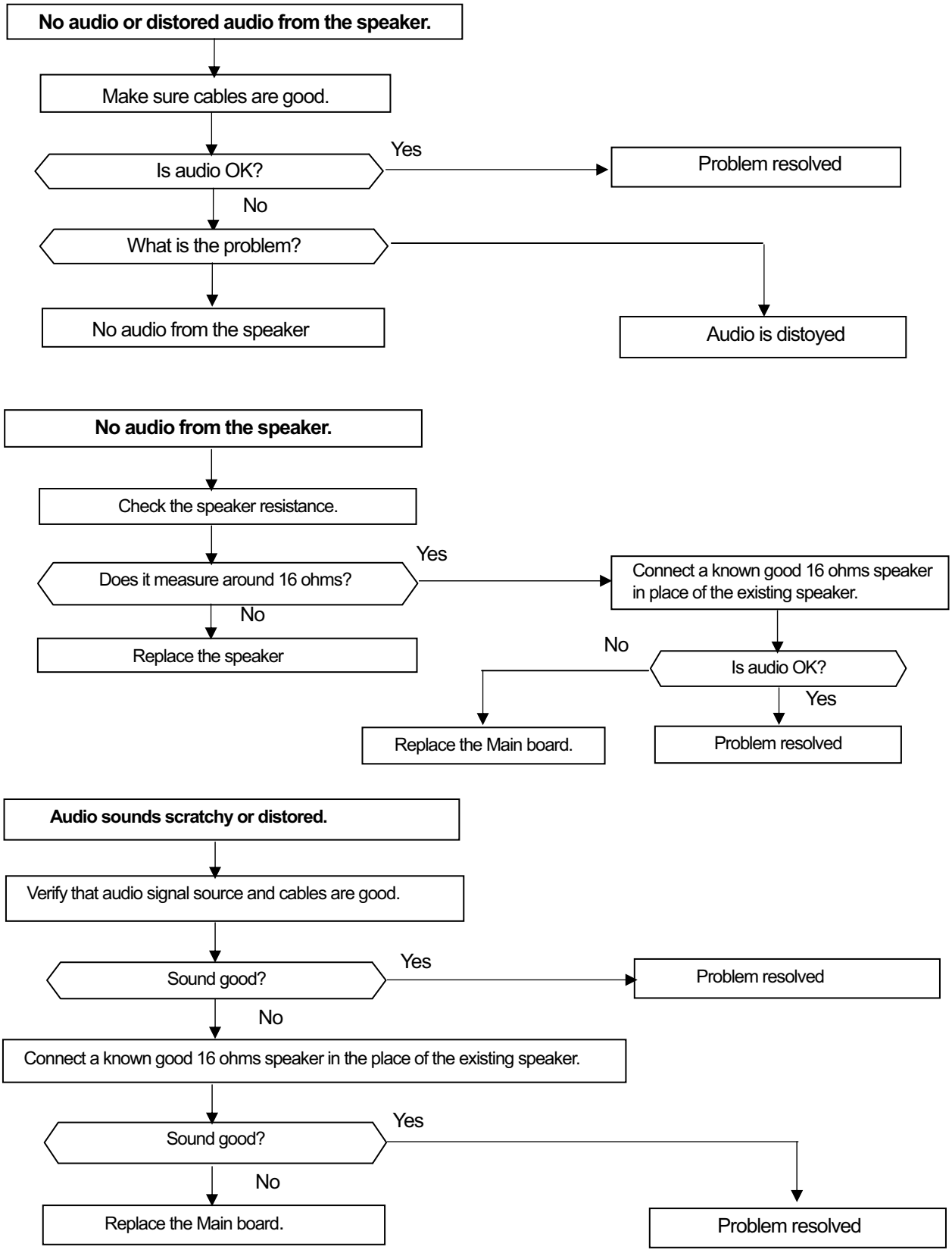




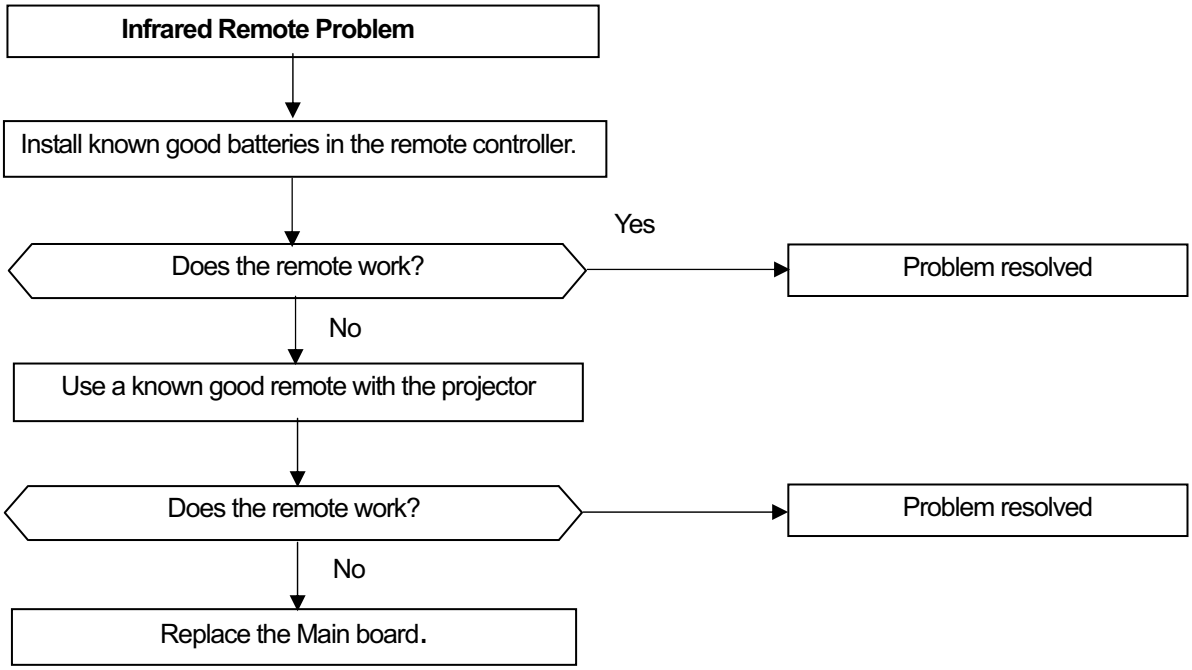

Dim image
Substitute known good lamp.
Image brighter?
Yes
Replace the lamp.
No
Substitute known good Main board.
Image brighter?
Yes
Replace the Main Board
No
Replace the optical engine


Bad or missing tint or color.
Distorted image, excess noise, rolling, torn, frozen," Plaid" image, repeated single image or shifted image.
Make sure cables are good.
Check the color wheel delay index value in the service mode.
Image good?
Yes
Problem resolved
No
Replace the Main Board

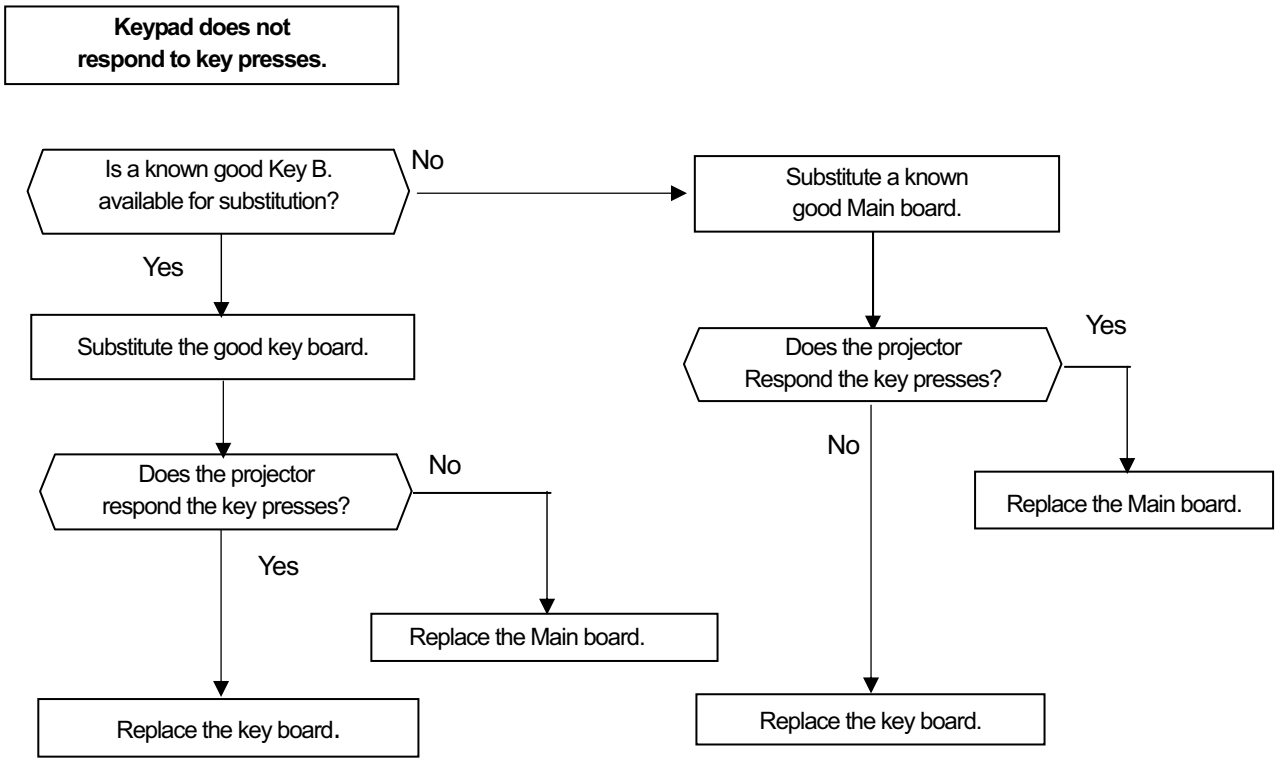
Troubleshooting Audio Problems



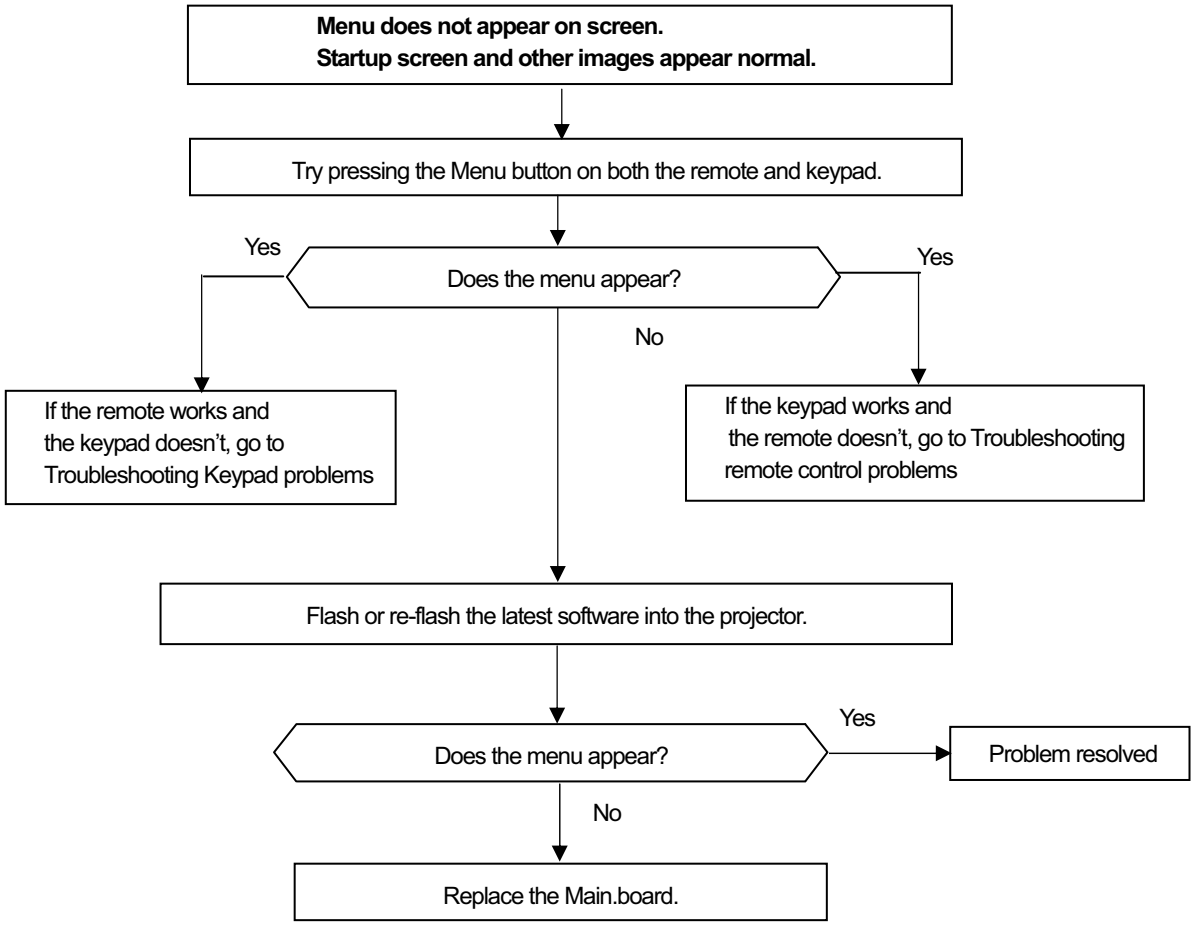
Troubleshooting Remote Controller Problems



Troubleshooting Keypad Problems



Troubleshooting Menu Problems



Operation of Power Supply (APS-M675)

The APS-M675 power supply circuit is shown as below. (Fig.1)

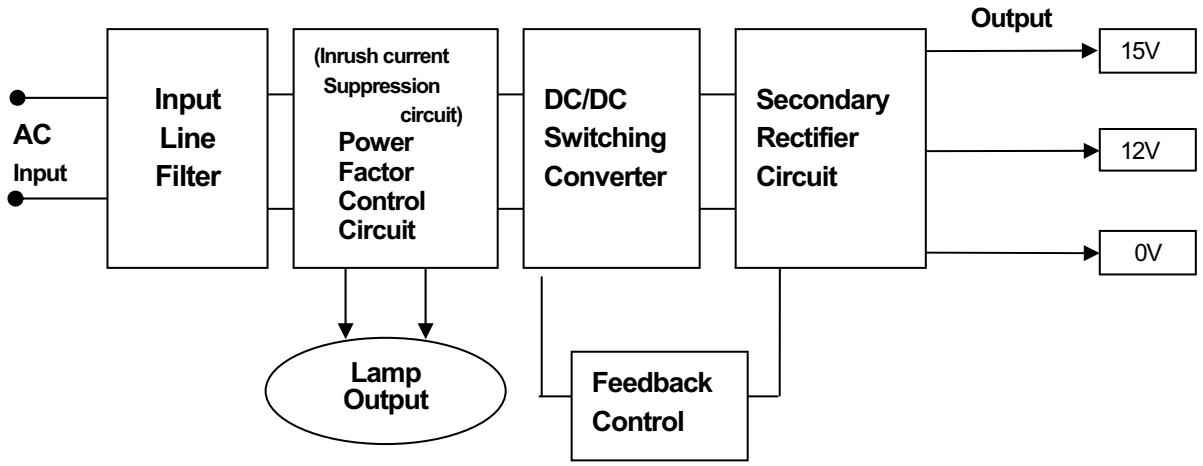


Fig. 1

1) Input Line Filter

A switching power supply generates a lot of electromagnetic noise. The function of the AC line filter, witch is made up of capacitors (e.g. C101) and inductor choke (e.g. L101,L102), is to attenuate these noise so that other equipments may not be affected.
The surge absorber Z101 which absorbs high voltage surge from the input lines.
These are mounted on the input filter.

※ The fuse (F101) becomes open in order to protect other parts, when excessive current flows at abnormal conditions.
※ CN101 is connected thermo sensing element (ex. Thermal protector).
Power Supply is operated by CN101 shorted condition.

2) Power Factor Control Circuit

This circuit has 5 functions as below.
A) To generate stable voltage
B) To reduce input harmonic currents
C) Over current protection
D) Over voltage protection
E) (Inrush current suppression circuit)

A) Generate stable voltage

This circuit operate as step up to 370Vdc(typ.) and voltage control. Actually, Q1,Q2(MC102) are switched by MC101.
Initial voltage setting of 370V output (between pin 1 and pin 3 of P2) has set at 370V (typ.) by VR101. (Input voltage : 85Vac , max. load)

B) Reduce input harmonic current

Normally switching power supply circuit is capacitor input type. Input current of this power supply has many harmonics, because of the conduction angle of input current is narrow. Therefore, an input current is distorted and this is a cause of low power factor. Main purpose of Power Factor Correction Control Circuit is reducing input harmonic current. MC101 senses input voltage (through R106, R107, R156 to pin1 of MC101), then compare the sine waveform and control Q1, Q2 (MC102) switching as correct sine waveform.

C) Over current protection

The peak current through Q1, Q2 (MC102) is detected at pin 2 ,pin 4 of MC101 as the voltage across R114. When the drain current of Q1, Q2 (MC102) goes over a certain limit, control ON-duty of them, and MC101 turns off.

D) Over voltage protection

PFC output voltage is adjusted at 12 pin of MC101 voltage by VR101. Even if this Connection to be open, it must be protected.

Over voltage protection stops oscillation in Q1 and Q2 by activating the over voltage protection of PFC control IC in MC101 when PFC output voltage becomes over voltage.And the over voltage protection starts oscillation again when voltage goes down to a certain level, and it repeats oscillation and stop.

E) (Inrush current suppression circuit)

Not related by PFC, but include inrush current suppression circuit . (TH101)
This circuit is to reduce (big) charge current through P2 lamp drive (Ballast) power supply and Charge current C114, at AC input timing.

3) Switching Converter

The main parts of switching converter are transformer T101, switching MOS FET Q3 (MC102) and output diode D201, D202. This converter is Fly Back type.
This means that energy is transferred from the primary to secondary when Q3 (MC102) is off.
The main output is 12V output and auxiliary output is 15V output.

4) Control Circuit

a) Start up

When AC input is ON, power source of IC101 is supplied from R129～R132 and start switching and then the converter is start. Once the converter begins switching, power source of IC101 is supplied from B1 winding of T101.

b) Output Voltage Control

The stabilization of output voltage is controlled by Pulse Width Modulation (PWM).
It is stabilized at 12V by resistance ratio of R206 and R207 based on the standard voltage at IC201.This stabilization is done by feedback from the secondary circuit to the primary circuit through Optoisolator PC102 and adjusting the level of current drawn from pin 2 of IC101.
When 12V output voltage is above the control level, IC101 to shorten the on-time (duty cycle) of Q3 (MC102).
This cause the average output to decrease. When the output is below the control level, on-time (duty cycle) is increase, thereby increasing the average output voltage.

c) Over Current Limit

The peak current through Q3 (MC102) is detected at pin 3 of IC101 as the voltage at both ends of R147.
When the drain current of Q3 (MC102) goes over a certain limit, IC101 turns off Q3 (MC102).

d) Over Voltage Limit

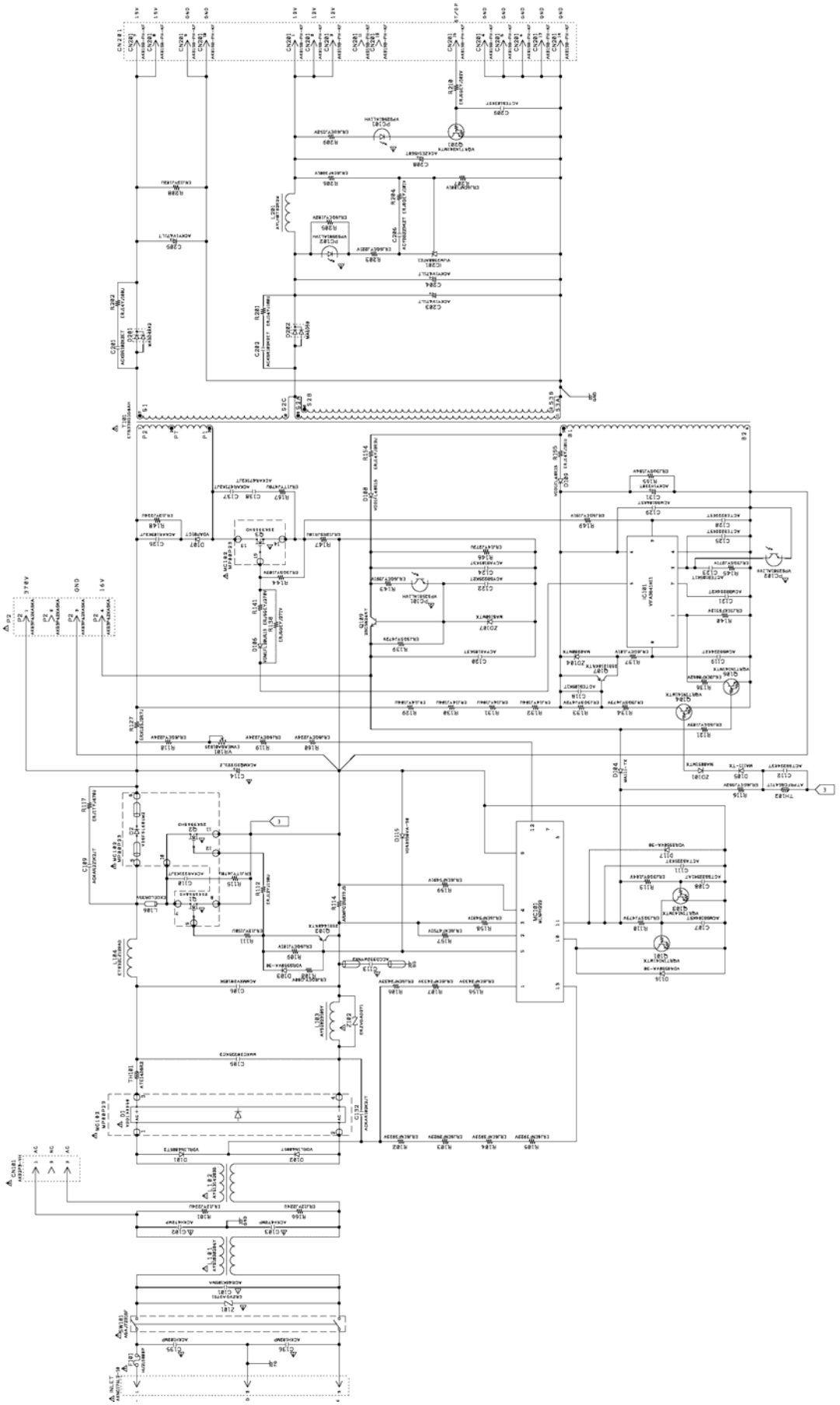
Output voltage is detected by winding voltage of B1-B2 (T101).
This voltage is same as Vcc of
IC101 (pin 6). If output voltage becomes over voltage condition, pin 8 of IC101 to be pulled up through zener diode ZD104, then power supply is shut down .(Latch)

e) Over Heat Protection

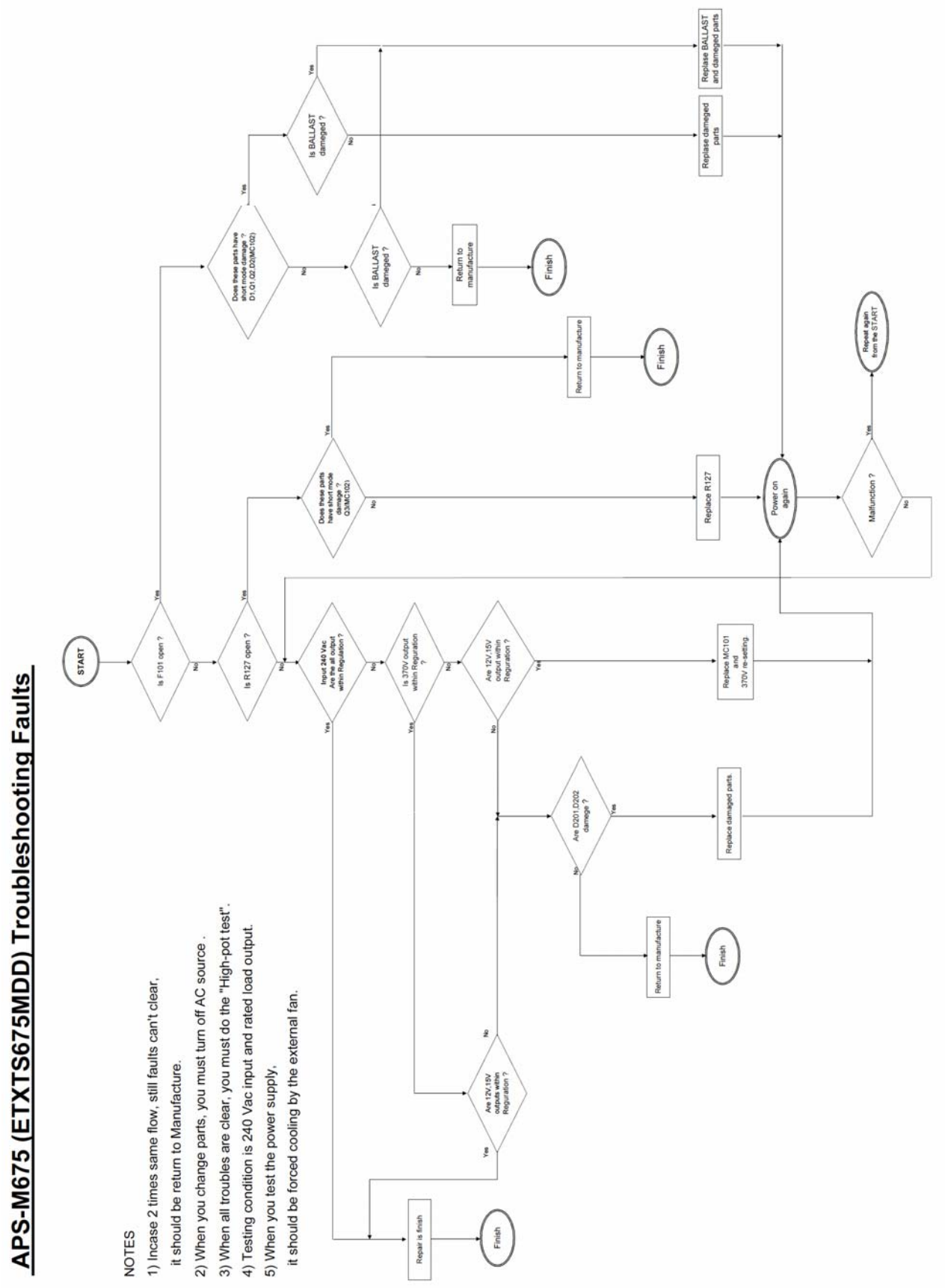
Over heat protection is detected Soldering parts temperature of Q1,Q2 (MC102) by TH102.
At abnormal condition (ex. Over-load or fan-lock) when over temperature from setting temperature, power supply shall be shut downed.

5) Secondary rectifier circuit

The cathode voltage of D202 is pulsating. D202,C203 and C204, which smooth out the pulsation to make a ripple voltage lower through LC filter at L201 and C208.



APS-M675 (ETXTS675MDD) Troubleshooting Faults



NOTES

1) Incase 2 times same flow, still faults can't clear,
   it should be return to Manufacture.
2) When you change parts, you must turn off AC source .
3) When all troubles are clear, you must do the "High-pot test".
4) Testing condition is 240 Vac input and rated load output.
5) When you test the power supply,
   it should be forced cooling by the external fan.

Electrical Adjustment

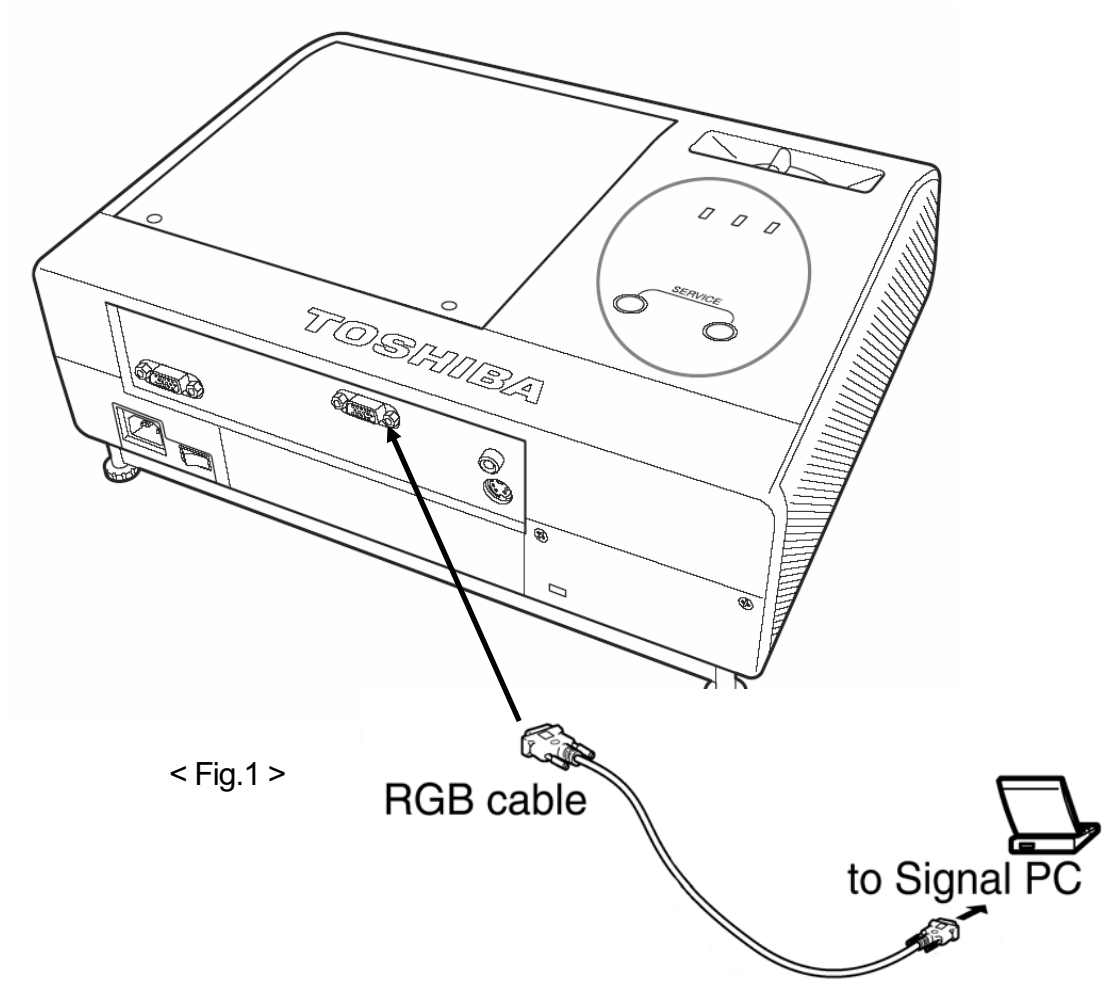
Preparation

< Test equipment >

1) Personal computer (Windows PC, OS: Windows 98SE, ME, 2000, XP)
2) Signal generating software
   SINGOWS2000.msi (Installer) and V_Ramp.bmp (Bitmap file)
3) Cables RGB Cable
4) Remote controller

< For connection and setting of Personal computer >

1) Connection of personal computer
   Connect the PC to computer input as shown in following Fig.1
2) Set the screen resolution and refresh rate to XGA (1024x768) 60Hertz.
   Set RGB output of the PC to CRT.



< Fig.1 >

Adjustment Points vs Part Replaced

The table below shows you the items to be adjusted according to the type of part you replaced.

Parts \ Adjustment	C/W Delay	Sub Contrast	Altitude	Lighting Position
Main Board	○	○	○	×
Optical Engine	○	×	×	×
DMD Chip	×	×	×	□
DMD Socket	×	×	×	□
DMD Board	×	×	×	□
Color Wheel	○	×	×	×
C/W Sensor Board	○	×	×	×

○ Adjustment is needed

□ Check and adjust if necessary

× Not necessary

< SAVE DATA to EEPROM > (Common on all adjustment)

Press the buttons of remote controller,
[ENTER] 4 times, **[RETURN]** 4 times, **[ENTER]** 4 times and **[RETURN]** 4 times.

When these operations are accepted, all LED's light orange.

Projector Setup

Plug in the power cord, turn on main power switch and the power of the projector.

How to enter to the Service Mode (TDP-ST20)

Press the buttons of remote controller,
[ENTER] 5 times, **[RETURN]** 5 times, **[ENTER]** 3 times and **[RETURN]** 3 times.

When the projector enters to the Service Mode, the buzzer beeps for 3 sec.

How to display the Service status

After the projector has entered to the Service Mode, press the buttons of remote controller,
[ENTER] 8 times and **[RETURN]** 8 times. Then, the following display appears.
If it doesn't appear, repeat from the beginning.
This service mode maintains until you turn off the Main power switch.

```
Version ( Main-OSD-Network )                    1000 - 1000 - XXXX
User lamp time                    1H - 10M - 10S                0
Total time                        1H - 10M - 10S
KC0      25 - 3473 - 2060         KC1     25 - 3473 - 1850
KC2      25 - 3473 - 2267         KC3     25 - 3460 - 2055
Sub contrast        69 - 69 - 69          Altitude          0
Fan1     2533rpm                          Fan2         2254rpm
Fan3     2363rpm                          Fan4         4765rpm
Temp1      25deg       Temp2      72deg  Temp3           35deg
Engine No.             000AAA0           C/W delay index     11
Error count               0              Shut down            0
Err log      0 - 0 - 0 - 0 - 0 - 0 - 0 - 0 - 0 - 0
Serial No.   63731126                    Model        TDP-ST20
Total time             Enable            Password      Disable
```

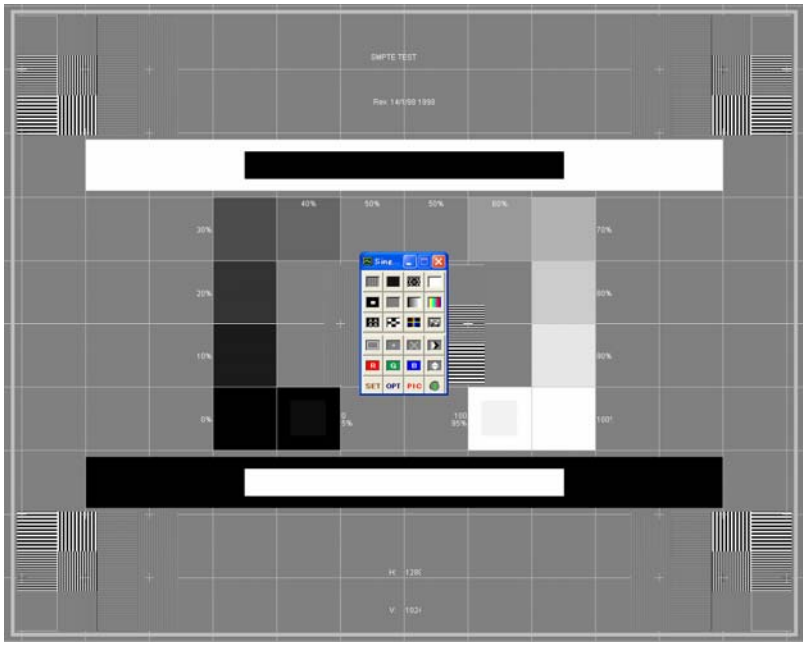
FAN1 is Z102 (Service part location No.). **FAN2** is Z101.
FAN3 is Z103. **FAN4** is Z100.
Temp1 is Intake temperature at Sensor Board.
Temp2 is Exhaust temperature at Sensor Board.
Temp3 is Main board temperature.
A number of **Error log** means an error ID.

< C/W index delay >

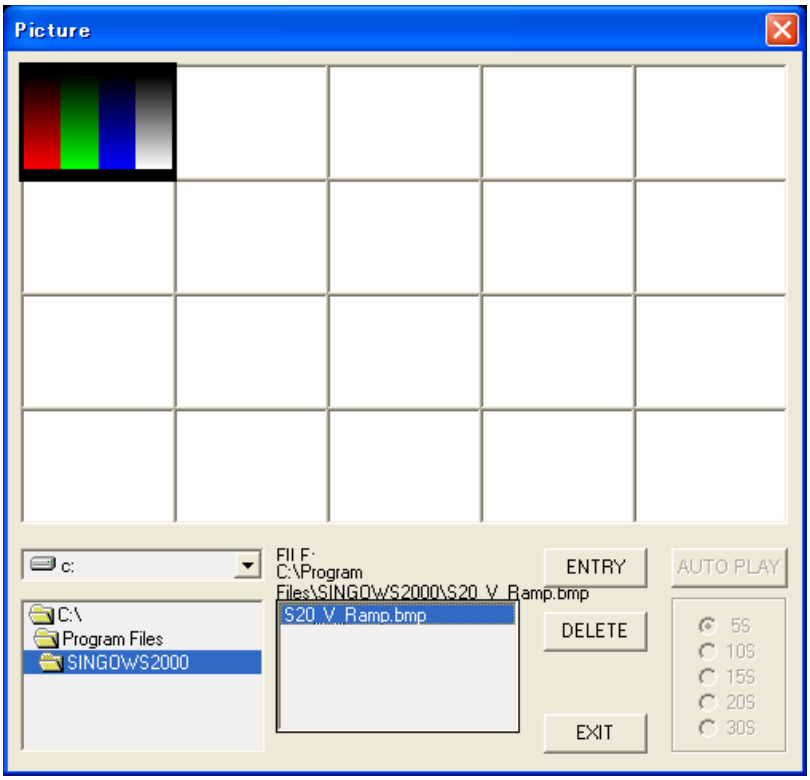
Press the buttons of remote controller,
[ENTER] 12 times and **[RETURN]** 4 times.
Then, the following display appears.
Select **C/W index delay** by pressing **[Down]** button.

KC0	0 -	0 -	2048
KC1	0 -	0 -	2048
KC2	0 -	0 -	2048
KC3	0 -	0 -	2048
Sub contrast	64 -	64 -	64
Altitude	0		
C/W index delay	10		

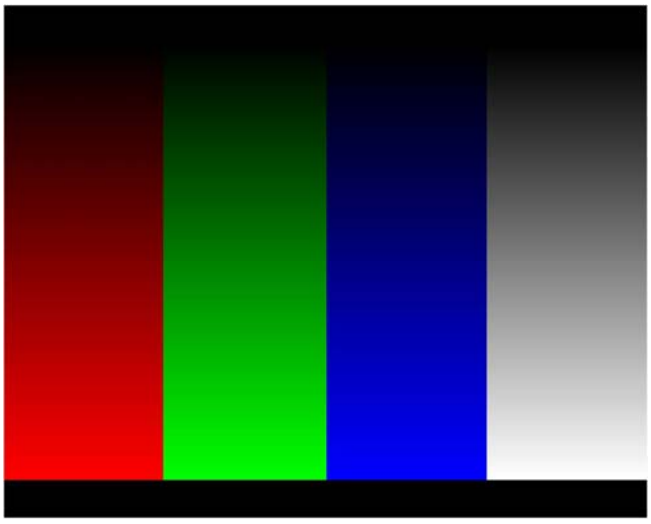
Start the signal generating software (SINGOWS2000.exe),
the following signal pattern appears and click **[PIC]** button.



The following Picture dialog box appears.
Select the downloaded file of **V_Ramp.bmp**.
Click **[ENTRY]** button.



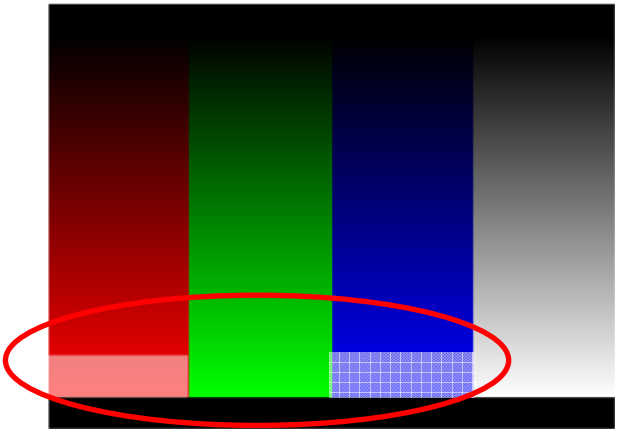
Double click the V_Ramp window, the following V-Ramp signal appears.



Adjust the C/W index delay by pressing **[Left]** or **[Right]** button

<STEP 1> Check on red and blue.

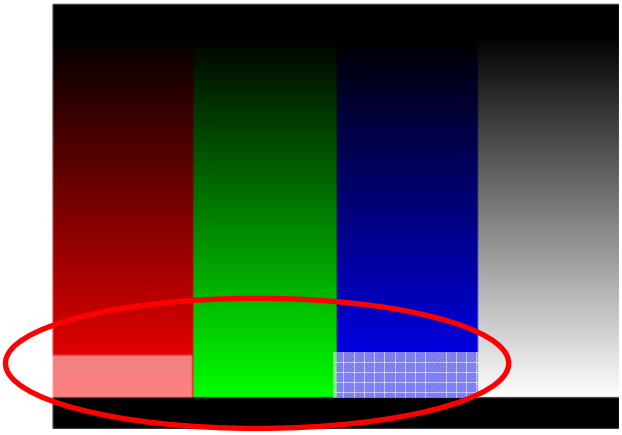
Read the value when the horizontal stripes (EX. Fig.2) is minimized and the value is referred to "A.".



< Fig.2 >

<STEP 2> Check on red and blue.

Read the other side value when the horizontal stripes (EX. Fig.3) is minimized, and it is referred to as "B."

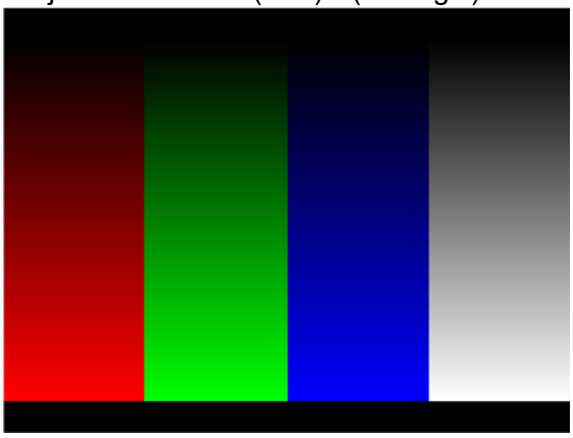


< Fig.3 >

<STEP 3>

Adjust the value to final adjustment value.

Final adjustment value = (A+B)/2 (EX. Fig.4)



< Fig.4 >

Then, press **[Esc]** key of PC and click **[EXIT]** button of picture dialog box for next adjustment.

< Sub contrast >

Right - click to display the following color pallets. Click **[White]** button.
Note: Move the mouse cursor out of a screen to avoid the error.

Select **Sub contrast** by pressing **[Up]** button.
Press **[Enter]** button of remote controller.

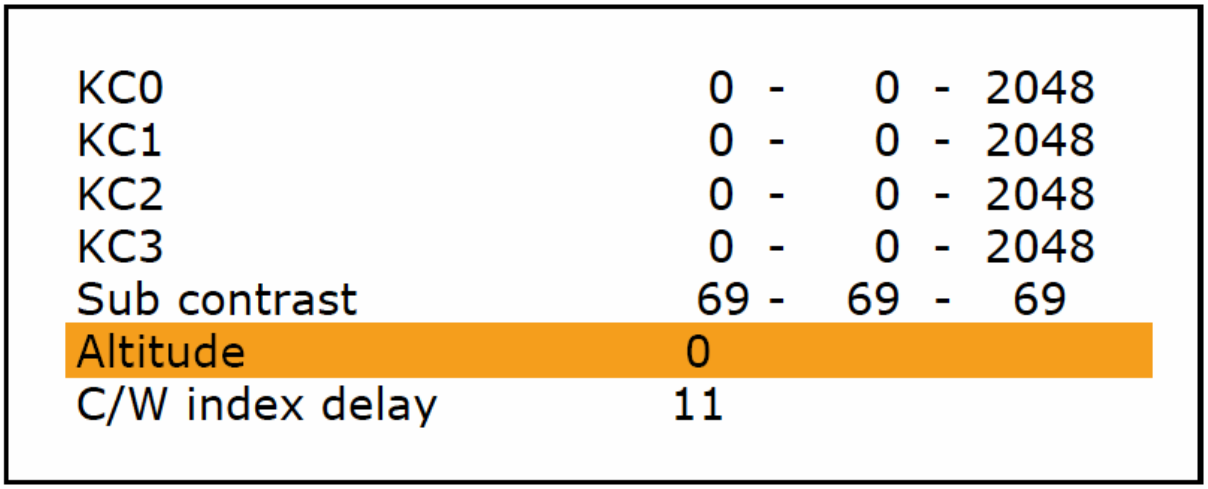
KC0	0 -	0 -	2048
KC1	0 -	0 -	2048
KC2	0 -	0 -	2048
KC3	0 -	0 -	2048
Sub contrast	64 -	64 -	64
Altitude	0		
C/W index delay	11		

Press the buttons of remote controller, **[ENTER]** 12 times and **[RETURN]** 4 times.
When the adjustment is successfully completed, values changes
from default [64]. (Example: The following menu)
If it fails, values don't change from default [64].

KC0	0 -	0 -	2048
KC1	0 -	0 -	2048
KC2	0 -	0 -	2048
KC3	0 -	0 -	2048
Sub contrast	69 -	69 -	69
Altitude	0		
C/W index delay	11		

< Altitude >

Select **Altitude** by pressing **[Down]** button and proper value
by pressing the **[Left]** or **[Right]** button of remote controller.
Factory setting is 0.
The value 1 is more than 500m (1,640ft) and under 1,000m (3,281ft).
The value 2 is more than 1,000m (3,281ft) and under 1,500m (4,921ft).
The value 3 is more than 1,500m (4,921ft) and under 2,000m (6,562ft).
The value 4 is more than 2,000m (6,562ft) and under 2,500m (8,202ft).
The value 5 is more than 2,500m (8,202ft) and under 3,000m (9,843ft).
The value 6 is more than 3,000m (9,843ft).
For example, in case of 2,700m altitude set the value to 5.



Press **[Return]** button.

Functional Test

You perform the functional tests after you've repaired the projector to make sure
All components of the projector operate properly.
You can also perform the functional tests if you're having trouble determining what is wrong with the projector.

Required Equipment

Equipment	Notes
Video player	Make sure the video player has an S-video Out port and cables. The player should also have a Composite video port (RCA). Toshiba strongly suggests you use a DVD player to test the Video quality. DVD players reproduce colors better and project Sharper images. The least preferable is a VCR.If you must use a VCR, make sure you use a commercially produces recoding not one recorded from a broadcast source. The VCR must include an S-Video connector in addition to a composite connector.
Commercially produced video	You'll need the video in DVD, etc. format.
Cables	1. RCA Pin jack cable for Composite video & audio. 2. S-video cable. 3. RGB cable that come with the projector. 4. 3.5mm mini-jack cable for PC audio.
Remote controller	Ensure that the remote has fresh batteries.
Projector screen	Use a flat screen, not a curved one.
Personal computer (PC)	The stereo audio card should have either a 3.5mm stereo audio Jack or RCA left and right output ports. The PC must have a CD-ROM and must have outputs for RGBHV, VESA, D-sub15pin.

Before beginning

Make sure the work surface where you perform the functional tests is level and clean.
Place the projector on a soft surface (such as an anti-static mat) when running the tests.

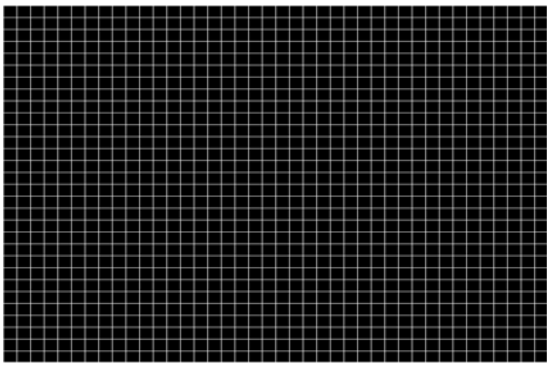
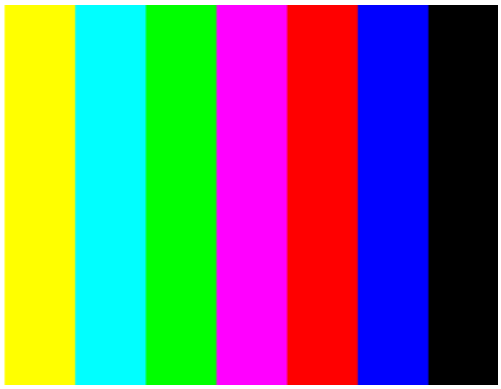
Connect the following the I/O panel on the projector.

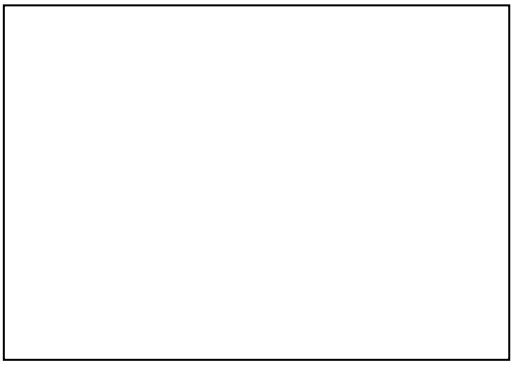
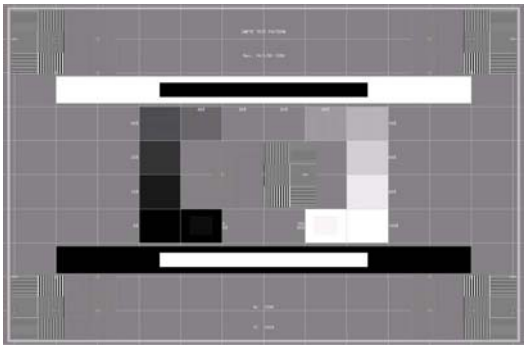
1. Video player through Composite Video and S-video ports.
2. Audio sources through Audio ports (RCA) or 3.5mm mini-jack.
3. Personal computer through RGB cable

.

Perform the following tests

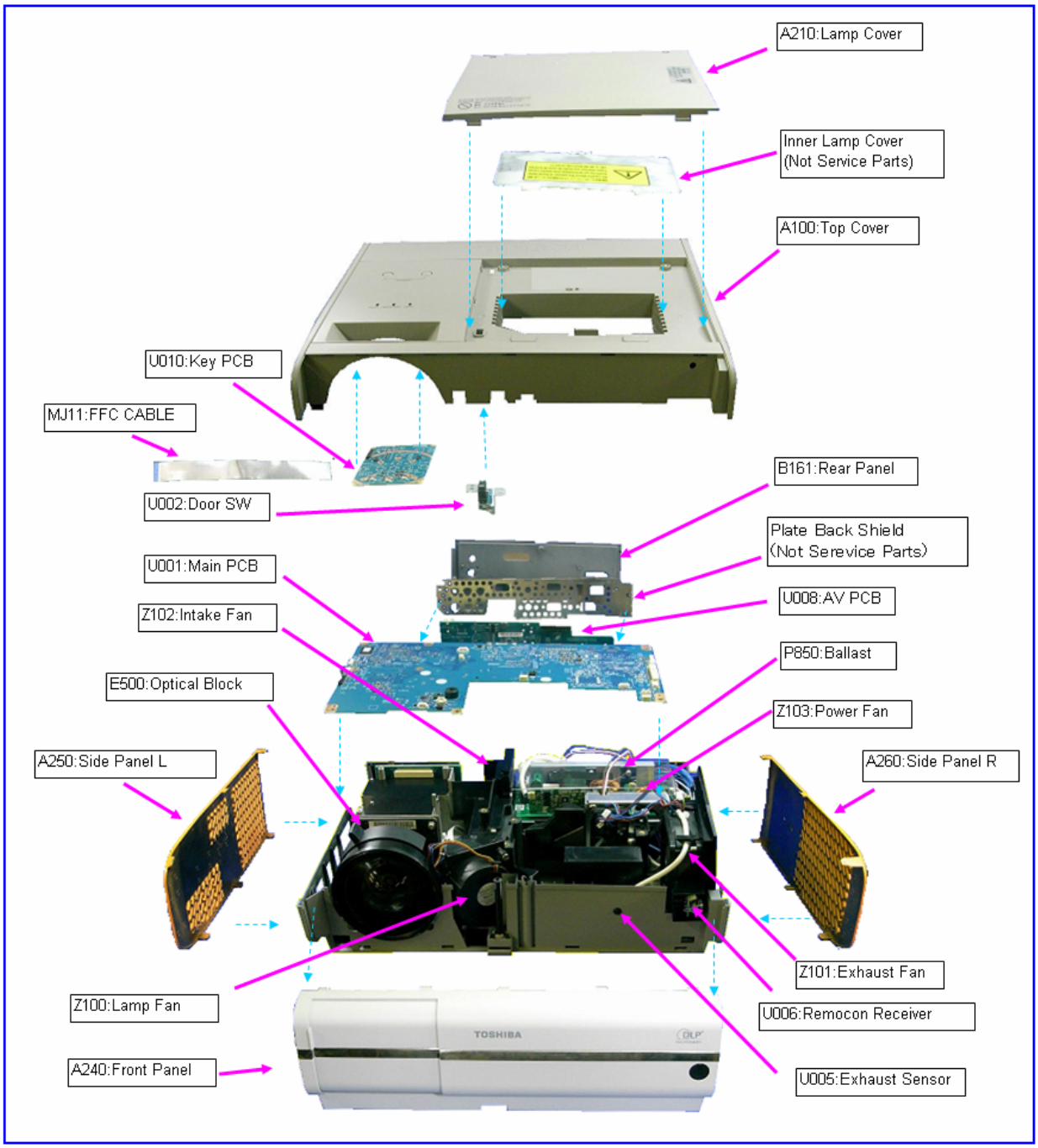
Test	Verification
Power Up Connect AC power, and turn the unit on.	Verify that the proper splash (logo) screen Appears. Verify image quality.
Cosmetics and mechanicals Adjust the projector so that the image is Square. Make sure the lens is at a 90 degree angle to the wall.	Verify that the elevator and leveling foot Are functional. Verify that the focus and zoom rings operate properly. Verify cosmetics.
Composite video from video source Connect the yellow composite (RCA) video Connector to the projector. (Ensure that no other video source is connected to the projector)	Verify that the video automatically synchronizes. Verify there is no distortion, noise or other abnormalities.
S-Video from video source Connect the S-Video cable to the projector. Disconnect the yellow composite (RCA) Video connector.	Verify that the video automatically synchronizes. Verify there is no distortion, noise or other abnormalities.
Image keystone adjustment Connect a video source to the projector.	Verify that image responds properly when You adjust the keystone setting.
Audio from audio source Connect the audio cable to the projector.	Verify that audio source plays through the projector's speaker. Verify that the volume controls function correctly.
Manual source selection Manually select a connected source.	Verify that the projector switches to the manually-selected source. Verify that the video automatically synchronizes. Verify there is no distortion, noise or other abnormalities.
Software Version / Lamp time Used Navigate through the Basic menu to the Setup menu. Navigate to the Service menu. Select info from the Service menu.	Verify software version Verify the keys are not sticky. Verify that the software version is current and that the lamp is within its service life.

Test	Verification
Focus SINGOWS2000 Cross Hatch image.	Verify that the image synchronizes properly through the computer 1 input.  Verify that image focuses through the full zoom range. Verify there are no problems.
Color Wheel Index Delay SINGOWS2000 Color bar image.	Verify that the image synchronizes properly through the computer 1 input.  Verify that the color is located in a line. Verify there are no problems

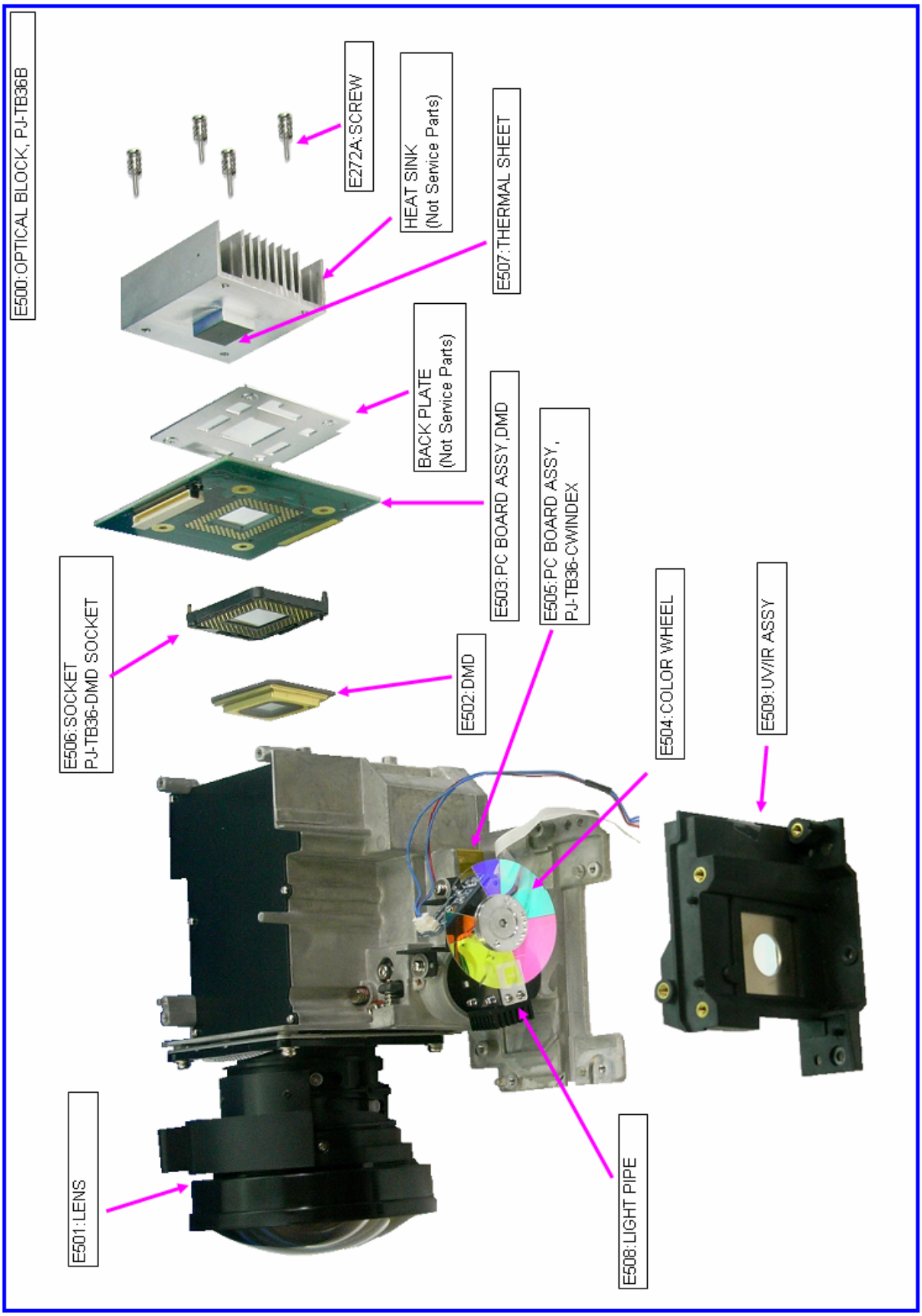
Test	Verification
LCD Images SINGOWS2000 White image (Level 100%) SINGOWS2000 Black image (Level 0%) SINGOWS2000 SMPTE image	Verify that each image synchronizes properly through the computer 1 input.    Verify there are no problems
System Reset On the keypad, press the Menu key. Navigate through the basic menu to the default setting menu. Select Reset all.	Verify that the image synchronizes after system reset.
Power Down After all tests are complete turn the power off and disconnect all cables. Attach the lens cap.	Verify unit is powered off before disconnecting cables.

Spare Parts List

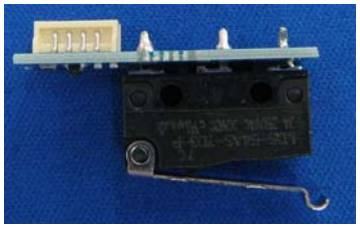
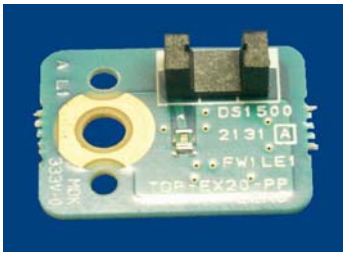
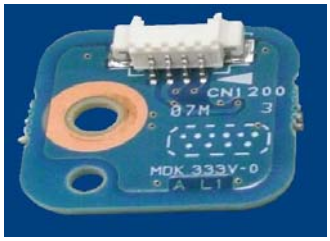
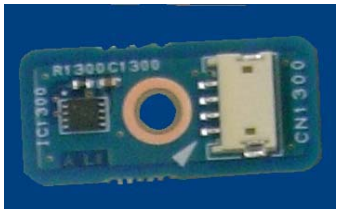
Exploded View



Exploded View (E500:Optical Block)



Other Parts

U002 **Door Switch**	
U003 **Lens Cover**	
U004 **Intake Sensor**	
U005 **Exhaust Sensor**	
U006 **Remocon Reciever**	
MJ02 **Thermal Switch**	

Spare parts list (TDP-ST20) GREEN

No	Location	Description	Part No	
			E	B
1	A100	COVER, TOP	75009012	
2	A103	SCREW	70391261	
3	A110	BRACKET, DOOR SW	75009000	
4	A210	COVER, LAMP COVER ST20	75009001	
5	A240	PANEL ASSY, FRONT ST20	75009018	
6	A250	PANEL, SIDE L ST20	75009003	
7	A260	PANEL, SIDE R ST20	75009004	
8	A403	BAG, PROTECTIVE	23943034	
9	B001	COVER ASSY, BOTTOM ST20	75009013	
10	B121	SCREW, FLAT PT5X10 SNI	23738062	
11	B126	SCREW, FLAT PT5X10 SNI	23738062	
12	B137	SCREW, FLAT PT5X10 SNI	23738062	
13	B161	PANEL, REAR ST20	75009002	
14	B167	SCREW, PP 3X6 SW+W SNI, PP3X6SW+W NI	23717323	
15	CN500	CONNECTOR, D-SUB, DZ11A92-ND201-7F	75004141	
16	E251	OPTICAL FILTER, ARG-T100	23405624	
17	E272A	SCREW, PP 3X6 SW+W SNI, PP3X6SW+W NI	23717323	
18	E500	OPTICAL BLOCK, PJ-TB36B	75009015	
19	E502	DMD, 1076-6318	75009016	
20	E503	PC BOARD ASSY, DMD	75009006	
21	E504	COLOR WHEEL, PJ-TB36-CW	75009011	
22	E505	PC BOARD ASSY, COLOR WHEEL, PJ-TB36-CWINDE	75009007	
23	E506	SOCKET, DMD	75009008	
24	E507	THEARMAL SHEET	75009009	
25	E508	LIGHT PIPE	75009010	
26	F2000	FUSE, CHIP 0.7A	75009395	
27	IC100	IC, 2506224-0002 POWER AND MOTOR DRIVER,	75008991	
28	IC101	IC, MP2307DN-C104-LF-Z, STEP-DOWN CONVERTER	75008993	
29	IC102	IC, 2507605-0001, IMAGE PROCESSOR	75008990	
30	IC103	IC, BD87A29FVM-TR	75004425	
31	IC105	IC, CDCDLP223PWR, CLOCK GENERATOR	75008995	
32	IC106	IC, CDCD5704PWR, CLOCK GENERATOR	75008994	
33	IC107	IC, BR24L16F-WE2	75001222	
34	IC108	IC, K4S641632K-UC75000, 64(1X16X4BANKS)MBIT SDRAM	75008989	
35	IC109	IC, M29W640FB70N6E, 64M(4MX16)BIT FLASH MEMORY	75008996	
36	IC110	IC, K4Y50084UE-JCB3000, 512M(16MX8X4BANKS)BIT	75008985	
37	IC1100	IC, PNA4612MO1TH	75001241	
38	IC111	IC, 2506593-0004, DMD POWER AND RESET DRIVER	75008987	
39	IC112	IC, LM393DR	75001228	
40	IC113	IC, TC7SH08FU(TE85L,F)	75001245	
41	IC114	IC, TC7SH08FU(TE85L,F)	75001245	
42	IC115	IC, SCHMITT INVERTER	75002121	
43	IC116	IC, TC74LCX273FT	75000895	
44	IC117	IC, TC7SH32FU(TE85LF)	75001247	
45	IC118	IC, TC7SH32FU(TE85LF)	75001247	

No	Location	Description	Part No	
			E	B
46	IC1200	IC, , G751-2RDF TEMPERATURE SENSOR AND THERMAL WATCHDOG	75004147	
47	IC122	IC, SCHMITT INVERTER	75002121	
48	IC123	IC, G751-2RDF TEMPERATURE SENSOR AND THERMAL WATCHDOG	75004147	
49	IC124	IC, TC7SH32FU(TE85LF)	75001247	
50	IC127	IC, TC7SH08FU(TE85L,F)	75001245	
51	IC129	IC, TC7SH08FU(TE85L,F)	75001245	
52	IC1300	IC, G751-2RDF TEMPERATURE SENSOR AND THERMAL WATCHDOG	75004147	
53	IC131	IC, TC7SH08FU(TE85L,F)	75001245	
54	IC2000	IC, ST3232EBTR RS-232 DRIVER AND RECEIVER	75008997	
55	IC2007	IC, PQ200WNA1ZPH	75004422	
56	IC350	IC, TC7WBD126AFK	75001220	
57	IC352	IC, G794D5U	75004421	
58	IC353	IC, PQ200WNA1ZPH	75004422	
59	IC354	IC, PQ200WNA1ZPH	75004422	
60	IC355	IC, PQ200WNA1ZPH	75004422	
61	IC356	IC, PQ200WNA1ZPH	75004422	
62	IC503	IC, SN74LVC2G17DCKR	75004411	
63	IC505	IC, BR24C21FV-E2 1K(128X8)BIT EEPROM	75008986	
64	IC514	IC, ISL51002CQZ-165 ANALOG FRONT END	75008992	
65	IC6101	IC, NJM2370U1-09-TE1	75001239	
66	IC6104	IC, TVP5147M1PFPRG4 VIDEO DECODER	75008988	
67	MJ02	WIRE HARNESS, THERMAL SWITCH	75009660	
68	MJ11	CABLE, FFC P0.5-30S	23389372	
69	P800	P0WER UNIT, MAIN, APS-M675	75008981	
70	P850	P0WER UNIT, LAMP, RPB-7489KC	75008982	
71	U001	PC BOARD ASSY, MAIN	75008970	
72	U002	PC BOARD ASSY, DOOR SWITCH	75008971	
73	U003	PC BOARD ASSY, LENS COVER	75008972	
74	U004	PC BOARD ASSY, SENSOR FW1S12	75008973	
75	U005	PC BOARD ASSY, SENSOR FW1S22	75008974	
76	U006	PC BOARD ASSY, REMOCON RECEIVER FW1RE2	75008975	
77	U007	PC BOARD ASSY, ANNTENA FW1AN2	75008976	
78	U008	PC BOARD ASSY, AV FW2AV2	75008998	
79	U010	PC BOARD ASSY, KEY FW2KY2	75008999	
80	Y202	MANUAL OWNERS MANUAL TDP-ST20, OWNERS MANUAL TDP-ST20	75008984	
81	Y260	POWER CORD, CEE250V6A 3M	23372167	-----
82	Y261	POWER CORD, UK250V6A MP5004 GR 3000L	-----	23372337
83	Y700	REMOCON HAND UNIT CT-90294, CT-90294	75008983	
84	Z100	FAN, SF6023RH12-52A	75008979	
85	Z101	FAN, T80T12MUB7-52J17	75008980	
86	Z102	FAN, 2806KL-04W-B59	23125939	
87	Z103	FAN, 2806KL-04W-B59-C5H	75009299	

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