INSTRUCTION MANUAL

AUTO CHART PROJECTOR

INTRODUCTION

Thank you for purchasing the Auto Chart Projector. To get the best use this instrument, please carefully read these instructions and keep this Instruction Manual in a convenient.

Precautions

- To ensure smooth operation, install the instrument on a level surface free of vibrations. Also, do not place any objects on the instrument.
- Use the specified source voltage.(±10% 50/60Hz ±1kHz)
- Before using the instrument, connect all cables properly.
- When not in use, turn the power off and dust cover on the instrument.
- To ensure a correct reading, do not soil the measuring window with finger prints, dust, etc. Also, do not touch the measuring nozzle except when cleaning.
- This machine is a precision instrument; install it in a place that is set to the following conditions: temperature (10-40℃), humidity(30-85%) and atmospheric pressure(70-106KPa). Avoid direct exposure to sunlight.

CONTENT

DISPLAY FOR SAFE USE

In order to encourage the safe use of this product and prevent any danger to the operator and others or damage to properties, important warnings are placed on the product and inserted in the instructing manual.

We suggest that everyone understand the meaning of the following displays and icons before reading the "Safety Cautions "and text.

Safety cautions

The safety contents are defined as different signs in these instructions as follows:

⚠ Danger	indicate the emergent situations, if not avoidable, the death or grievous harm will happen.
⚠Warning	Indicate the potential dangerous situations, if not avoidable, the death or grievous harm may happen.
⚠Caution	indicate the potential dangerous situations, if not avoidable, the light harm or farther harm may happen or the property of instrument may be influenced.

Operation

⚠ CAUTION

- Do not modify and touch the inside of the instrument.
  You may get an electric shock or the system may malfunction.
- Be sure to use the specified electrical current.
  If the supplied voltage is too high or too low ,the instrument may not work sufficiently ,may malfunction or cause an electric shock.
- Never yank the power cord to disconnect from receptacles but hold the plug.
  This can weaken the metal core of the cord and may result in a fire from short circuit, or an electric shock.
- If the metal core of the power cord is exposed, power turns ON and OFF by shaking the cord ,or cord plug gets so heated that one cannot hold it ,it means that the cord is damaged. Change the cord to a normal one immediately.
  It may cause an electric shock or a fire
- Do not crush or squeeze the power cord with heavy objects.
  If the cord becomes damaged ,it may cause a fire or an electric shock
- Wipe between the prongs of the power plug every once in a while with a dry cloth.
  If dust settles between the prongs that makes moisture absorb , a short circuit or a fir may occur.
- Do not use the instrument for other than the intended purpose
  It will not be responsible for accidents or malfunction caused by such carelessness.
- If you encounter any abnormal conditions such as smoke or strange smells, turn OFF the instrument and pull out the power cord immediately .After confirming the smoke is no more produced, contact your authorized distributor.
  If the instrument is used under abnormal condition, it may cause an electric shock or a fire.
- The instrument can only be used indoors.

In Storage

NOTE

- Do not store the instrument in a place where it may get wet or where poisonous gas or liquid is stored.
- Be sure to store the instrument in a place away from direct sunlight and within the specified temperature and humidity

In Transference

⚠ CAUTION

- To carry the instrument, hold it form the backside with both hands on its base. Otherwise , possible injury or the instrument damage may occur.
- Do not drug the instrument by its cord or cable. This may cause possible injury or the instrument damage.

In Installation

⚠ CAUTION

- Do not install the instrument near water. If water gets into the internal structure there is a possibility of an electric shock or instrument malfunction
- Please install the instrument in a horizontal and stable place.
  If the instrument is tipped over because of any accidental shock, it may hurt somebody around.

NOTE:

- Avoid using the instrument where wind from air conditioner blows directly. Dust may drift into the nosepiece and measurement may become in accurate.
- Do not use the instrument in a hot , humid or dusty environment. Be sure to install the instrument on a place which can keep the specified environmental conditions.

In Wirings

⚠ CAUTION

- Be sure to use a wall outlet equipped with a grounding terminal.
  Otherwise, it may cause an electric shock or a fire when it breaks or power leaks.

- Be sure to securely plug in the power cord.
  Insecure connections may cause a fire.

After Use

⚠ CAUTION

- When the instrument is not in use , turn the power OFF and put the dust cover on.

In Maintenance

⚠ CAUTION

- Be sure to replace fuses after turning OFF the power switch and disconnecting the powercord from the power inlet.
  You may get an electric shock.
- Be sure to replace fuses after turning OFF the power switch and disconnecting the power cord from
  the power inlet.
  You may get an electric shock.
- Be sure to use the specified fuses for replacement.
  This may cause a fire.
- When replacing fuses, do not change the number shown in the voltage indication window.
  If the voltage setting does not match the specified line voltage, it may cause a fire or a malfunction.
- In case that the instrument breaks down, disconnect the power cord from the wall outlet and contact your authorized distributor without touching the inside of the instrument.

NOTE:

- Never use an organic solvent such as paint thinner to wipe the exterior.
  It may ruin the surface.

Labels

In order to draw the operator's attention the appropriate warning labels are attached to the specified locations on main body.

The parameter of the power is on the center label of on main body.

WARNING INDICATIONS AND POSITIONS

⚠ NOTE

Disconnect before replacing lamp. This is to prevent electrical shocks. Lamp replacing must not take place immediately after the lamp went out because the heated lamp may burn your fingers.

Accessories

Standard accessories

No	Name	Number
1	Power cord	1
2	Calibration card	1
3	Silicone cloth	1
4	Spare fuse	2
5	Spare lamp	1
6	Dry battery	2
7	Hexagonal wrench for focus adjustment	2
8	Screen	1
9	Instruction manual	1

Optional accessories

Wall mount

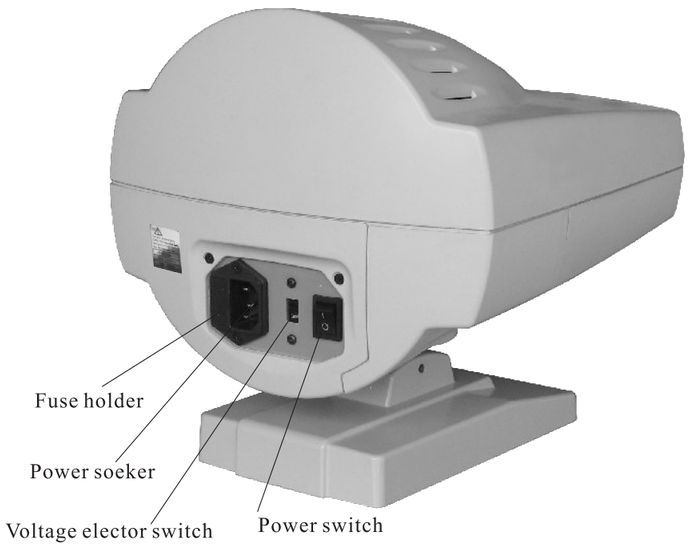
If the instrument cannot be placed on a table or on the ophthalmic unit, it can be mounted on a wall with the optional wall mount.

Specifications

1.Projection distance	1.5m---6.1m
2.Numbers of charts	30
3.Chart change-over	1 frame/0.03 second
4.Projection magnifications	30×(5m)
5.Numbers of mask	Open 1, Horizontal line 5, Vertical line 8, Single isolation 21, R & G 1
6.Mask change mask	1 frame/0.03 second
7.Program step	Max. of 30 steps are available × 2 type
8.Tilt range	+/-10° Upward/downward tilt form horizontal line of projection
9.Projection lamp	50W/12V
10.Automatic shut-off mechanism	After 10 minutes
11.Electricity	AC 110,120,220,230,or 240V, 50/60Hz (adjustable by voltage selector on the fuse holder)
12.Power consumption	80VA
13.Dimensions	300mm(L)×230mm(W)×24mm(H)
14.Weight	6 kgs

Names of parts

Names of parts on the main body



Remote controller

1 . Light emitter

2 . Chart switch

3 . Program back switch

4 . Program forward switch

5 . Reset switch

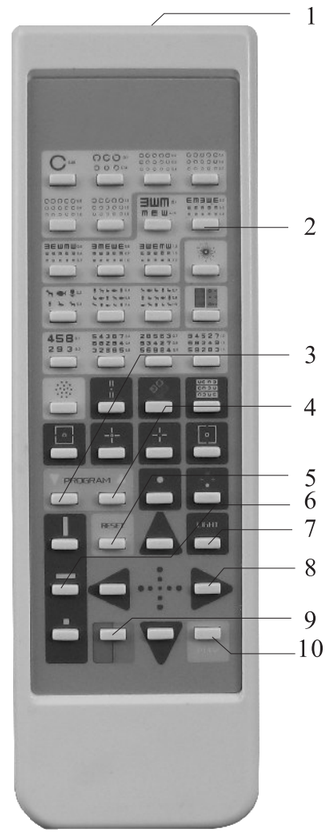
6 . Light switch

7 . Mask selector

8 . Mask transfer switch

9 . Red & Green switch

10 . Program switch



Operation procedures

Preparations

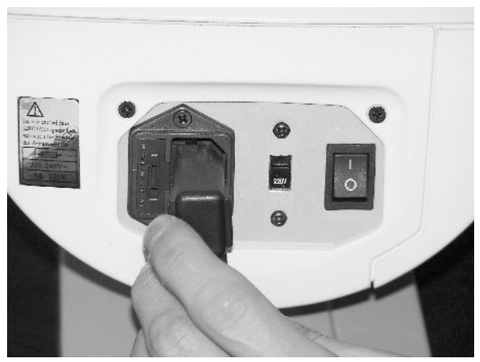
⚠ CAUTION	Do not tilt the device or place it in an unstable place. Otherwise, the device may topple over, drop or cause injury.

⚠ WARNING	Connect the power plug to a three-prong properly grounded AC socket with an earth. If it is connected to socket that is not grounded , it can cause a fire and electric shock due to leakage.

⚠ CAUTION	Handing the power plug with wet hands can cause electric shock.

⚠ CAUTION	When this instrument is not used for a long time, remove the batteries from the remote controller.

1. Place the instrument at the same level as the person to be measured.
2. Turn the power 'off '.
3. When more than two instruments are installed in close proximity to each other, it is necessary to set the channel by the DIP switches of the body and the signal channel switches of the remote controller in order to avoid interference.
   * At the time of shipment, the instrument is set at channel 1.
   * To change the channel, see page 20.
4. Insert connector of the power cord into the power socket on the body and insert the power supply plug into the outlet.

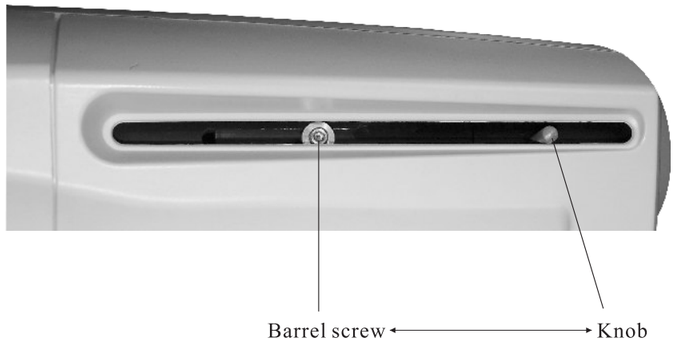


5. Turn the power switch ‘on’.
6. Open the battery cover from the back of the remote controller.
7. Insert the dry batteries into the remote controller as illustrated and replace the battery cover.

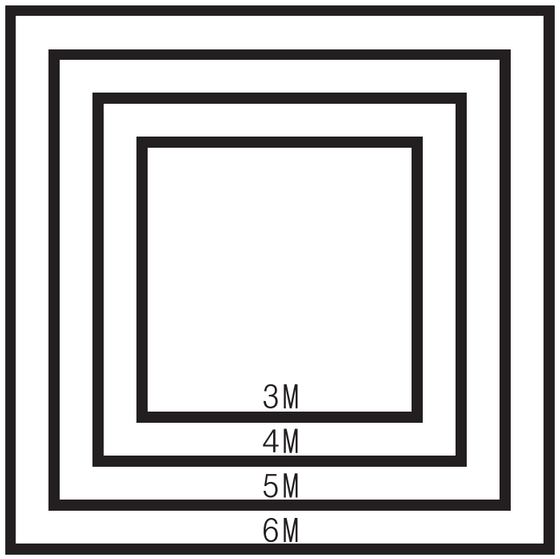
8. Adjust the position of the body so that the projected light is centered on the screen.

9. Loosen the barrel screw about a half of a turn with the attached hexagonal wrench.

Move the knob in the arrow direction so that the projection on the screen is sharp and clear. For proper calibration, the projection of the chart which has 0.1(or 20/200) visual acuity should contact the inner side of one of the scales on the calibration card which correspond is to the desired refracting distance.



10. If the size does not match the respective refracting distance scale, move the instrument either toward or away item the screen and then repeat items 9 above.
11. Fix the barrel screw to complete preparation.

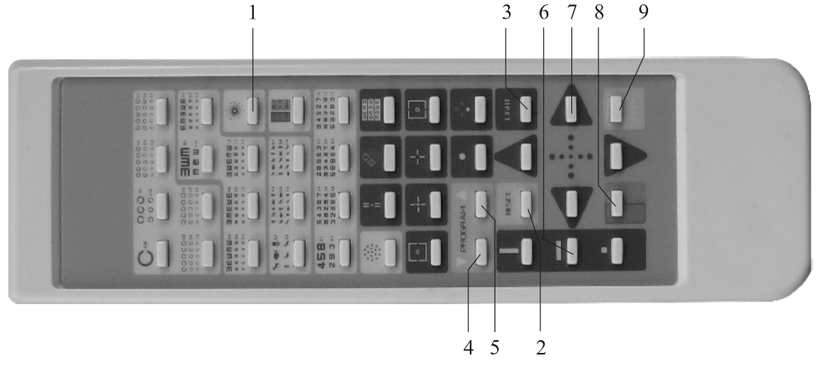


Usage guide

Operating the random access controller

1. Turn the power switch on. The chart will be reset to the start position and the lamp will right up.
2. Direct the light emitter on the remote controller to the sensor on the projector body or use a wall with high reflectivity to receive the reflected light on the light emitter and press each switch before using.

• Switch functions



1. Chart switch .....Projects the chart as indicated on the switch.
2. Reset switch.....Returns to the step 1 chart.
3. Light switch.....Turns the lamp on/off.
4. Forward switch.....Automatically advances the step in the program.
5. Back switch.....Automatically backs the step in program.
6. Mask selector.....Allows selection of a mask that is appropriate for the chart.(horizontal mask, vertical mask, one character mask).
7. Mask transfer switch.....Moves the mask in the direction as indication on the switch. When the mask moves to the maximum(minimum) indication of a chart being projected, the next (previous) chart in the sequence will automatically appear. Charts can be switched within the same type of charts.
8. R&G filter switch.....R&G filter can be applied only for the chart that allows R&G filtering.
9. Switch the program P1 with the program P2.

* See P.13 for using the program function.

* When the lamp is turned off, the lamp will light up by pressing either the 1 or 3-9 switches.
* When the mask is not open, it will automatically be open by pressing the (1) chart switch.
* When the instrument is not used for 10 minutes, it will be automatically turned off the lamp.(The work led is twinkled)

Using the program functions

How to program the measuring procedure

(1). To start programming

Turn the power switch on. The chart will be reset to be start position and the lamp will light up. Press the reset switch, the buzzer sounds twice. Select either program 1 or 2 by pressing P1 or P2. (Buzzer once:P1 initial value, buzzer twice :P2).press R&G filter switch, the buzzer sounds thrice. Press the '▲'switch, the buzzer sounds thrice.

(2). Programming the charts

Press the chart switch or the mask switch according to the measuring procedure project and press the. The buzzer sounds four times and this completes one step.

* Repeat this to program the procedure. Programming is available for up to 30 steps.

(3). Completing the programming

Press the reset switch, this completes the programming.

* Programming 30 steps will automatically complete the function without pressing the reset switch.

* Turning the power switch off won't erase the program.

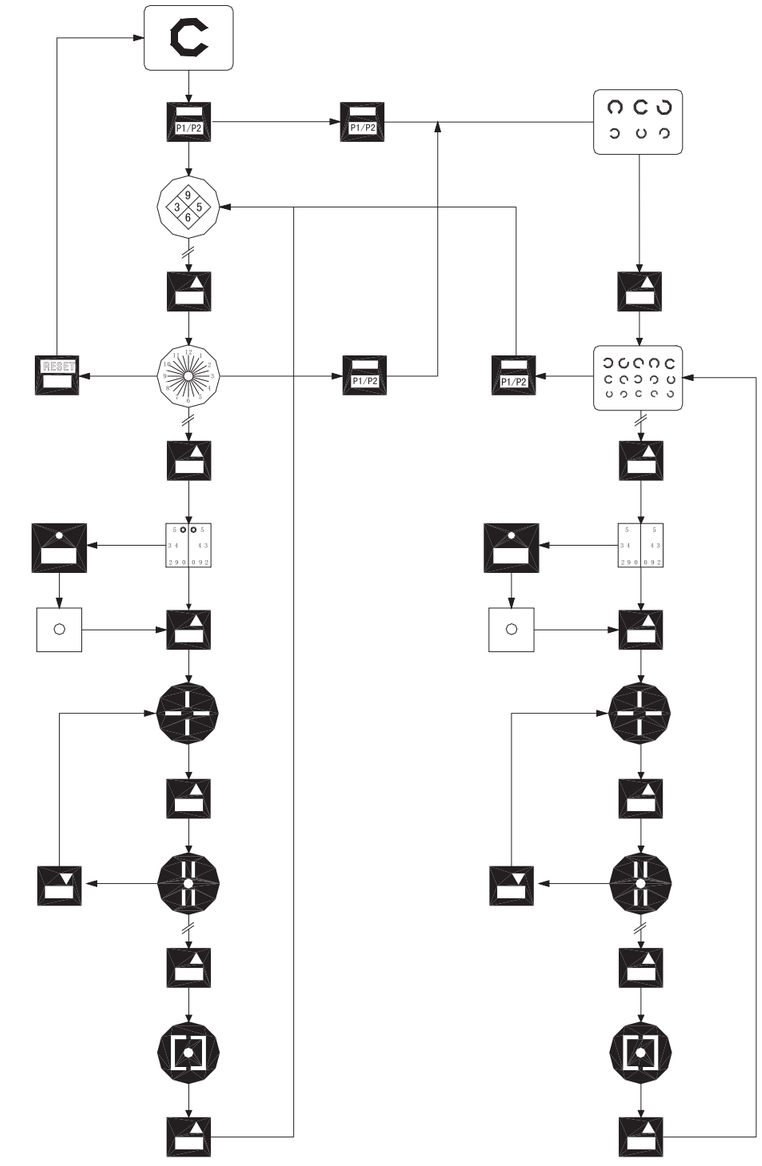
* Follow the steps above to start a new program. The former program will be erased to start a new program.

(4).Used the program

Press the P1/P2 switch.(Buzzer once:P1 initial value, buzzer twice :P2). Press the '▲' switch, the buzzer sounds twice. Then press the program switch.

Carrying out program-base examinations

Press "p1/p2" select p1, p2



Using charts for measuring binocular visual function

		Polarized R and G test	Binocular balance test	Worth four dot test
	Chart			
	Filter	Polarizing filters	Polarizing filters	Red filter for the right eye and green filter for the left eye
	Purpose	Test of binocular refraction and accommodation balance	Test of the final binocular refraction balance	Test of the function of binocular
How the charts are viewed	Right eye			
	Left eye			
	How the charts are seen binocularly	Myopia: The right eye is over corrected and the left eye is under corrected.  The left eye is over corrected and the ritht eye is under corrected.  Hyperopia: The left eye is over corrected and the right eye is under corrected.  The right eye is over corrected and the left eye is under corrected.  The binocular refraction and accommodation balance are achieved when the two reds or two greens are seen at the same intensity. 	There is a variance of degree between the right eye and the left eye.  Adjust the spherical power to provide binocular balance. 	In the case where 4 dots are seen, there will be normal fusion. The white (bottom) color indicates which eye can see better. If red is seen mixed with green, the right and left eyes function at the same level.  If only two targets are seen, the left eye is suppressed.  If only three green targets are seen, the right eye is suppressed.  If five targets are seen, it indicates that the patient has diplopia.. 

Polarized crosshair test	Reticle heterophobia test with a fixation target	Coincidence test	Coincidence test	Stereo test
				
Polarizing filters	Polarizing filters	Polarizing filters	Polarizing filters	Polarizing filters
Test of the accommodation balance and heterophobia	Heterophobia which can not be examined by the reticle testing is tested	Test of the aniseikonia and vertical heterephobia which can not be examined by polarized crosshair test	Test of the aniseikonia and vertical heterephobia which can not be examined by polarized crosshair test	Test the presence of stereoscopy
				
				
Esophoria  Exophoria  Left eye hyperphoria  Left eye hyperphoria  If either line is seen thiner, the eye in question is suppressed. 	The right eye has an infixation disparity. Indicates that the right eye has an infrafixation disparity. Indicates that the right eye has an infrafixation disparity. Indicates that the left eye has an infrafixation disparity. If either line is seen thiner, the eye in question is suppressed.	Aniseikonia of about 7%(equivalent to two lines). A single line indicates about 3.5%. Vertical heterophoria If either line is seen thinner, the eye in question is suppressed.	Aniseikonia of about 7%(equivalent to two lines). A single line indicates about 3.5%. Vertical heterophoria If either line is seen thinner, the eye in question is suppressed.	Two lines are seen in fusion form a single line image and central circle. The binocular parallaxes is about 1.1m (when seen at a distance of 5m with a PD of 64mm) If the axis of the polarizing filter is reversed at the same time for both eyes and seen sunk about 2.1m, it is normal. If the images are slowly fused, there is still correctable heterophoria. Verify with another heterophoria test. If it takes some time until the image appears to float, the patient may have an exophoria. If it takes some time until the image sinks, the patient may have an esophoria.

Care and check

Daily Maintenance

- This instrument is very sensitive to dust. Protect the instrument with the dust cover when it is not in use.
- Turn the power switch off when the instrument is not used.

Replacing the projection lamp

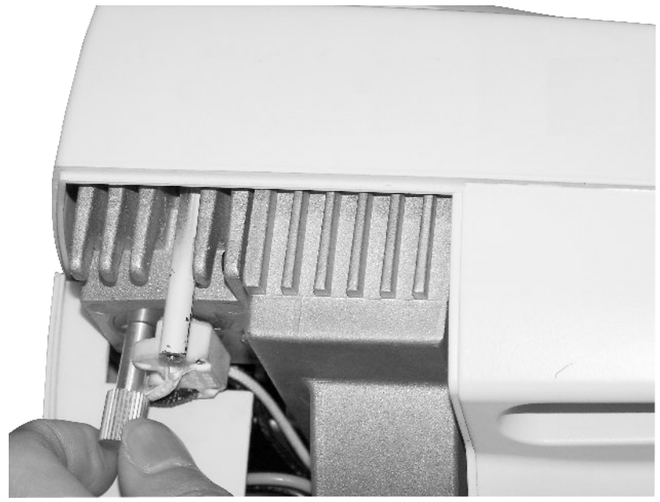
⚠Caution	To avoid electric shock, unplug the power cable when replacing the projection lamp.

⚠Caution	Do not replace the projection lamp immediately after turning off the light. Otherwise, you might get burnt by the not temperature of the lamp.

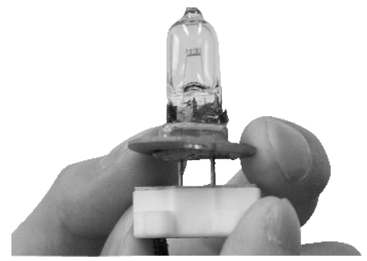
1 . Turn the power switch off.

2 . Remove the lamp cover's screw and remove the cover.

3 . Remove the lamp attaching screws, hold the socket and remove the lamp.



4 . Hold the socket and the lamp flange and remove the lamp from the socket.。



5 . Install the spare lamp securely as shown in the diagram. Make sure that you install it in the correct direction.(see diagram)

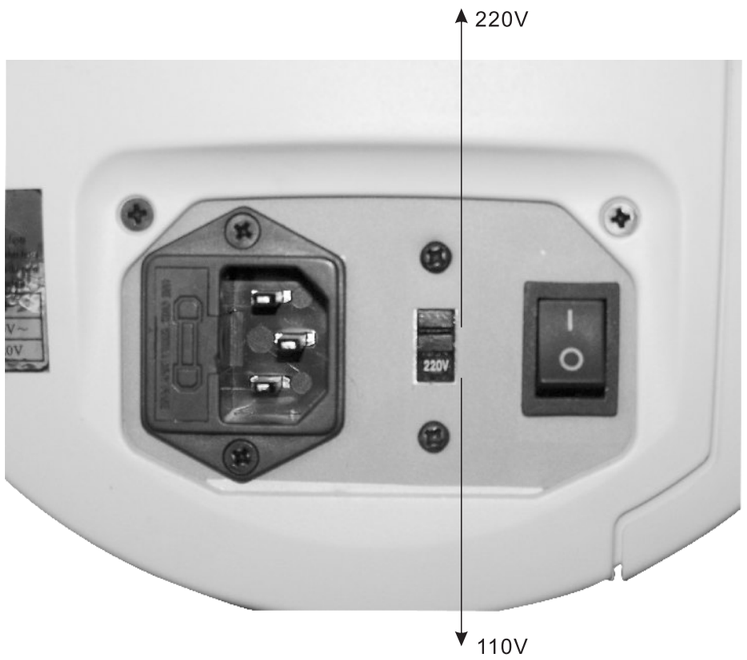
Note： Do not touch the glass tube of the lamp directly with your finger. In case you touch the glass tube by accident, wipe the finger points off with alcohol.

6 . Match the protruded part of the lamp attaching area with the lamp flange notch and tighten them with the lamp attaching screw to secure the lamp.
7 . Place the lamp cover on.
8 . Turn the power switch ‘on’.
9 . Make a trial projection to check that there is no illumination irregularity. If there is any irregularity, turn the power off again and check that the lamp is installed properly.

⚠ Warning	Please be sure of current voltage before use the instrument.

Changing voltage selector switch

1. Turn the power switch ‘off ’and disconnect the power supply plug.
2. If you need 110V or 220V voltage, please change voltage.(see diagram)
3. You must replace the Fuse.(see replacing the Fuse)



Replacing the Fuse

⚠ Warning	Unplug the power cable before removing the fuse cover to replace the fuse. Removing the fuse cover with the power cable plugged in can cause electric shock. Do not install the power cord on the body with the fuse cover removed.

⚠ Warning	Use only attached fuse(For 110,120V range: 2A,250V For 220,230,240V range: 1A,250V). Using other fuses may cause a fire in the event that the instrument fails.

1. Turn the power switch ‘off’ and disconnect the power supply plug.
2. Simultaneously squeeze both sides of the fuse holder and then remove the fuse holder. The fuses will be removed together with the holder.

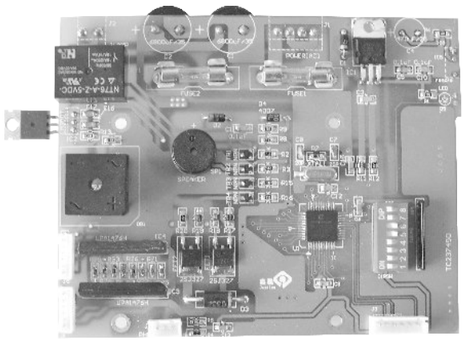
3. Remove the blown fuses and insert the spare fuses on the cap of the fuse holder and install it as before (Press to install it). Use the attached fuses specified below.

Changing the channel setting of the remote controller

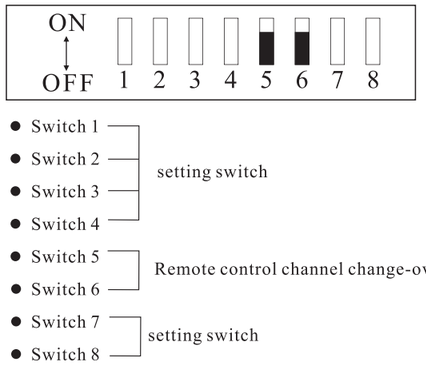
1. Turn the power switch ‘off ’and unplug the power cable.
2. Remove the lamp cover screws and the screws on the lower cover (four in total) and lift the top cover to remove it.
3. Change the DIP switch 5 and 6 according to the diagram on page 21.

4. Remove the battery cover from the back of the remote controller and change the channel switch S1 and S2

DIP switch position on the motherboard



Enlarged view of the DIP switch on the motherboard



Channel switch position on the remote controller

If only has one channel switch on your remote control

Channel	Remote control	Motherboard	
		5	6
1	SW= left	ON	ON
2	SW=right	ON	OFF

If have two channel switch on your remote control

Channel	Remote control		Motherboard	
			5	6
1	S2 = L	S1 = L	ON	ON
2	S2 = L	S1 = R	ON	OFF
3	S2 = R	S1 = L	OFF	ON
4	S2 = R	S1 = R	OFF	OFF

5.Replace the top cover after completing the DIP switch setting, tighten the three screws on the lower cover (with the lamp cover removed) and then tighten the lamp cover with attaching screw.

Maintenance

Clearing the cover

Request	Do not wipe the replace area on the body with a volatile solvent. Wiping the area with thinner, either, gasoline etc. can cause the color to change and the quality to deteriorate.

1. Wipe the cover and the operating panel with a dry cloth when they get dirty.
2. When the cover is very dirty, reduce a neutral detergent for dish washing with hot water, dampen a cloth with the mixture wring the water out, and wipe off the dirt.

* When the lens is dirty, wipe it lightly with a dry soft cloth.

Troubleshooting

Operating procedures for troubleshooting

⚠ Warning	Do not break down, modify or repair the equipment. Doing so can cause electric shock. Request a repair from your dealer.

Situation	Example	Action
The projection lamp does not light with the power switch on.	● Is the power supply plug connected to the incoming line source?	Plug it securely in the outlet.
	● Is the power cord connected?	Plug it securely in the power on the motherboard
	● Is the fuse blown	See P.20 for fuse replacement.
	● Is the lamp burnt out?	See P.17 for lamp replacement.
The instrument does not function when the remote controller switch is pressed.	● Are the batteries fresh?	Replace the battery.
	● Is there anything interrupting the light emitter on the remote controller and the sensor on the motherboard?	Remove the interrupting object.
	● Is the remote controller set at proper channel setting with the motherboard?	See P.20 for adjusting the channel.