

**NIDEK**  
**CHART PROJECTOR**  
**Model CP-670**  
**OPERATOR'S MANUAL**

\* Specification and design are subject to change without notice for improvement.

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**BEFORE USE, READ THIS MANUAL.**

This manual contains information necessary for correct and effective operation of NIDEK Chart Projector Model CP-670, and provides procedures for operation, cautions, specification, and procedures for maintenance.

In this manual, IEC 60601 and UL standards are applied. For correct use, it is necessary that this manual, in particular the operating procedures, be thoroughly understood before using this instrument.

Keep the manual handy to verify use.

There are no user-serviceable parts inside the instrument except fuses and batteries. If you find any problem or question about the instrument during the operation, please contact your authorized distributor.

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# **§1 INTRODUCTION**

## **1.1 Outline of Product**

NIDEK Chart Projector Model CP-670 is developed as the newest chart projector, which has features such as wide screen, 33 charts, etc. The wireless remote control takes charge of the whole operation, which makes it possible to have outstanding operation ability in refraction. The CP-670 also has many remarkable features such as a program function to present charts in a programmed order, various masking functions, etc. Also, when the instrument is synchronized with a NIDEK RT, it is possible to control whole operations with the control box.

## **1.2 Classifications**

### **[Classification under the provision of 93/42/EEC(MDD)] Class I**

CP-670 is classified into Class I system.

### **[Protection method against electric shock] Class I**

CP-670 is classified into Class I instrument.

Class I instrument in which protection against electric shock does not rely on basic insulation only, but which includes an additional safety precaution in such a way that means are provided for the connection of accessible conductive parts to the protective (earth) conductor in the fixed wiring of the installation in such a way that accessible conductive parts cannot become live in the event of a failure of the basic insulation.

### **[Degree of protection against electric shock] Type B**

CP-670 is classified into Type B instrument.

Type-B instrument with an internal electrical power source providing an adequate degree of protection against electric shock particularly regarding;

- allowable leakage currents
- reliability of the protective earth connection (if present).

### **[Degree of protection against ingress of liquids] IP20**

CP-670 is the ordinary instrument (enclosed instrument without protection against ingress of liquids). Be careful not to splash water on the instrument.

### **[Method(s) of sterilization or disinfection recommended by the manufacturer]**

CP-670 does not have any part to be sterilized or be disinfected.

### **[Degree of protection against flammability]**

CP-670 is classified as an equipment not suitable to be used in a potentially flammable environment.

Do not use near flammable materials.

**[Mode of operation]**

Continuous operation

## 1.3 Symbol Information



This symbol means degree of protection against electric shock is for Type B instrument.



This symbol on the main switch indicates that the power is ON.



This symbol on the main switch indicates that the power is OFF.






This symbol indicates that the alternating current should be applied to the instrument.



This symbol indicates a fuse.

## §2 SAFETY

In this manual, Signal Words are used to designate a degree or level of safety alerting, whose definitions are as follows.

-  **DANGER:** Indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.
-  **WARNING:** Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.
-  **CAUTION:** Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury or property damage accident.

### 2.1 Operation

#### CAUTION

- Never disassemble or touch the inside of the instrument.  
This may result in an electric shock or instrument malfunction.
- Do not put your hand on the top cover because the temperature over the top cover of the instrument will be raised while the Halogen lamp is lit.  
Otherwise, you will burn your hand.
- Never yank the power cord to disconnect from wall outlet but hold the plug while disconnecting.  
This can weaken the metal core of the cord and may result in a short circuit or an electric shock.
- Do not place the instrument on the power cord.  
The sheath of the cord becomes ragged and may cause an electric shock or a short circuit.
- 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. Immediately replace the cord.  
This may cause an electric shock or a fire.
- Do not use the instrument for other than the intended purpose.  
NIDEK will not be responsible for accidents or malfunction caused by carelessness.
- In the event of a malfunction, do not touch the inside of the instrument, but unplug the power cord and contact your authorized distributor.

## 2.2 Storage

### NOTE

- Do not store the instrument in a place where it may get wet or where poisonous gas or liquid is stored.
- Avoid storing the instrument in an area with excessive heat, humidity or dust.  
To preserve the appearance or internal parts of the instrument, avoid direct exposure to sunlight.

## 2.3 Installation

### CAUTION

- Do not install the instrument near water.  
If water gets into the internal structure, there is the possibility of electrical shock or instrument malfunction.
- Install the instrument in a stable and level place where vibration or shock does not occur.  
The instrument may not perform observation correctly or may malfunction.  
Also, if the instrument is tripped over because of any accidental shock, it may result in possible injury.

### NOTE

- Use the instrument under the following circumstances.  
Dust free environment  
Place away from direct sunlight  
Light interference free environment  
Vibration and shock free environment
- Install the instrument in the environment whose condition can be set to the following. Use the instrument under the following temperature and humidity.  
Use environment    Temperature :    10 - 40°C  
                                 Humidity :        30 - 85% (non-condensing)
- Install the instrument in a place where the remote control sensor is not exposed to direct sunlight.  
The remote control may not function properly if the remote control sensor is exposed to direct sunlight.

## 2.4 Wiring

### CAUTION

- Be sure to use the wall outlet which meets the requirements of power specification.  
If the line voltage is too high or too low, the instrument may not give full performance.  
Malfunction or a fire also may occur.
- Be sure to use a power outlet equipped with a grounding terminal.  
Otherwise, this may cause electric shock when it breaks or power leaks.
- Be sure to securely plug in the power cord.  
Insecure connections may cause a fire.
- Be sure to securely plug in the interface cable.  
Insecure connections may cause a malfunction.  
Accessory equipment connected to the analog and digital interfaces must be certified according to the representative appropriate national standards (for example, IEC 60601-1.)  
Further more all configurations shall comply with the system standard IEC 60601-1-1. Everybody who connects additional equipment to the signal input part or signal output part configured a medical system, and is therefore responsible that the system complies with the requirements of the system standard IEC 60601-1-1. If in doubt, consult the technical service department or your local representative.

## 2.5 After Use

### CAUTION

- If the instrument is not used for a long time, disconnect the power cord from the wall outlet.  
This may cause a fire.
- Remove batteries from the battery case of the remote control when the remote control will not be used for a long time.

**NOTE**

- If the instrument will not be used during an extended period of time, turn off the main switch and put the dust cover over the instrument.  
If dust settles on the optical parts, charts become hard to see.

## 2.6 Maintenance and Checks

**⚠ CAUTION**

- As the projection lamp can get quite hot, replace it when it is cool.  
Otherwise, it may cause an injury.
- In replacement of the lamp, do not touch the inside of the instrument except the lamp, lamp cover and lamp cover fixing screw.  
An electric shock may occur.
- Be sure to use specified fuses for replacement.  
Otherwise, it may cause a fire.
- The direction of batteries should be the same as plus ⊕ and minus ⊖ marks printed in the battery case of the remote control.  
The remote control may not work normally, and leakage of battery acid may cause a malfunction of the device or damage the periphery.

**NOTE**

- Disassembling for service is not permitted except at NIDEK or authorized distributor.
- Take enough care not to touch the projection lens.  
The dirt or the fingerprints on the projection lens may effect the accuracy of the refraction.
- Never use an organic solvent such as paint thinner to wipe the exterior.  
This may ruin the surface.
- When the instrument is sent back to NIDEK for repair or maintenance, wipe the surface (especially, the area where the patient's skin contacts) of the instrument with a clean cloth immersed in ethyl alcohol for disinfection.

## 2.7 Disposal

### NOTE

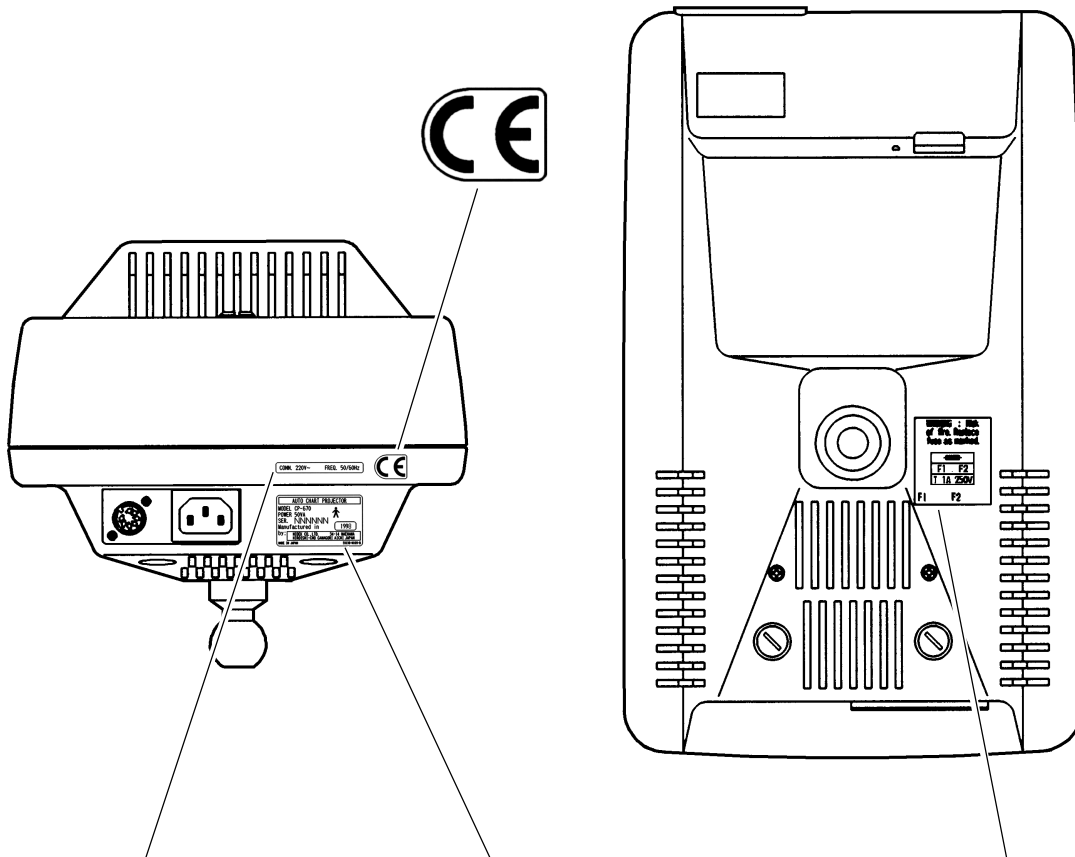
- Follow local governing ordinances and recycling plans regarding disposal or recycling of device components.  
Check the specified disposing method for the specific waste in advance, especially when disposing the batteries used in the remote control.
- When disposing packing materials, sort them by the materials and follow local governing ordinances and recycling plans.

## 2.8 Labels

The following labels provide safety information about each part.

[Rear View]

[Underside View]



CONN. 120V~      FREQ. 50/60Hz  
 or  
 CONN. 220V~      FREQ. 50/60Hz  
 or  
 CONN. 230-240V~ FREQ. 50/60Hz

AUTO CHART PROJECTOR  
 MODEL CP-670  
 POWER 50VA  
 SER. NNNNNN  
 Manufactured in 1998  
 by: NIDEK CO., LTD. 34-14 WAEHAMA  
 HIROISHI-CHO GAMAGORI AICHI JAPAN  
 MADE IN JAPAN 33138-M103-B

For 100V areas

WARNING : Risk of fire. Replace fuse as marked.

F1 . F2  
 T 1A 250V

F1      F2

For 200V areas

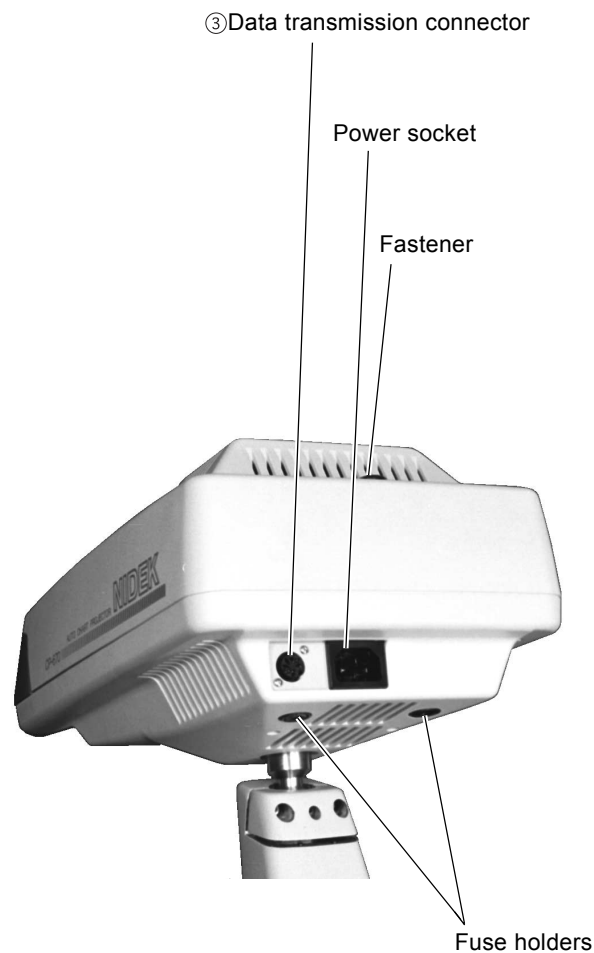
WARNING : Risk of fire. Replace fuse as marked.

F1 . F2  
 T 0.5A 250V

F1      F2

# §3 CONFIGURATIONS

## Main Body



### ① Focusing wheel

This is for focusing the chart on the screen.

### ② Pilot lamp

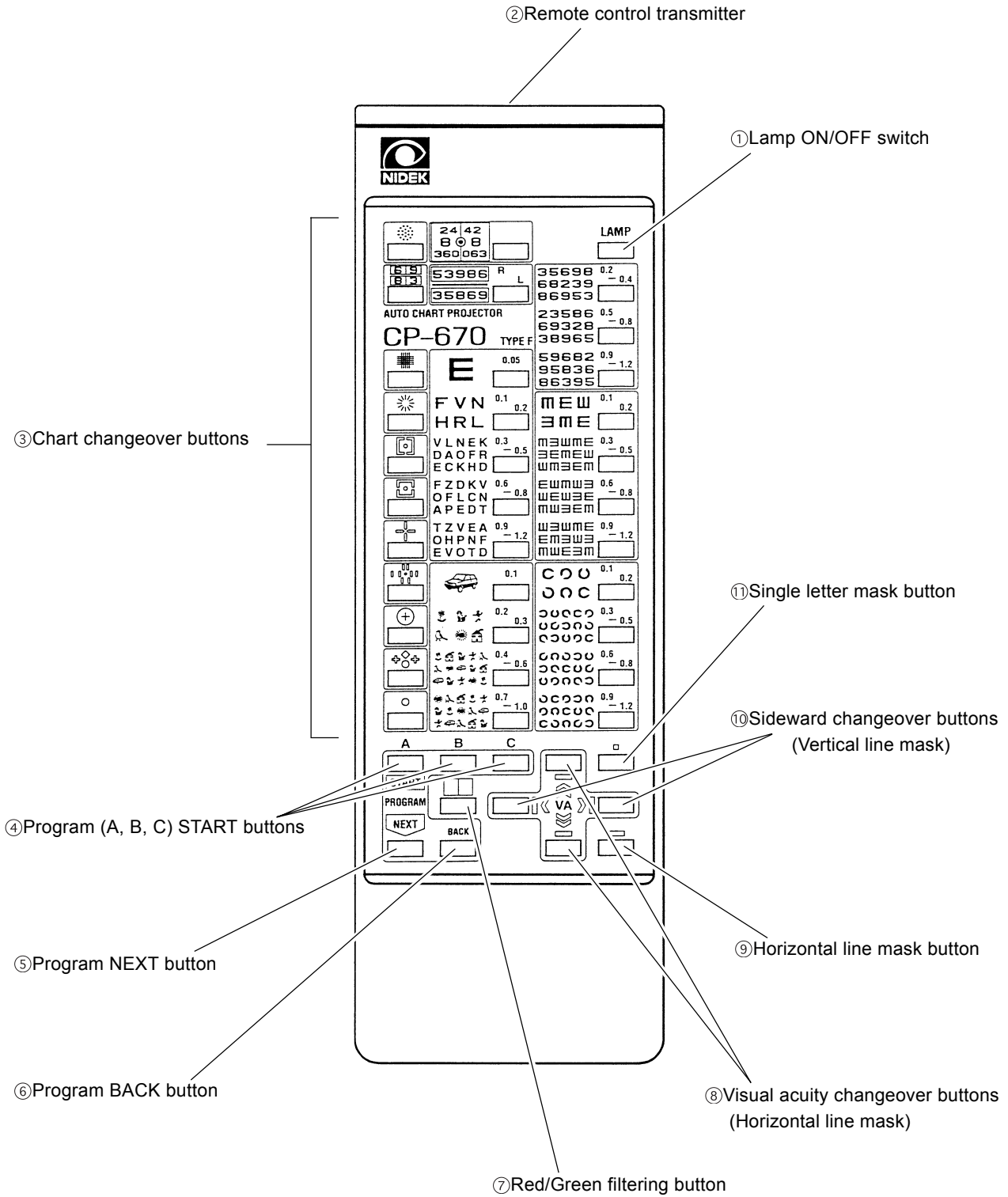
This lamp is lit while power is ON.

### ③ Data transmission connector\*1

This is a connector to be used for synchronized operation with NIDEK AOS series or RT-2100S/U.

\*1 Be sure to connect the instruments which comply with IEC 60601-1-1 to the interface connector.

# Remote Control





### ① Lamp ON/OFF button

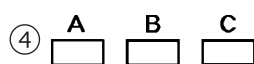
This button turns ON and OFF the projection lamp.

### ② Remote control transmitter

Operation commands are transmitted from this part for control of the main body.

### ③ Chart changeover buttons

By pressing these buttons, charts of 33 varieties can be selected.



### ④ Program (A, B, C) START buttons

These buttons start programs (A, B, C).



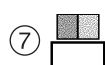
### ⑤ Program NEXT button

During program operation, this button changes the charts in programmed order.



### ⑥ Program BACK button

During program operation, this button changes the chart in reverse order of the program.



### ⑦ Red/Green filtering button

This button covers the visual acuity charts with a Red/Green filter.



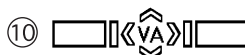
### ⑧ Visual acuity changeover buttons (Horizontal line mask)

These buttons change the visual acuity of the presented chart with the Horizontal line mask. When the chart is not masked, the chart will automatically be masked within this operation.



### ⑨ Horizontal line mask button

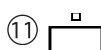
This button covers the visual acuity charts with the Horizontal line mask and shows only horizontal line of the same visual acuity. This button also serves to release the mask.



### ⑩ Sideward changeover buttons (Vertical line mask)

These buttons change the position of the Vertical line mask on the visual acuity charts right and left.

When the chart is not masked, the chart will automatically be masked within this operation.



### ⑪ Single letter mask button

This button covers the visual acuity charts with the Single letter mask and shows only a single letter.

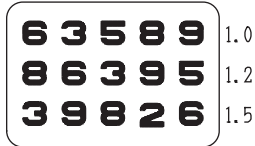
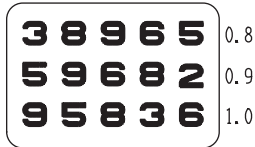
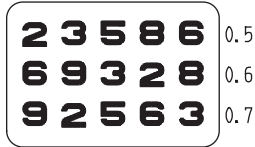
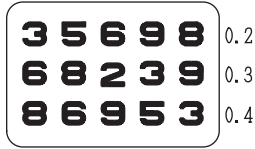
This button also serves to release the mask.

# §4 CHARTS

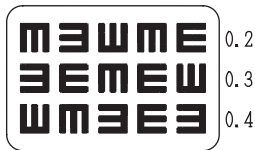
[T-type]

① VA charts

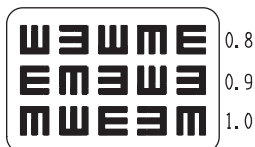
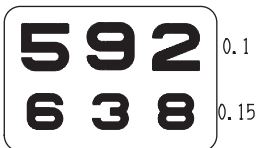
Letters



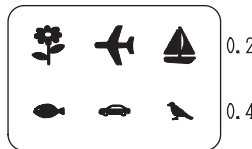
Snellen



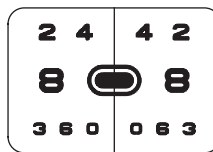
Numbers



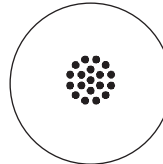
Children



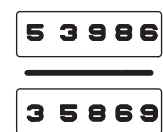
② Red/Green



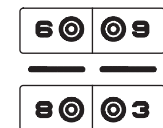
③ Dots



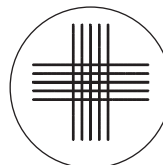
④ Binocular balance



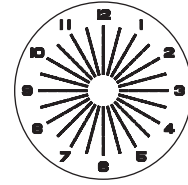
⑤ Polarized Red/Green



⑥ Cross grid



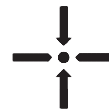
⑦ Astigmatism clock dial



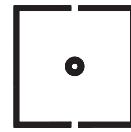
⑪ Phoria



⑧ Phoria with fixation



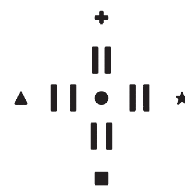
⑭ Vertical coincidence



⑯ Schober



⑰ Minute stereo



⑱ Worth



⑲ Fixation



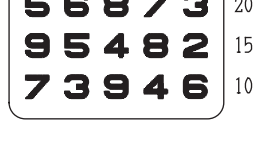
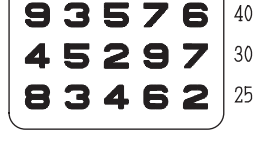
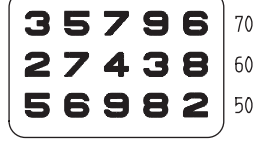
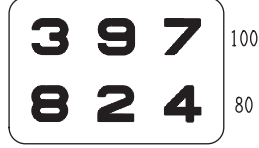
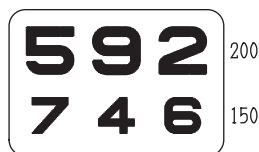
[U-type]

① VA charts

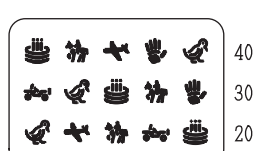
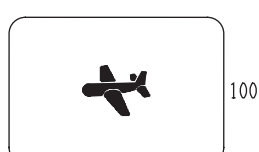
Letters



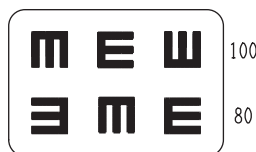
Numbers



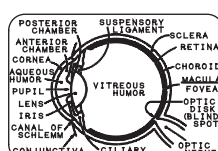
Children



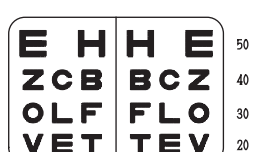
Snellen



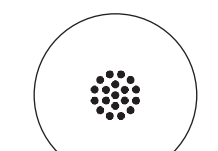
Schematic eye



② Red/Green



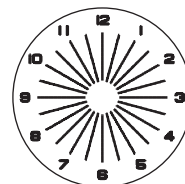
③ Dots



④ Binocular balance



⑦ Astigmatism clock dial



⑫ Vertical row of letters



⑬ Horizontal row of letters



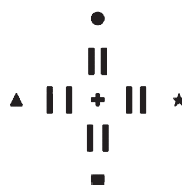
⑩ Phoria



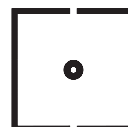
⑧ Phoria with fixation



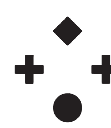
⑰ Minute stereo



⑭ Vertical coincidence



⑱ Worth



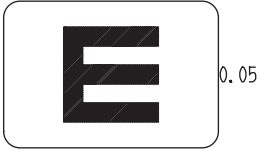
⑲ Fixation



[F-type]

① VA charts

Letters



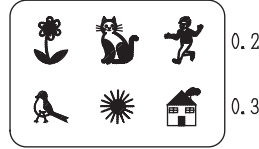
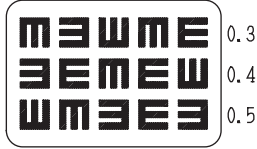
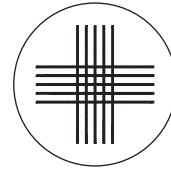
Snellen



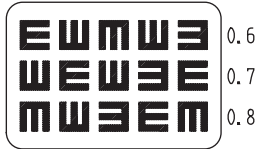
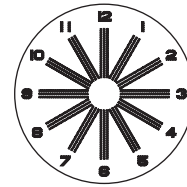
Children



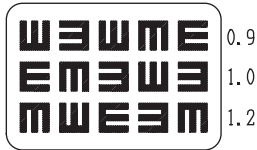
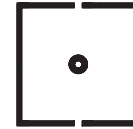
⑥ Cross grid



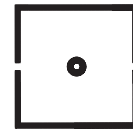
⑦ Astigmatism clock dial



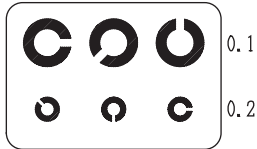
⑭ Vertical coincidence



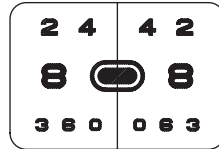
⑮ Horizontal coincidence



Landolt



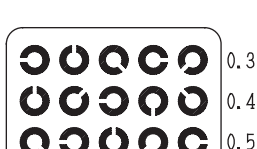
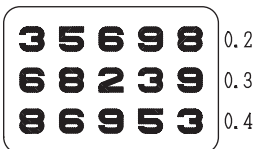
② Red/Green



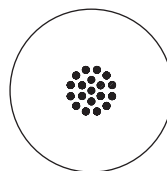
⑪ Phoria



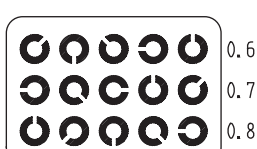
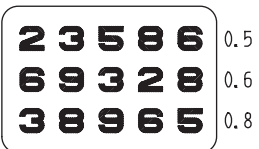
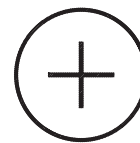
Numbers



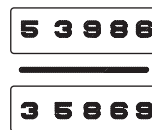
③ Dots



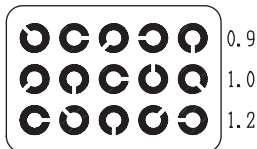
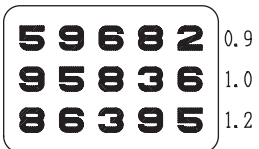
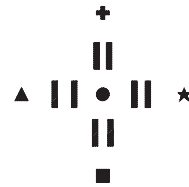
⑫ Schober



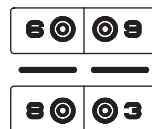
④ Binocular balance



⑰ Minute stereo



⑤ Polarized Red/Green



⑱ Worth



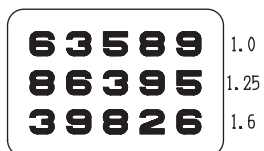
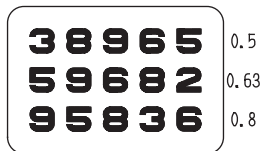
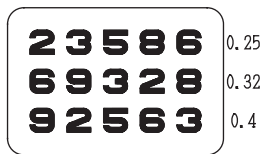
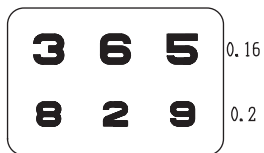
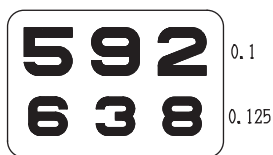
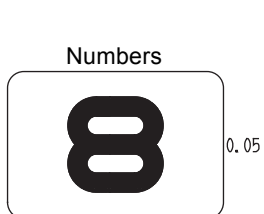
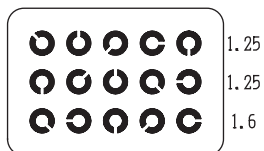
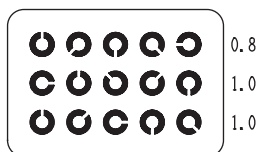
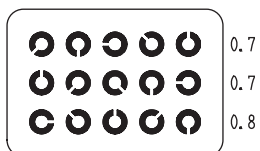
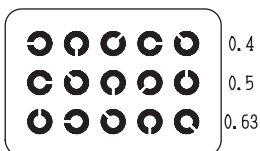
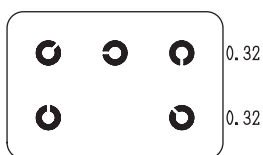
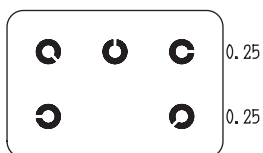
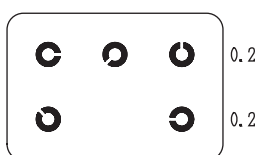
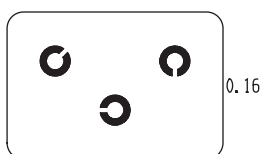
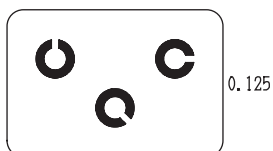
⑲ Fixation



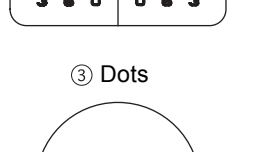
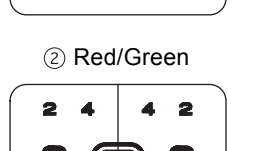
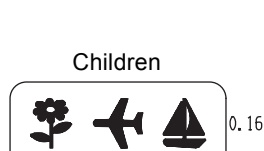
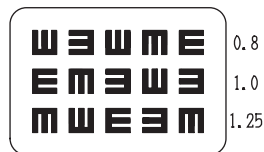
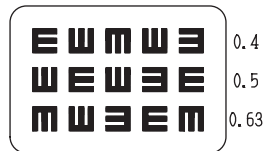
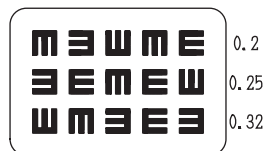
[ISO-type]

① VA charts

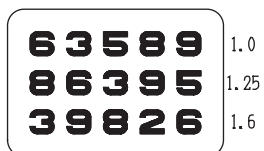
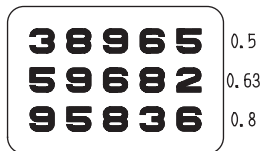
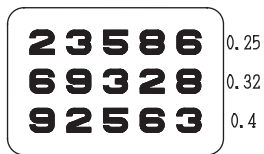
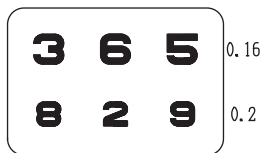
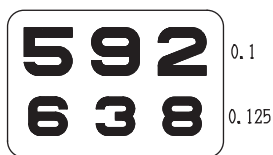
Landolt



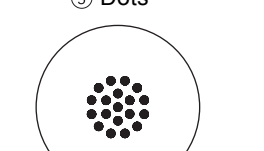
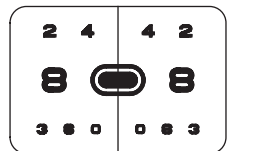
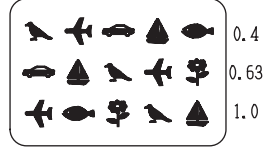
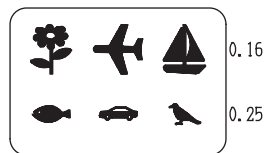
Snellen



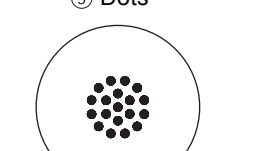
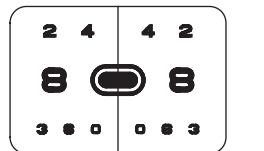
Numbers



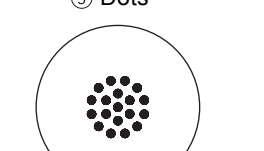
Children



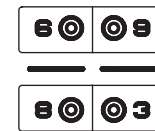
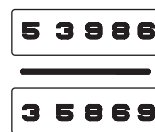
② Red/Green



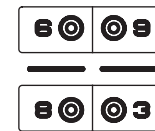
③ Dots



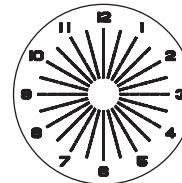
④ Binocular balance



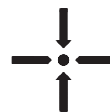
⑤ Polarized Red/Green



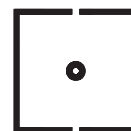
⑦ Astigmatism clock dial



⑧ Phoria with fixation



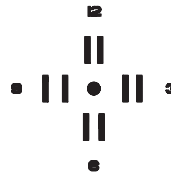
⑭ Vertical coincidence



⑯ Schober



⑰ Minute stereo



⑱ Worth



⑲ Fixation



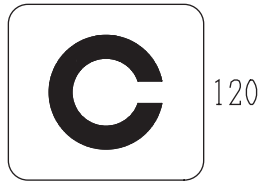
[UK-type]

① VA charts

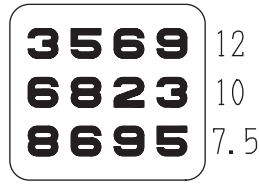
Letters



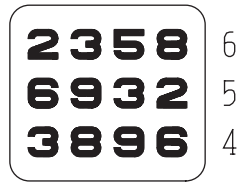
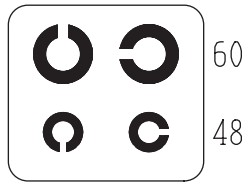
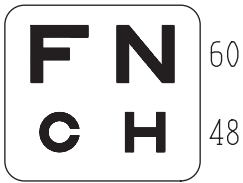
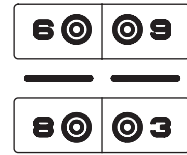
Landolt



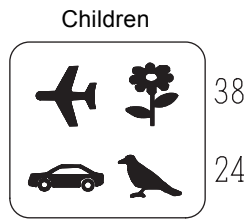
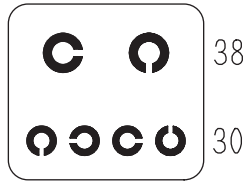
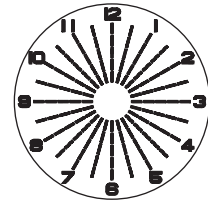
Numbers



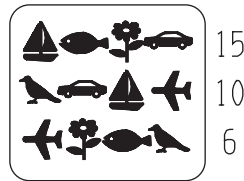
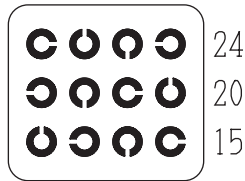
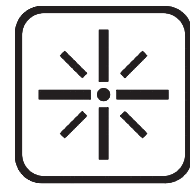
⑤ Polarized Red/Green



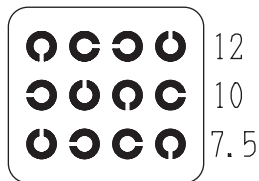
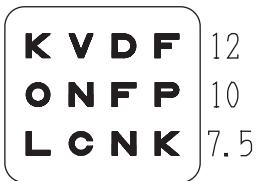
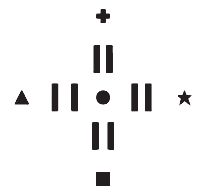
⑦ Astigmatism clock dial



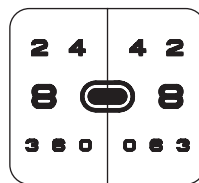
⑨ Muscle



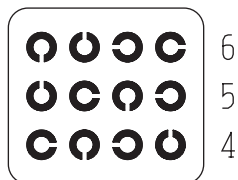
⑰ Minute stereo



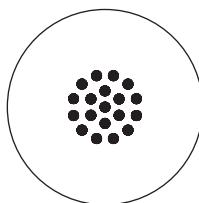
② Red/Green



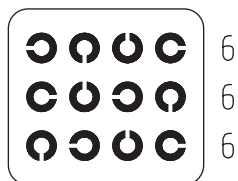
⑱ Worth



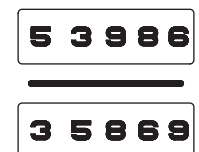
③ Dots



⑲ Fixation



④ Binocular balance



① VA charts

Use : Visual Acuity (VA) measurement

Chart Varieties :

	TYPE T	TYPE U	TYPE F	TYPE ISO	TYPE UK
Letters	0.05 - 1.5	400 - 10	0.05 - 1.2	-	120 - 4
Numbers	0.05 - 1.5	200 - 10	0.2 - 1.2	0.05 - 1.6	12 - 4
Landolt	-	-	0.1 - 1.2	0.1 - 1.6	120 - 4
Snellen	0.1 - 1.5	100 - 15	0.1 - 1.2	0.1 - 1.25	-
Children	0.1 - 1.0	100 - 20	0.1 - 1.0	0.16 - 1.0	38 - 6

② Red / Green

Use : Sphere refinement

Ideal Appearance : The sharpness of letters on the red side and green side appear equal.

- Letters on the right side are sharper. ⇒ Add negative power.
- Letters on the left side are sharper. ⇒ Add positive power.

③ Dots

Use : Cylinder power and axis refinement using cross cylinder (XC) lens

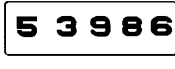
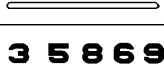
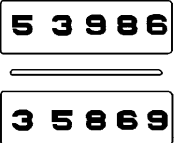
Ideal Appearance : Clearness of dots does not change even though the XC lens is reversed.

④ Binocular balance

Use : Binocular balancing (Comparison of right-eye view and left-eye view)

Auxiliary lens : Right eye 135° & left eye 45° polarizing filter

Appearance :

Right eye	Left eye	Binocular ideal
		
		<p>Clearness of top and bottom are the same.</p>


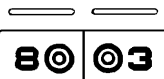
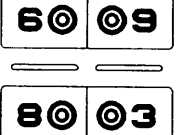
- The top is clearer. ⇒ Add +0.25 D to the right eye.
- The bottom is clearer. ⇒ Add +0.25 D to the left eye.

⑤ Polarized Red / Green (for TYPE T, F, ISO and UK)

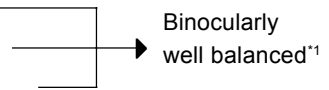
Use : Binocular balancing (Balancing the accommodation of right and left eye)

Auxiliary lens : Right eye 135° & left eye 45° polarizing filter

Appearance :

Right eye	Left eye	Binocular ideal
		
		<p>Sharpness of top and bottom are equal.</p>

- (a) Sharpness of all four marks (⊙) are equal.
- (b) Sharpness of two marks (⊙) on Red side are equal.
- (c) Sharpness of two marks (⊙) on Green side are equal.
- (d) Green is sharper on top and Red is sharper on bottom.  
⇒ Add +0.25 D to the right eye.
- (e) Red is sharper on top and Green is sharper on bottom.  
⇒ Add +0.25 D to the left eye.



⑥ Cross grid (for TYPE T and F)

Use : Sphere refinement

Auxiliary lens : ±0.50D cross cylinder lens (Fixed with the axis set at 90°.)

Ideal Appearance : The darkness of horizontal and vertical lines are equal.

⑦ Astigmatism clock dial

Use : Cylinder axis measurement

Ideal Appearance : The darkness of all the radiating bars are equal.

- One of the bars appears darker. ⇒ Cylinder axis is obtained by multiplying the smaller number next to the bar (1-6) by 30°.

[Example]

Bar 2 appears sharper.  $2 \times 30^\circ = 60^\circ$

⑧ Phoria with fixation (for TYPE T, U and ISO)

Use : Heterophoria detecting test by fusional stimulus









Auxiliary lens : Right eye 135° & left eye 45° polarizing filter

Appearance :

Right eye	Left eye	Binocular ideal
!- •	-i •	+ • +
(Orthophoria)		

\*1 As both eyes are over-corrected though well balanced in case of (c), it is desirable to

When the patient does not see an ideal appearance, see the table below to reduce the shifting amount.

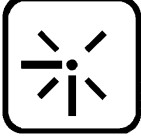


Patient's vision	Phoria	Correction
① 	Esophoria	Add BO prism power until the vertical lines become straight.
② 	Exophoria	Add BI prism power until the vertical lines become straight.
③ 	Left eye hyperphoria	Add BU prism power to the right eye and BD prism to the left eye until the horizontal lines become straight.
④ 	Right eye hyperphoria	Add BD prism power to the right eye and BU prism to the left eye until the vertical lines become straight.
⑤ 	Esophoria + Right eye hyperphoria	Correct the horizontal phoria by the same correction in vision ① and the vertical phoria by the same correction as in vision ④.
⑥ 	Esophoria + Left eye hyperphoria	Correct the horizontal phoria by the same correction in vision ① and the vertical phoria by the same correction as in vision ③.
⑦ 	Exophoria + Right eye hyperphoria	Correct the horizontal phoria by the same correction in vision ② and the vertical phoria by the same correction as in vision ④.
⑧ 	Exophoria + Left eye hyperphoria	Correct the horizontal phoria by the same correction in vision ② and the vertical phoria by the same correction as in vision ③.

⑨ Muscle (for TYPE UK)

Use : Heterophoria detecting test by fusional stimulus

Auxiliary lens : Right eye 135° & left eye 45° polarizing filter

Appearance :

Right eye	Left eye	Binocular ideal
		 (Orthophoria)




For heterophoria eyes, vision deviates from the same as the test with Phoria with fixation.

⑩ Phoria (for TYPE U)

Use : Heterophoria detecting test

Auxiliary lens : Right eye 135° & left eye 45° polarizing filter

Appearance :

Right eye	Left eye	Binocular ideal
		 (Orthophoria)




For heterophoria eyes, vision deviates from the same as the test with Phoria with fixation.

⑪ Phoria (for TYPE T and F)









Use : Heterophoria detecting test

Auxiliary lens : Right eye 135° & left eye 45° polarizing filter

Appearance :

Right eye	Left eye	Binocular ideal
		 (Orthophoria)

When the center of vertical lines and the horizontal lines are shifted, see the table below to reduce the shifting amount.

Patient's vision	Phoria	Correction
① 	Esophoria	Add the BO prism power until the vertical line intersects horizontal line at the center.
② 	Exophoria	Add the BI prism power until the vertical line intersects horizontal line at the center.
③ 	Left hyperphoria	Add the BU prism power to the right eye and the BD prism power to the left eye until the vertical line intersects horizontal line at the center.
④ 	Right hyperphoria	Add the BD prism power to the right eye and the BU prism power to the left eye until the vertical line intersects horizontal line at the center.
⑤ 	Esophoria + Right hyperphoria	Correct the horizontal phoria by the same correction as in vision ① and vertical phoria by the same correction as in vision ④.
⑥ 	Esophoria + Left hyperphoria	Correct the horizontal phoria by the same correction as in vision ① and vertical phoria by the same correction as in vision ③.
⑦ 	Exophoria + Right hyperphoria	Correct the horizontal phoria by the same correction as in vision ② and vertical phoria by the same correction as in vision ④.
⑧ 	Exophoria + Left hyperphoria	Correct the horizontal phoria by the same correction as in vision ② and vertical phoria by the same correction as in vision ③.

⑫ Vertical row of letters (for TYPE U)

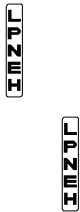
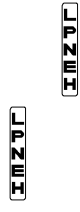
Use : Horizontal phoria detecting test (Von Graefe test)

Auxiliary lens : 6 Δ BU to the right eye

Appearance :

Right eye	Left eye	Binocular ideal
IMZUJ	IMZUJ	IMZUJ IMZUJ

When the two vertical lines do not make straight, see the table below to reduce the shifting amount.

Patient's vision	Phoria	Correction
① The vertical line on top is shifted to the left. 	Esophoria	Add the BO prism power to the left eye until the two vertical lines become straight.
② The vertical line on top is shifted to the right. 	Exophoria	Add the BI prism power to the left eye until the two vertical lines become straight.

⑬ Horizontal row of letters (for TYPE U)



Use : Vertical phoria detecting test (Von Graefe test)

Auxiliary lens : 10 Δ BI to the left eye

Appearance :

Right eye	Left eye	Binocular ideal
FADTN	FADTN	FADTN FADTN

When the two horizontal lines do not make straight, see the table below to reduce the shifting amount.


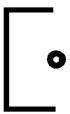
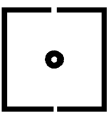
Patient's vision	Phoria	Correction
① The left row is higher. 	Right eye hyperphoria	Add the BD prism power to the right eye until the two rows of letters are line-up.
② The right row is higher. 	Left eye hyperphoria	Add the BU prism power to the right eye until the two rows of letters are line-up.

⑭ Vertical coincidence (for TYPE T, U, F and ISO)

Use : To detect aniseikonia and vertical phoria

Auxiliary lens : Right eye 135° and left eye 45° polarizing filter

Appearance :

Right eye	Left eye	Binocular ideal
		

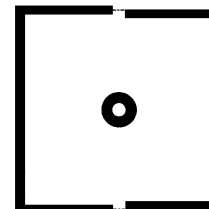
[Detection of aniseikonia]

Checking whether the left frame and the right frame are equal in size.

[Example]



3.5 % aniseikonia

Width of one line corresponds to 3.5 % aniseikonia.



[Alignment of hyperphoria]

Check the left frame and the right frame are positioned at the same height. When the frames are shifted, see the table below to align the frames.



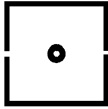
Patient's vision	Phoria	Correction
① The left frame is higher. 	Right eye hyperphoria	Add the BD prism power to the right eye and BU prism power to the left eye until the right and left frames are positioned at the same height.
② The right frame is higher. 	Left eye hyperphoria	Add the BU prism power to the right eye and BD prism power to the left eye until the right and left frames are positioned at the same height.

⑮ Horizontal coincidence (for TYPE F)

Use : To detect aniseikonia and horizontal phoria

Auxiliary lens : Right eye 135° and left eye 45° polarizing filter

Appearance :

Right eye	Left eye	Binocular ideal
		

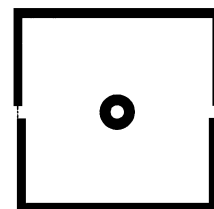
[Detection of aniseikonia]

Checking whether the top frame and the bottom frame are equal in size.

[Example]

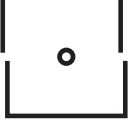
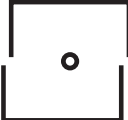
3.5 % aniseikonia

Width of one line corresponds to 3.5 % aniseikonia.



[Alignment of hyperphoria]

Check that the left frame and the right frame are horizontally set at the same position. When the frames are shifted, see the table below to align the frames.

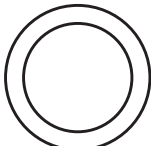
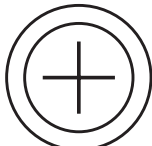
Patient's vision	Phoria	Correction
① The top frame is shifted to the left. 	Exophoria	Add the BI prism power until the top and bottom frames are horizontally set at the same position.
② The top frame is shifted to the right. 	Esophoria	Add the BO prism power until the top and bottom frames are horizontally set at the same position.

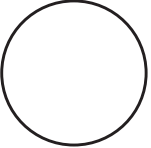
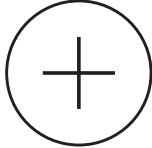
⑩ Schober (for TYPE T, F and ISO)

Use : To correct heterophoria

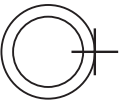



Auxiliary lens : Red filter on the right eye and green filter on the left eye

Appearance :

Right eye	Left eye	Binocular ideal
+		

Right eye	Left eye	Binocular ideal
+		

When the cross is not positioned at the center of the rings, see the table below to reduce the shifting amount.


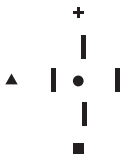

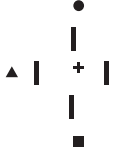
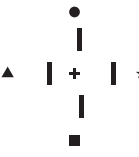
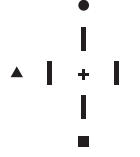
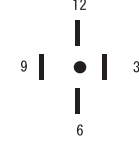
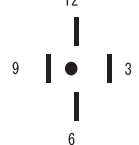
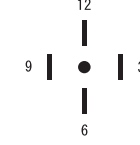
Patient's vision	Phoria	Correction
① Cross is shifted to the right 	Esophoria	Add the BO prism power until the cross is positioned at the center of rings.
② Cross is shifted to the left. 	Exophoria	Add the BI prism power until the cross is positioned at the center of rings.
③ Cross is shifted upward. 	Left eye hyperphoria	Add the BU prism power to the right eye and the BD prism power to the left eye until the cross is positioned at the center of rings.
④ Cross is shifted downward. 	Right eye hyperphoria	Add the BD prism power to the right eye and the BU prism power to the left eye until the cross is positioned at the center of rings.

⑰ Minute stereo

Use : To detect stereo vision

Auxiliary lens : Right eye 135° and left eye 45° polarizing filter

Appearance :

Right eye	Left eye	Binocular ideal
		 <p>Bars appear closer than ○ , + , ☆ , □ and △ marks.</p>
		
		

The bar with △ mark appears closest, then bars with □ , ☆ , + and ○ marks appears further in sequence.


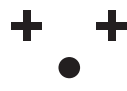
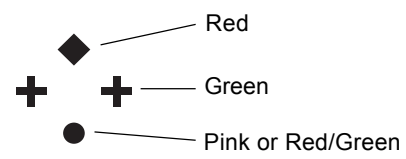
- Stereoparallax between the mark ○ and the bar with + : 10'
- Stereoparallax between the bar with + and the bar with ☆ : 1'
- Stereoparallax between the bar with ☆ and the bar with □ : 2'
- Stereoparallax between the bar with □ and the bar with △ : 4'

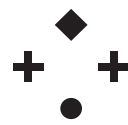


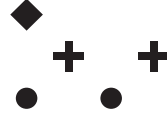
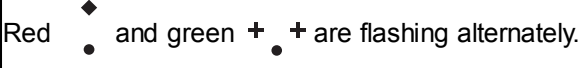
⑱ Worth

Use : To detect fusion and suppression

Auxiliary lens : Red filter for right eye and green filter for left eye

Appearance :

Right eye	Left eye	Binocular ideal
		
◇ : Red, ○ : Red	+: Green, ○ : Green	




Patient's vision	Symptom	Details
① Four points 	Fusion	◇ : Red, + : Green, ○ : Pink or Red/Green alternately However, if a patient has an obvious dominant eye ; Right eye is dominant ○ : red Left eye is dominant ○ : green
② Three points 	Right eye suppression	The patient can see the green two + and one ○.
③ Two points 	Left eye suppression	The patient can see the red ◇ and ○.
④ Five points at the same time 	Diplopia	The patient can see red ◇ and ○, green ○ and two + at the same time.
⑤ Five points and blink in turn.	Alternate suppression	Red ◇ and green +, + are flashing alternately. 

① Fixation



Use : To detect horizontal phoria (Maddox test)

Auxiliary lens : Horizontal maddox rod on the right eye

Appearance :

Right eye	Left eye	Binocular ideal
		




If the white spot is shifted to the right or left of the bar, see the table below to reduce the shifting amount.

Patient's vision	Phoria	Correction
① White dot is shifted to left of the red bar. 	Esophoria	Add the BO prism power until the white dot is positioned on the red bar.
② White dot is shifted to right of the red bar. 	Exophoria	Add the BI prism power until the white dot is positioned on the red bar.



Use : To detect vertical phoria (Maddox test)

Auxiliary lens : Vertical maddox rod on the right eye

Appearance :

Right eye	Left eye	Binocular ideal
		

If the white spot is shifted to the upper or lower of the bar, see the table below to reduce the shifting amount.

Patient's vision	Phoria	Correction
① White dot is shifted to upper of the red bar. 	Left-eye hyperphoria	Add the BU prism power until the white dot is positioned on the red bar.
② White dot is shifted to lower of the red bar. 	Right-eye hyperphoria	Add the BD prism power until the white dot is positioned on the red bar.

\* Moddox test should be performed in a darkroom.

# §5 OPERATING PROCEDURES

## 5.1 Operation with Remote Control

### A. Turning ON the CP-670

Turn ON the power switch of CP-670.

The projection lamp lights and the chart for 0.05 vision will be presented in 3 seconds.

### B. Changing the chart

Press the appropriate chart changeover button on the remote control.\*1

The charts have 33 varieties (See “§4 CHARTS”).

### C. Isolating the visual acuity chart

- To use Vertical line mask;

Press  or .

To move the isolated line right or left,

press the button again. To change the

chart, press  or .



## NOTE

- For the chart which has three columns, the Vertical line mask only isolates the columns on both sides, and for the chart which has five columns, the columns on the center and both sides.

- To use the Horizontal line mask;

Press ,  or .

To move the isolated line up or down,


press  or .





\*1 Auto-OFF function



When the remote control has not been operated for 15 minutes, the light automatically goes out. To turn ON the light again, press any button on the remote control.

- To use Single letter mask;

Press .

To move the isolated letter position up or down, press  or .

To move the position right or left, press



 or .

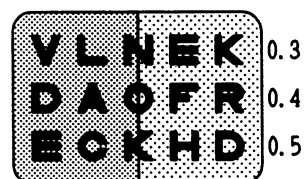


- To use Red/Green filter;

Press .




The Red/Green filter covers the present chart.

To change the chart, press  or .



- To release the masks and the filter;

By pressing any chart changeover button, the presented mask/filter is released.

 also serves to release the Horizontal line mask,  serves to release the Single letter mask, and  serves to release the Red/Green filter as well.




#### D. Programmed operation

There are three programs, which are Program A, B and C.

Program A has a standard program which is previously set at the time of shipment.

For programmed contents, see “6.1 Program A for Operation with Remote Control”.


It is possible to rearrange the preset program. For procedure, see “E. Program arrangement”.

1. Press one of   .

The first chart in the program is presented, and the programmed operation starts.

2. Press .

For every press, the chart changes in the programmed order.\*2

\*2 By pressing , the chart changes back to the previous one.

### E. Program arrangement

Program B and C has no preset program at the time of shipment.

It is possible to arrange the original program in the following procedure.

#### 1. Enter the Program arrangement mode.

1) Turn ON the power switch.

2) Press <sup>LAMP</sup> to turn OFF the lamp.

3) Press one of <sup>A</sup> <sup>B</sup> <sup>C</sup>, which is selected for the program arrangement, and hold it for about 5 seconds until sounds "pip, pip, pip..." are heard.

\* Lamp lights again and a fixation dot chart will be presented to show that it is ready to program.

#### 2. Input the charts.

1) Present the chart which is for inputting.

(Mask or filter the chart if necessary.)

2) Press <sup>NEXT</sup>.

A sound "pip" is heard and the projected chart is memorized in the program. The chart can be changed freely without being memorized unless <sup>NEXT</sup> is pressed.

3) Repeat the process 1) - 2) to input the rest of the charts in the order of presentation.

A maximum of 20 charts can be memorized in each Program A, B and C.\*<sup>3</sup>

### NOTE

- Be careful not to press <sup>NEXT</sup> too long, lest the same chart should be set twice.

3. To finish program arrangement, press the selected one of <sup>A</sup> <sup>B</sup> <sup>C</sup>.




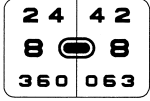

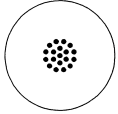

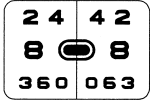



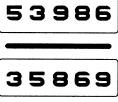

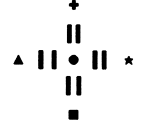


The sounds "pip, pip, pip,..." is heard and 0.05 vision chart is presented to show that the program arrangement is completed.

\*3 If <sup>NEXT</sup> is pressed after 20 charts are memorized, pip sounds will be heard twice as "pip, pip".

# §6 STANDARD PROGRAM

## 6.1 Program A for Operation with Remote Control

Program A has the standard program as follows at the time of shipment.

Key	Program No.	Chart
	1	0.7 alphabetical chart (with masking) 
	2	Red-green chart 
	3	Dot chart 
	4	Red-green chart 
	5	1.0 alphabetical chart (with masking) 
	6	Binocular balance chart 
	7	Minute stereo test chart 
	8	1.0 alphabetical chart (with masking) 

# §7 MAINTENANCE

## ATTENTION:



BEFORE MAINTENANCE OR CARE,  
READ INSTRUCTIONS.

## 7.1 Cleaning Main Body

### <Projection Lens>

Blow dusts with a blower brush.

If it is not clean enough, wipe with lens cleaning paper.

### <Cover and Screen>

Wipe with a dry and soft cloth.

For stubborn dirt, immerse a cloth in a neutral detergent, wring it well, and wipe the part.

Wipe off with a dry cloth to finish.

## NOTE

- Never use an organic solvent such as paint thinner.  
This could dissolve the surface.

## 7.2 Replacement of Fuses

\* Be sure to use the provided spare fuses.

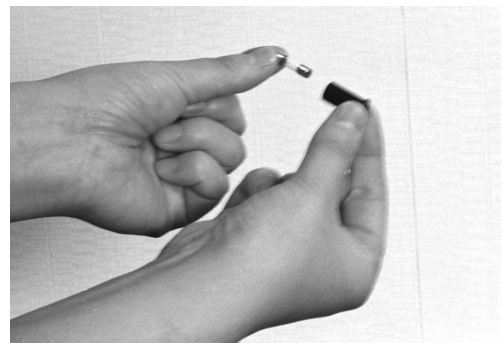
1. Turn OFF the power switch and pull out the power code.

2. Check the fuses.

1) Push and turn the fuse holders counterclockwise with a screwdriver and remove them.



2) Remove the fuses from the fuse holders and check if they are broken.



3. Set the fuses.

1) If either one of the fuses are broken, set the new fuses into the fuse holders.  
If not, return the original ones.

### NOTE

- Both fuses must be replaced though the other fuse is not broken.  
\* Use only the fuses specified as follows.

Net voltage	Fuse
120V AC	T1A 250V ; IEC 127
220, 230-240V AC	T0.5A 250V ; IEC 127

2) Set the fuse holders as before.

## 7.3 Replacement of Batteries in Remote Control

\* Use the batteries of LR6 or R6 for replacement.

\* The memory of programs remains even though the battery is replaced.

1. Remove the battery case cover at the back side of the remote control.

2. Take out the consumed batteries.

3. Insert the new batteries.

The direction of the batteries are shown on the bottom of the battery case.

\* Be sure of direction.

### NOTE

- Do not mix the old and new batteries for use.

4. Set the battery case cover as previously.

# §8 COMMON PROBLEMS AND CORRECTIONS

If any problems occur during operation of the CP-670 or the remote control, check the following factors before putting it in for repair.

	Problems	Contermeasure
C P   6 7 0  M a i n  b o d y	The chart does not appear though the power is turned ON.	<p>[Pilot lamp is not lit]</p> <ul style="list-style-type: none"> <li>- Check if the plug for the power cable is connected correctly.</li> <li>- Check if the power is coming from the wall-outlet or AOS.</li> <li>- Check if the fuses are broken. If so, replace them (See 7.2 Replacement of fuses).</li> </ul> <p>[Pilot lamp is lit]</p> <ul style="list-style-type: none"> <li>- Check if the projection lamp is broken. If so, it needs to be replaced.</li> </ul>
	The chart is not presented clearly.	<ul style="list-style-type: none"> <li>- Focus the chart on the screen with the focusing wheel.</li> <li>- Check if the screen or the projection lens is clean. If not, clean it (See 7.1 Cleaning of Main Body).</li> </ul>
R e m o t e  c o n t r o l	The main body does not react to the button operation of remote control.	<ul style="list-style-type: none"> <li>- Aim the main body with the remote control and press the button again.</li> <li>- Check if the power switch of main body is ON.</li> <li>- Check if the light transmission way between the main body and the remote control is distracted by interference light.</li> <li>- Check if the direction of the battery is correct.</li> <li>- The batteries ran down. Replace them (See 7.3 Replacement of Batteries in Remote Control).</li> </ul>

## §9 SPECIFICATIONS (F, T and U-types)

Charts	:33
Distance of projection	:2.9 ~ 6.1m
Chart magnification	:30× (when projected at 5m distance)
Chart size	:275mm dia., 330 (W) × 225 (H)m (at 5m distance)
Lamp	:Halogen lamp (6V/20W : G4) (Life span: rated at 2000 hrs.)
Masks	:1 Open mask, 5 Horizontal line masks, 5 Vertical line masks, 21 single letter masks
Filter	:1 Red/Green filter
Power source	:220, 230 - 240V±10% ~ 50/60Hz 120V±10% ~ 50/60Hz * These are factory option.
Power consumption	:50VA
Dimensions	:(Main body) 210 (W) × 345 (D) × 195 (H)mm (Remote control) 64 (W) × 200 (D) × 18.5 (H)mm
Net weight	:(Main body) 5.2kg (Remote control) 150g
Environment	Temperature 10 - 40 °C (In usage) -40 - 70 °C (In storage/ Transference) Humidity 30 - 85 % (Non-condensing)(In usage) 10 - 100 % (In storage/ Transference) Installation place In the room
Standard accessories	: Remote control 1 pc. Dust cover 1 pc. Screen 1 pc. Spare fuses 2 pcs. Test scale sheet 1 pc. Polaroid glasses 1 pair Power cable 1 pc. Batteries 2 pcs. Operator's manual 1 pc.
Optional accessories	: Wall bracket Table stand Floor stand Red/Green glasses Screen angle fixing set Reflecting mirror

\* Specifications and design are subject to change without prior notice for improvement.

# ***ADJUSTMENT OF PROJECTION DISTANCE***

**APPENDIX 1**

The projection distance is adjusted during installation. If the distance between the CP-670 and the screen has changed because of moving the installation place, or if you want to change the projection distance, it is necessary to adjust the projection distance with the provided test scale sheet.

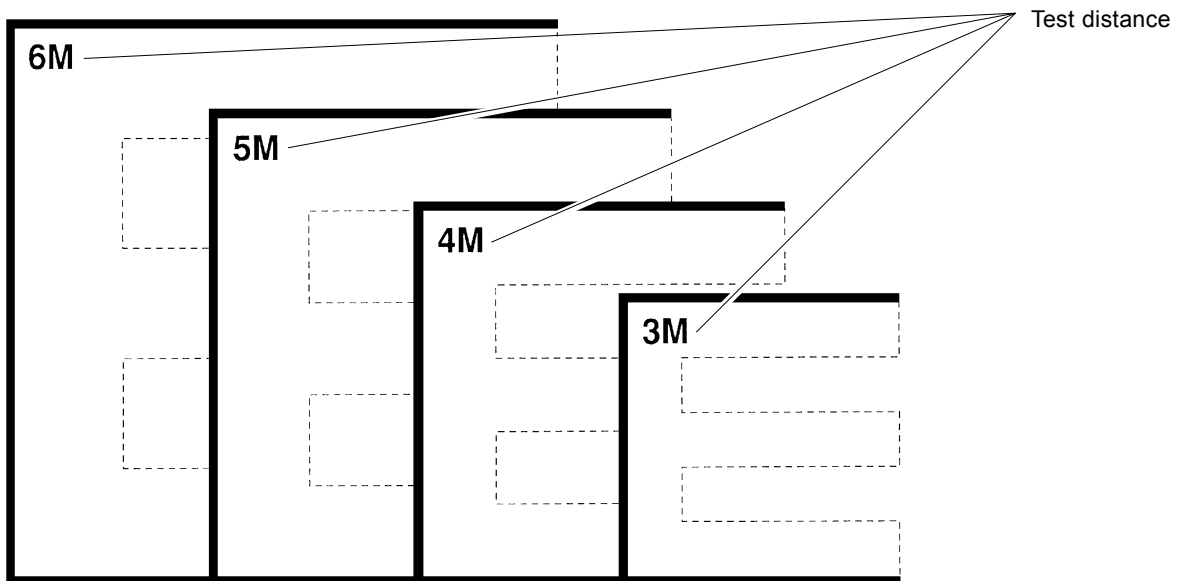
The size of the projected chart changes as the projecting distance varies.

The test scale sheet shows the relation between the test distance and the size of 0.05 vision chart “E”.

## **(Adjusting procedures)**

1. Set the distance between the position of patient’s eye and the screen to one of following test distances. (6m, 5m, 4m, and 3m)
2. Turn ON the power switch.
  - \* The 0.05 vision chart “E” is projected on the screen.
3. Focus the chart with the focusing wheel.
4. Place the provided test scale sheet on the screen.  
Place it where the projected chart “E” comes over the test scale “E” which corresponds to the distance set in process 1.
5. Move the main body or the screen until the projected chart “E” matches with that of the test scale.
6. Focus the chart with the focusing wheel again and check if the chart “E” still matches with the respective test scale.  
If not, repeat the process 5. and 6. until it is adjusted.

**NIDEK TEST SCALE FOR CHART PROJECTOR**



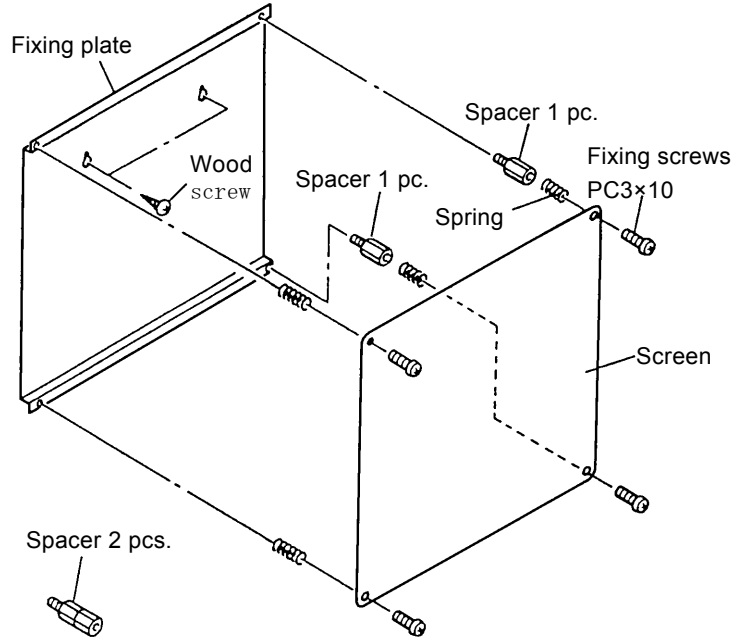
## **SCREEN FIXING BY SCREEN ANGLE FIXING PLATE (OPTION)**

### APPENDIX 2

By using the optional screen angle fixing plate, it is possible to adjust the angle of a screen to give patients brighter and clearer image of projected charts.

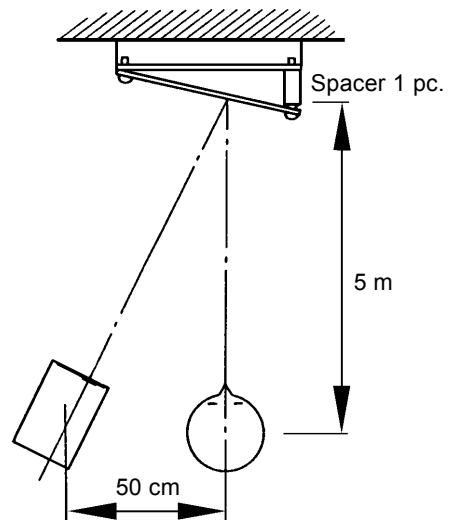
Parts for the Screen angle fixing plate

- |                 |        |
|-----------------|--------|
| 1 Fixing plate  | 1 pc.  |
| 2 Wood screws   | 2 pcs. |
| 3 Fixing screws | 4 pcs. |
| 4 Spacers       | 4 pcs. |
| 5 Springs       | 4 pcs. |



As shown on the right, when positioning the CP-670 at 50cm left of the patient, use one spacer each for corners at the right top and right bottom of the fixing plate.

When positioning it 1m left of the patient, use two spacers each for the same position.



When mounting CP-670 on the pole of AOS right pole type, use two spacers for the corner of the right bottom and one each for corners on the right top and the left bottom to obtain the best angle (see the figure below).

