Nikon

AUTO OPTESTER

Remote Vision

Instructions

Introduction

Thank you for purchasing our Nikon Auto-optester Remote Vision. The Nikon Auto-optester Remote Vision is a subjective refraction instrument that can perform all its functions through a remote control unit. Do not use the Auto-optester Remote Vision for other than the intended uses. For proper and efficient use, read this Instructions thoroughly before using your Auto-optester Remote Vision. Keep the manual in a convenient place so that you can obtain quick access to it for reference.

Notes

(1) No reproduction in any form of this manual, in whole or in part (except for brief quotation in critical articles or reviews), may be made without written authorization from NIKON CORPORATION.

(2) The information contained in this manual is subject to change without notice.

(3) If you find any discrepancy, error or omission herein, please notify your dealer of it.

(4) Notwithstanding the above paragraph (3), Nikon shall not be liable for incidental or consequential damages resulting from the use of this product.

CONTENTS

1. Operating Precautions

This instrument and the Instructions contain some warnings and precautions that you should follow to use the instrument safely and to prevent injuries to you or another person and damages to your property. The following symbols are used in the warnings and precautions.
Study and learn the meanings of the symbols before reading the main body of this manual.

Examples

Warning This symbol shows that a death or personal injury might occur if you disregard this warning and use the instrument improperly.

Caution This symbol shows that only a personal injury or damage to material might occur if you disregard this caution and use the instrument improperly.

Symbols Used in Illustrations

This symbol identifies a warning (including precautions). The contents of the warning are depicted in the triangle.

This symbol identifies a prohibited action. The prohibited action is depicted within or near the circle (the example instructs you not to disassemble the instrument).

1.1 Safety Considerations

Caution (Do Not Disassemble)
Never disassemble the instrument (high voltage is present inside the instrument).

Caution (Installation)
Install the lens chamber on the optester unit securely; otherwise the lens chamber could drop off, causing human injury. Contact your sales representative serving your locality when installing the lens chamber.

Caution (In Case Foreign Matter Got Into the Interior)
If water or foreign matter get into the unit interior or power supply, immediately turn off the POWER switch, then unplug the power cord and contact our sales representative. Failure to observe this precaution may result in fire or electric shock hazards.

Caution (Handling Power Cord)
Do not damage, break, modify, bend, pull, twist, or band the power cord. Placing a heavy material on the instrument or heat the instrument may cause damage to the power cord, resulting in fire or electric shock hazards. If the power cord is found damaged, replace with a new one.

⚠ Caution
(Dust on Power Plug Blades)

If power plug blades or the base that mounts the blades is covered with dust, unplug the power cord and brush the dust off. Dust might reduce the insulation across the power plug blades, resulting in a fire.

⚠ Caution (Use a Strap)

Do not drop the remote controller. Be sure to use the accompanying safety strap when handling the remote controller. Take care so that the remote controller is not subject to heavy shocks. Do not fling around the remote controller by grasping only the strap.

1.2 Environmental Considerations

⚠ Caution
(Temperature, Humidity, and Atmospheric Pressure)

Use the Auto-optester Remote Vision at temperatures of approximately 10°C to 40°C, humidities of 30% to 75%, and atmospheric pressures of 700 hPa to 1060 hPa.

⚠ Caution (Watery Location)

The instrument is not of the waterproof construction. Do not place the unit in an environment where it is subject to water splashes.

⚠ Caution
(After Condensation Disappears)

Once the instrument is subject to condensation, do not use it until condensation disappears.

⚠ Caution (Avoid Dust)

Avoid using the instrument in a dusty location though it employs a dustproof construction.

⚠ Caution
(Keep the Unit Well Ventilated)

Place the power supply in a well ventilated location. Do not cover up the vent holes on the power supply side of the unit. Covering the vent holes will accumulate heat within the unit, causing a fire or machine malfunction.

1.3 Handling Precautions

⚠ Caution (Handle Gently)

The Auto-optester Remote Vision is a high-precision equipment. Handle it very carefully.

⚠ Caution (Do Not Swing the Unit)

Do not swing the main unit or remote controller unnecessarily.

⚠Caution (Magnetism)

Keep the main unit, power supply, and remote controller away from magnetic fields.

⚠Caution (Do not Grasp the Power Plug with a Wet Hand)

Do not insert or remove the power plug with a wet hand.

⚠Caution
(When Removing a Cable)

When unplugging the power cord or (optional) communications cable from the outlet or connector, grasp the plug body and do not hold a wire. Pulling a cable with excessive power may damage the cable, causing fire or electric shock hazards.

1.4 Maintenance

⚠Caution
(Keep the Sight Apertures Clean)

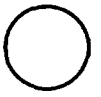
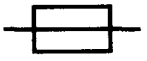
The Auto-optester Remote Vision is a high-precision optical instrument. Accurate measurement will be impossible if the sight aperture glass is smudged with grease from the patient's nose, finger prints or dust. Keep the surface of the sight aperture glass clean. Take care when cleaning the sight aperture glass so that the glass is not subject to scratches or excessive force. Failure to observe this precaution may break the glass, causing injuries.

⚠Caution
(After Using the Instrument)

After using the instrument, turn off the power and replace the attached vinyl cover over the unit. When maintaining the unit or when it is not to be in use for a long period, be sure to unplug the power cord from the power outlet for safety.

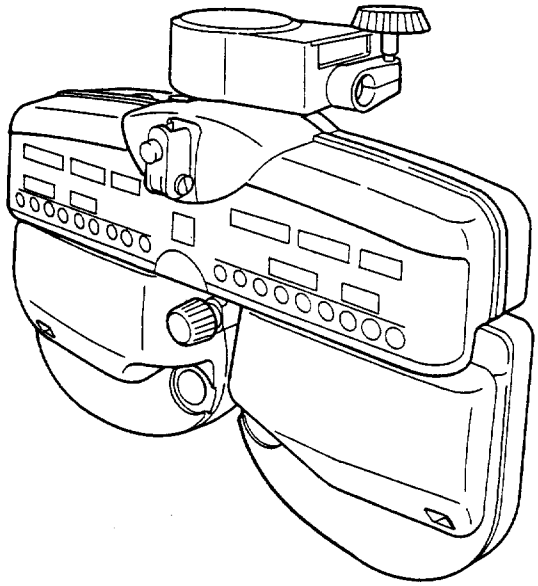
*** The Remote Controller runs on three commercial AA Batteries. Please remove the batteries when not using the Remote Controller one month or longer.**

The following safety symbols are used on the Auto-optester Remote Vision cover and name plate:

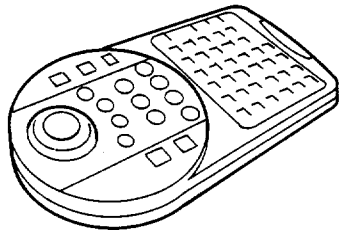
	A.C.		OFF (Power off)
	FUSE		ON (Power on)
	CAUTION		INPUT
	B Type Instrument		OUTPUT

2. System Components

● Lens chamber main unit

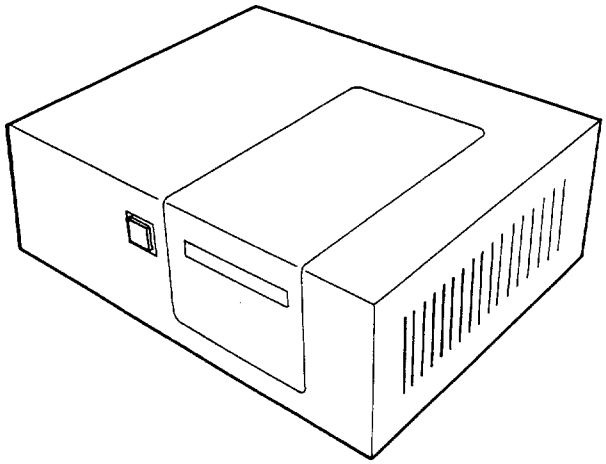


● Remote controller

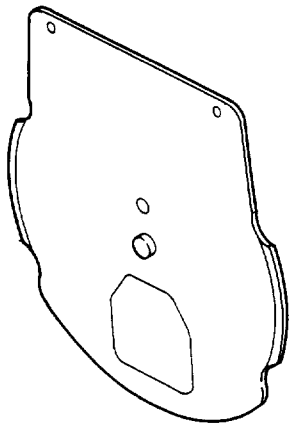


One of the following models:
NP-3S Compatible Model (Snellen Numbers)
NP-3S Compatible Model (Europe)
NP-3S Compatible Model (Multiple)
NP-3S Compatible Model (Numbers)
Exclusive Remote Controller for Remote Vision

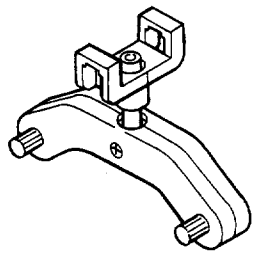
● Power control unit



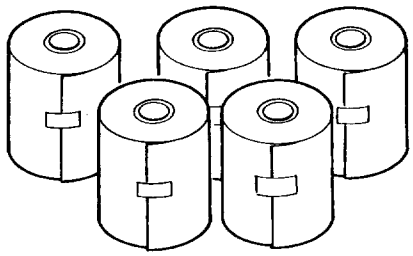
- Near point chart



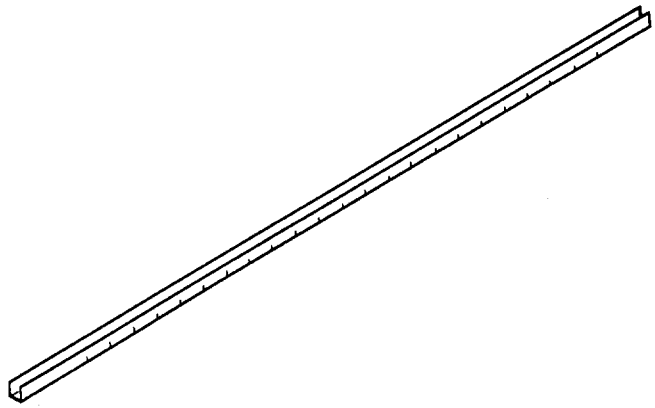
- Near point chart holder



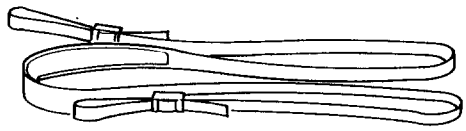
- Printer paper (5-rolls) *



- Near point chart supporting rod



- Remote controller strap



- Vinyl cover
- Power cord set*
- Spare fuse (2 fuses)* rated at 100/120V or 230V ×2
- Instructions

*Parts identified by an asterisk are not supplied if the Auto-optester Remote Vision is purchased together with a Nikon Ophthalmostation OS-Wing.

3. Nomenclature

1) Lens Chamber

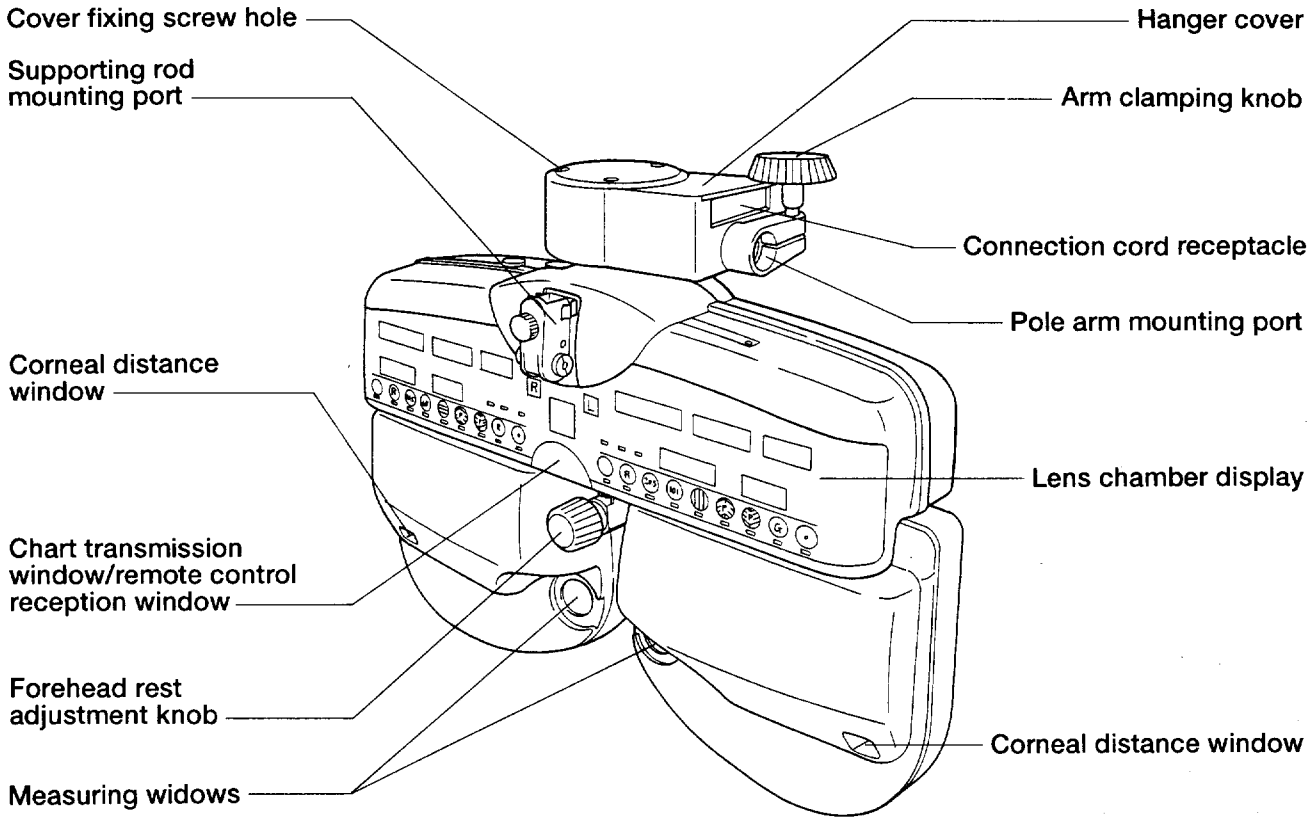


Figure 1-1 (Front View)

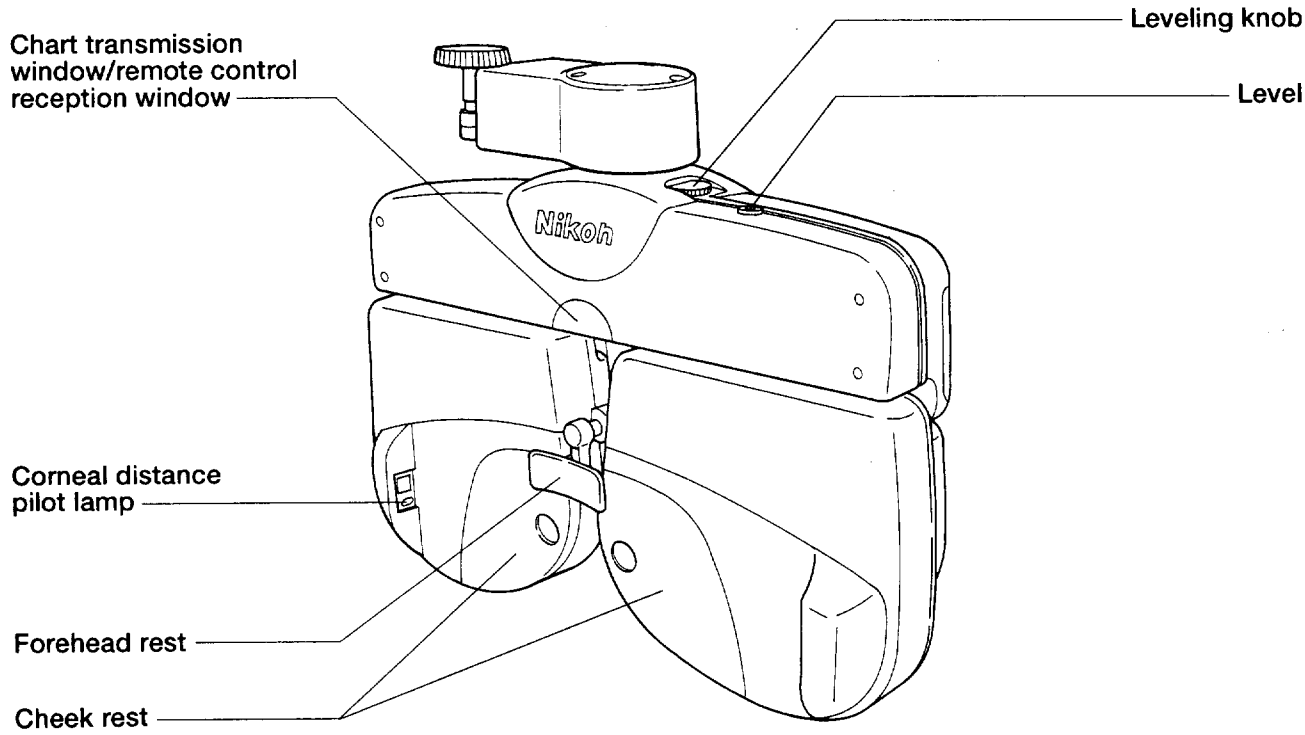


Figure 1-2 (Rear View)

2) Power Control Unit

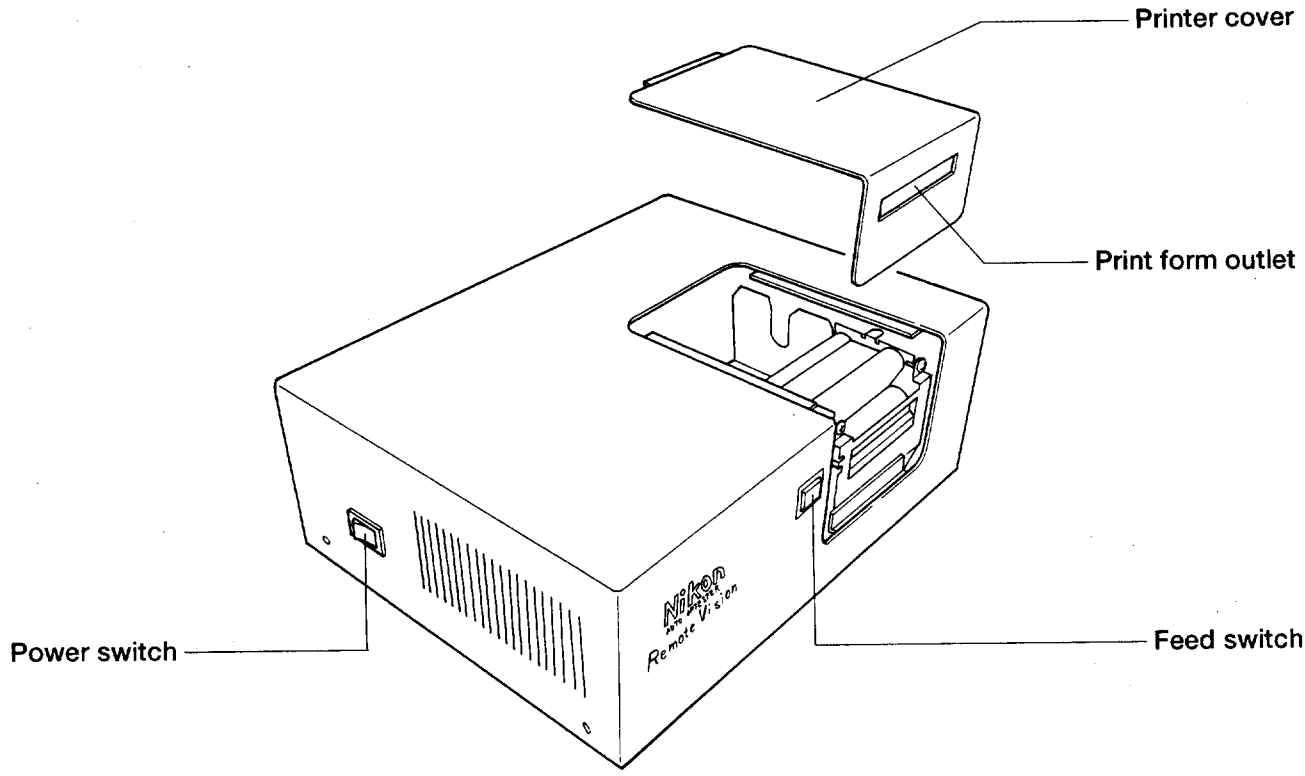


Figure 2-1

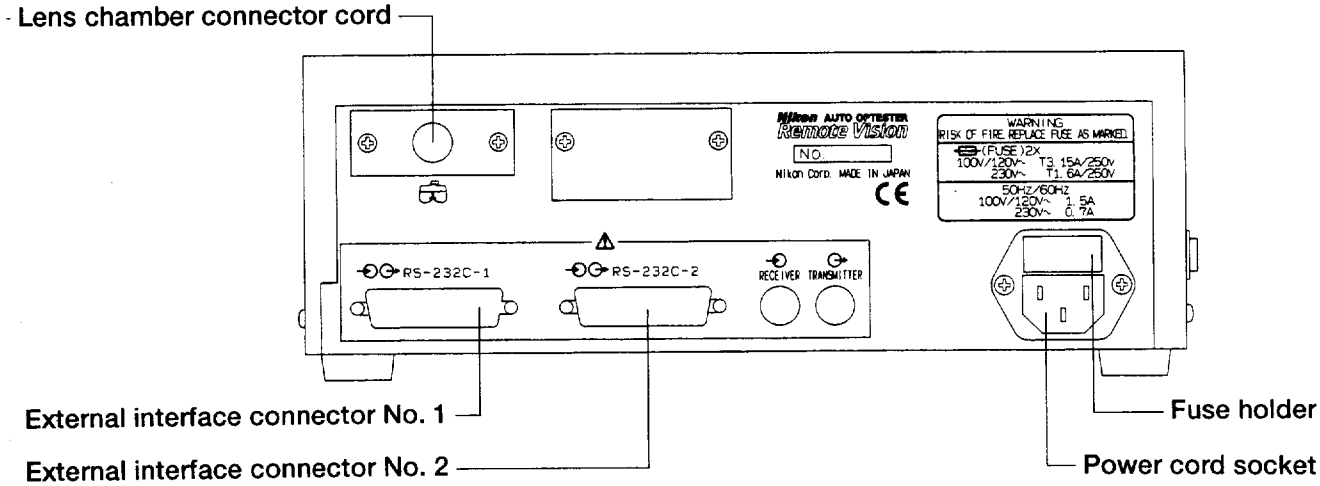


Figure 2-2

The following symbols are printed on the power supply box:

Power switch

○	OFF (Power off)
|	ON (Power on)

Power input panel

~	A.C.	⚠	Caution: See the instructions.
▭	FUSE		

3) Remote Controller

NP-3S Compatible Model
(Snellen Numbers Chart)

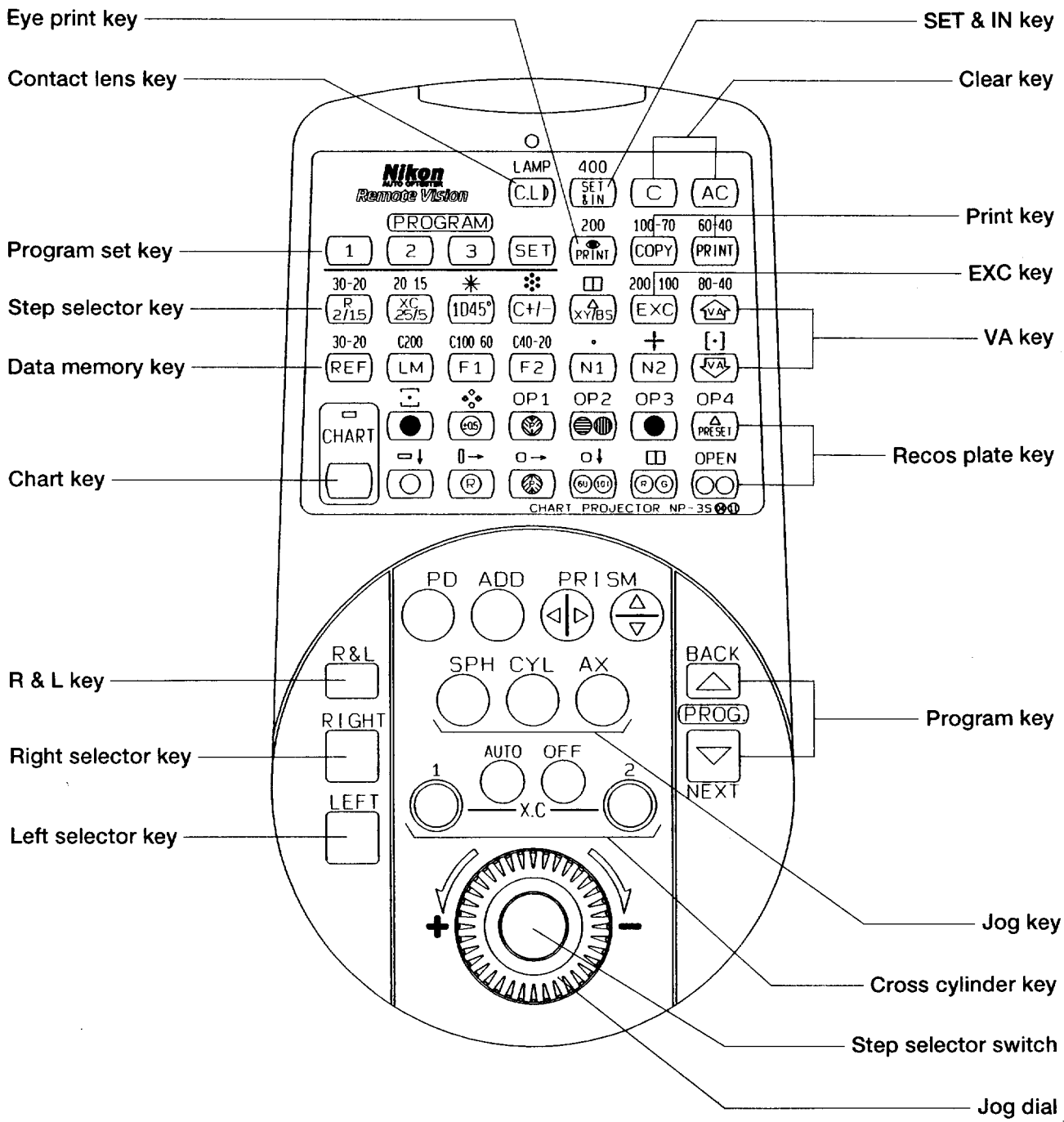


Figure 3-1

Exclusive Remote Controller for Remote Vision

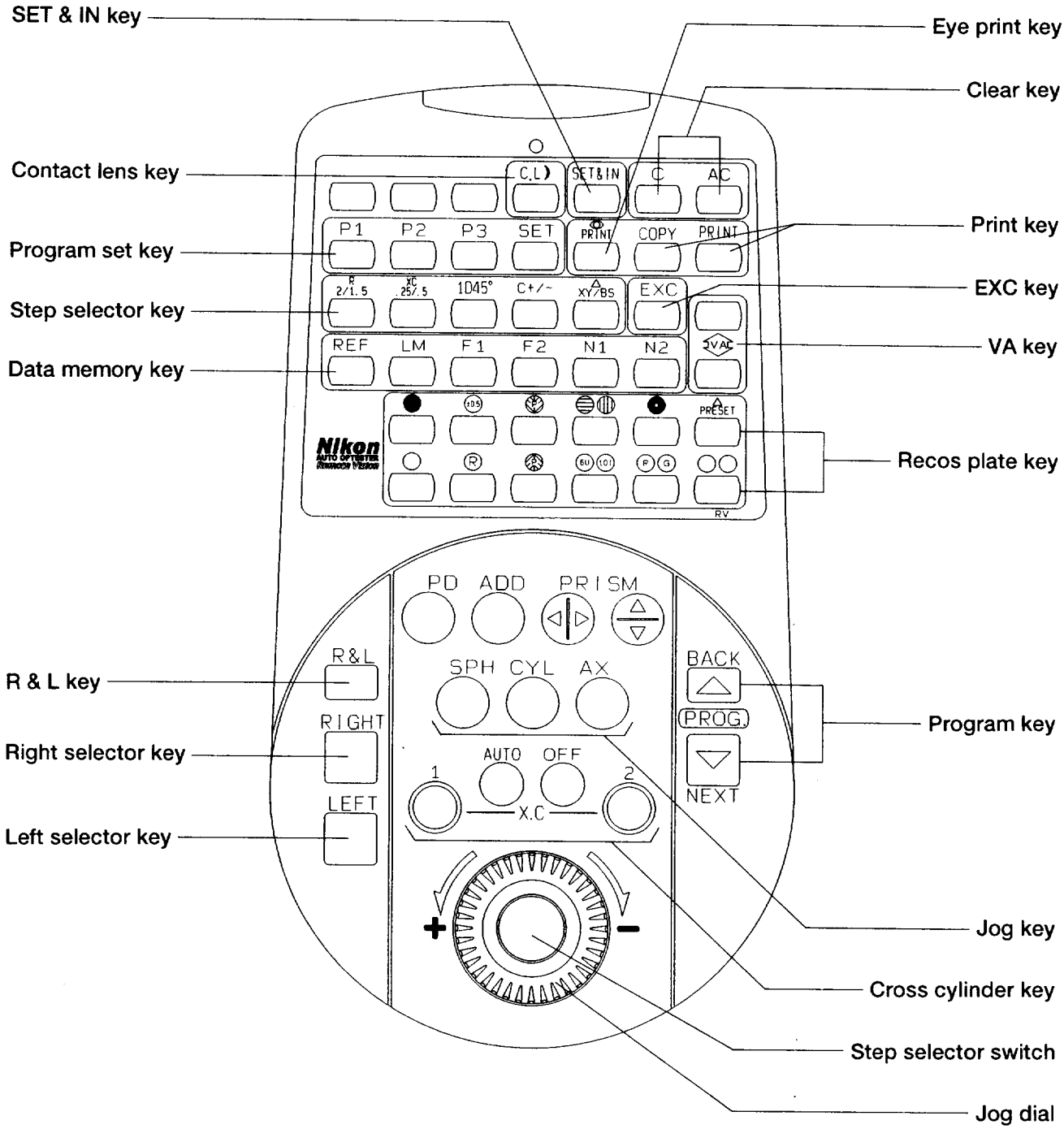


Figure 3-2

4. Setup

Be sure to contact your sales representative when installing and cabling the lens chamber.

1) Mounting the Near Point Chart

(1) Insert the end of the scale rod into the mounting port in the center of the lens chamber.
Note: Insert the scale rod from the oblique-upper side.
(2) Insert the chart holder from the other end of the scale rod.
(3) Secure the chart to the holder with two screws.

[Either keep the scale upright or remove it, in cases other than near view measurement.]

2) Leveling

Turn the leveling knob to set the lens chamber in the level state while observing the level through the mirror on top.

3) Turn on the Power Switch

Turn on the power switch (press the switch indicator, "I"); the lens chamber enters the initial state as shown below in a few seconds, enabling key operation.

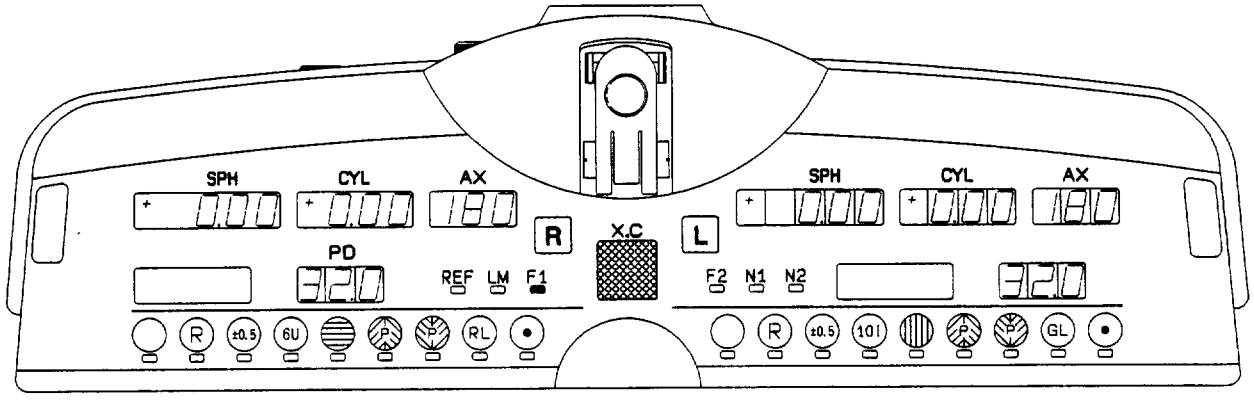


Figure 4

4) Installing the Safety Strap

Install the safety strap on the strap hook on the bottom plate of the remote controller.

⚠ Caution

- Make sure that the strap is secured and will not come off easily.
- Replace the strap with a new one if tears or frays are found on or in the strap.

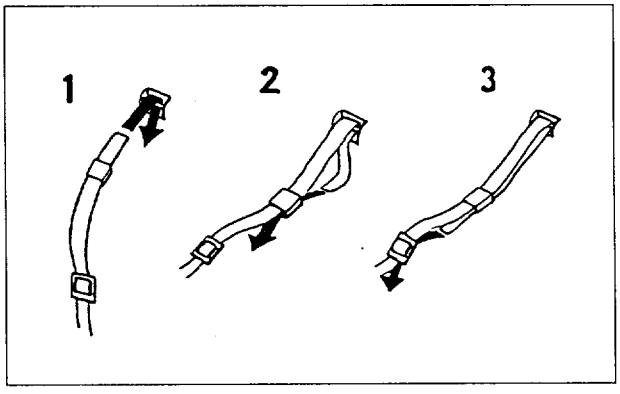
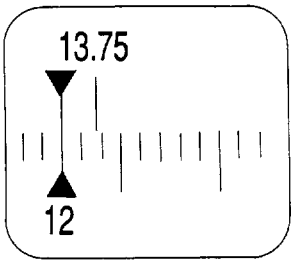


Figure 5

5. Adjusting the Corneal Distance

1) Adjusting the Corneal Distance for Normal Measurement

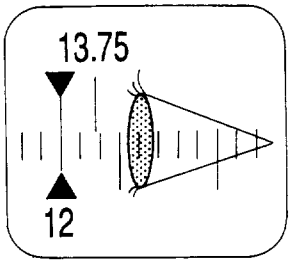
For normal measurement, set the corneal distance of the patient to the position shown in Figure 6-3 while observing the corneal distance window.



Make sure line 12 is on the triangle base mark.

Figure 6-1

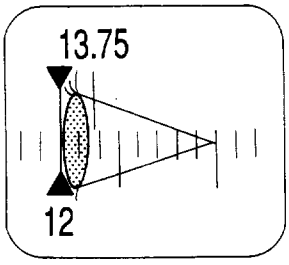
⇨



Turn the forehead rest adjustment knob while watching the corneal distance position of patient.

Figure 6-2

⇨



Adjust the position of the corneal distance to line 12 (At this time, the corneal distance is 12 mm.)

Figure 6-3

If corneal (wearing) distance is different for the test and for the dispensed spectacles, convert the test result (if more than 5 diopters) according to the diopter conversion table in Section 5.2) (pages 17 and 18.)

Example:

When SPH-9.00D was obtained with the corneal distance of 12 mm, and spectacles are dispensed for a wearing distance of 15 mm, the prescription is as follows:

(1) "(−) lens" because it is -9.00D. "3mm away" because 12 mm → 15 mm

(2) Follow the line of "test result 9.00D" to the right.

(3) Select the column "(−) lens distance by 3mm".

(4) SPH-9.25D is the prescription for the spectacles.

2) Diopter Conversion Table

Diopter (D) compensated by change in corneal distance (Change corneal distance: 1-6 mm)

Test result (D)	Change corneal distance (mm)											
	Longer in case of (+) lens Shorter in case of (−) lens						Shorter in case of (+) lens Longer in case of (−) lens					
	1	2	3	4	5	6	1	2	3	4	5	6
									Example ↓			
4.50	4.48	4.46	4.44	4.42	4.40	4.38	4.52	4.54	4.56	4.58	4.60	4.62
5.00	4.98	4.95	4.93	4.90	4.88	4.85	5.03	5.05	5.08	5.10	5.13	5.15
5.50	5.47	5.44	5.41	5.38	5.35	5.32	5.53	5.56	5.59	5.62	5.66	5.69
6.00	5.96	5.93	5.89	5.86	5.83	5.79	6.04	6.07	6.11	6.15	6.19	6.22
6.50	6.46	6.42	6.38	6.34	6.30	6.26	6.54	6.59	6.63	6.67	6.72	6.76
7.00	6.95	6.90	6.86	6.81	6.76	6.72	7.05	7.10	7.15	7.20	7.25	7.31
7.50	7.44	7.39	7.33	7.28	7.23	7.18	7.56	7.61	7.67	7.73	7.79	7.85
8.00	7.94	7.87	7.81	7.75	7.69	7.63	8.06	8.13	8.20	8.26	8.33	8.40
8.50	8.43	8.36	8.29	8.22	8.15	8.09	8.57	8.65	8.72	8.80	8.88	8.96
Example → 9.00	8.92	8.84	8.76	8.69	8.61	8.54	9.08	9.17	9.25	9.34	9.42	9.51
9.50	9.41	9.32	9.24	9.15	9.07	8.99	9.59	9.68	9.78	9.88	9.97	10.07
10.00	9.90	9.80	9.71	9.62	9.52	9.43	10.10	10.20	10.31	10.42	10.53	10.64
10.50	10.39	10.28	10.18	10.08	9.98	9.88	10.61	10.73	10.84	10.96	11.08	11.21
11.00	10.88	10.76	10.65	10.54	10.43	10.32	11.12	11.25	11.38	11.51	11.64	11.78
11.50	11.37	11.24	11.12	10.99	10.87	10.76	11.63	11.77	11.91	12.05	12.20	12.35
12.00	11.86	11.72	11.58	11.45	11.32	11.19	12.15	12.30	12.45	12.61	12.77	12.93
12.50	12.35	12.20	12.05	11.90	11.76	11.63	12.66	12.82	12.99	13.16	13.33	13.51
13.00	12.83	12.67	12.51	12.36	12.21	12.06	13.17	13.35	13.53	13.71	13.90	14.10
13.50	13.32	13.15	12.97	12.81	12.65	12.49	13.68	13.87	14.07	14.27	14.48	14.69
14.00	13.81	13.62	13.44	13.26	13.08	12.92	14.20	14.40	14.61	14.83	15.05	15.28
14.50	14.29	14.09	13.90	13.71	13.52	13.34	14.71	14.93	15.16	15.39	15.63	15.88
15.00	14.78	14.56	14.35	14.15	13.95	13.76	15.23	15.46	15.71	15.96	16.22	16.48
15.50	15.26	15.03	14.81	14.60	14.39	14.18	15.74	16.00	16.26	16.52	16.80	17.09
16.00	15.75	15.50	15.27	15.04	14.81	14.60	16.26	16.53	16.81	17.09	17.39	17.70
16.50	16.23	15.97	15.72	15.48	15.24	15.01	16.78	17.06	17.36	17.67	17.98	18.31
17.00	16.72	16.44	16.18	15.92	15.67	15.43	17.29	17.60	17.91	18.24	18.58	18.93
17.50	17.20	16.91	16.63	16.36	16.09	15.84	17.81	18.13	18.47	18.82	19.18	19.55
18.00	17.68	17.37	17.08	16.79	16.51	16.25	18.33	18.67	19.03	19.40	19.78	20.18
18.50	18.16	17.84	17.53	17.23	16.93	16.65	18.85	19.21	19.59	19.98	20.39	20.81
19.00	18.65	18.30	17.98	17.66	17.35	17.06	19.37	19.75	20.15	20.56	20.99	21.44
19.50	19.13	18.77	18.42	18.09	17.77	17.46	19.89	20.29	20.71	21.15	21.61	22.08
20.00	19.61	19.23	18.87	18.52	18.18	17.86	20.41	20.83	21.28	21.74	22.22	22.73

Diopter (D) compensated by change in corneal distance (Change corneal distance: 7-12 mm)

Test result (D)	Change corneal distance (mm)											
	Longer in case of (+) lens Shorter in case of (−) lens						Shorter in case of (+) lens Longer in case of (−) lens					
	7	8	9	10	11	12	7	8	9	10	11	12
4.50	4.36	4.34	4.32	4.31	4.29	4.27	4.64	4.67	4.69	4.71	4.73	4.76
5.00	4.83	4.81	4.78	4.76	4.74	4.72	5.18	5.21	5.24	5.26	5.29	5.32
5.50	5.30	5.27	5.24	5.21	5.19	5.16	5.72	5.75	5.79	5.82	5.85	5.89
6.00	5.76	5.73	5.69	5.66	5.63	5.60	6.26	6.30	6.34	6.38	6.42	6.47
6.50	6.22	6.18	6.14	6.10	6.07	6.03	6.81	6.86	6.90	6.95	7.00	7.05
7.00	6.67	6.63	6.59	6.54	6.50	6.46	7.36	7.42	7.47	7.53	7.58	7.64
7.50	7.12	7.08	7.03	6.98	6.93	6.88	7.92	7.98	8.04	8.11	8.17	8.24
8.00	7.58	7.52	7.46	7.41	7.35	7.30	8.47	8.55	8.62	8.70	8.77	8.85
8.50	8.02	7.96	7.90	7.83	7.77	7.71	9.04	9.12	9.20	9.29	9.38	9.47
9.00	8.47	8.40	8.33	8.26	8.19	8.12	9.61	9.70	9.79	9.89	9.99	10.09
9.50	8.91	8.83	8.75	8.68	8.60	8.53	10.18	10.28	10.39	10.50	10.61	10.72
10.00	9.35	9.26	9.17	9.09	9.01	8.93	10.75	10.87	10.99	11.11	11.24	11.36
10.50	9.78	9.67	9.59	9.50	9.41	9.33	11.33	11.46	11.60	11.73	11.87	12.01
11.00	10.21	10.11	10.00	9.91	9.81	9.72	11.92	12.06	12.21	12.36	12.51	12.67
11.50	10.64	10.53	10.42	10.31	10.21	10.11	12.51	12.67	12.83	12.99	13.17	13.34
12.00	11.07	10.95	10.83	10.71	10.60	10.49	13.10	13.27	13.45	13.64	13.82	14.02
12.50	11.49	11.36	11.24	11.11	10.99	10.87	13.70	13.89	14.08	14.29	14.49	14.71
13.00	11.92	11.78	11.64	11.50	11.37	11.25	14.30	14.51	14.72	14.94	15.17	15.40
13.50	12.33	12.18	12.03	11.89	11.75	11.61	14.91	15.13	15.37	15.61	15.85	16.11
14.00	12.75	12.59	12.43	12.28	12.13	11.99	15.52	15.77	16.02	16.28	16.55	16.83
14.50	13.16	12.99	12.83	12.66	12.51	12.35	16.14	16.40	16.68	16.96	17.25	17.55
15.00	13.57	13.39	13.22	13.04	12.88	12.71	16.76	17.05	17.34	17.65	17.96	18.29
15.50	13.98	13.79	13.60	13.42	13.24	13.07	17.39	17.69	18.01	18.34	18.69	19.04
16.00	14.39	14.18	13.97	13.79	13.60	13.42	18.02	18.35	18.69	19.05	19.42	19.80
16.50	14.79	14.57	14.37	14.16	13.97	13.77	18.65	19.01	19.38	19.76	20.16	20.57
17.00	15.19	14.96	14.74	14.53	14.32	14.12	19.30	19.68	20.07	20.48	20.91	21.36
17.50	15.59	15.35	15.12	14.89	14.68	14.46	19.94	20.34	20.77	21.21	21.67	22.15
18.00	15.96	15.73	15.49	15.25	15.03	14.80	20.59	21.03	21.48	21.95	22.44	22.96
18.50	16.38	16.11	15.86	15.61	15.37	15.14	21.25	21.71	22.20	22.70	23.23	23.78
19.00	16.77	16.49	16.23	15.97	15.72	15.47	21.91	22.41	22.92	23.46	24.02	24.61
19.50	17.16	16.87	16.59	16.32	16.06	15.80	22.58	23.10	23.65	24.22	24.82	25.46
20.00	17.54	17.24	16.95	16.67	16.39	16.13	23.26	23.81	24.39	25.00	25.64	26.32

6. Using the Remote Controller

All Auto-optester Remote Vision functions are controlled using the remote controller.
Point the light source side of the remote controller toward the photo detector block of the lens chamber before pressing a key on the remote controller (Figure 7).
Different models of remote controller are used depending on the available charts. This section explains how to use the NP-3S remote controller as an example. The basic operating procedures for the other models are identical.

- NP-3S Compatible Model (Snellen Numbers)
- NP-3S Compatible Model (Europe II)
- NP-3S Compatible Model (Multiple)
- NP-3S Compatible Model (Numbers)
- Exclusive Remote Controller for Remote Vision

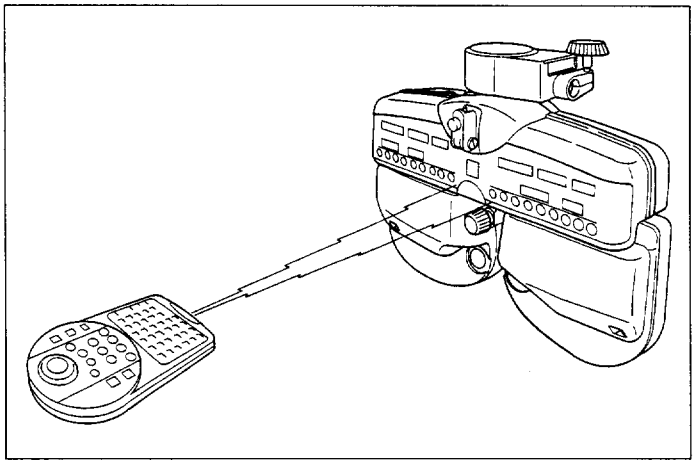


Figure 7

(1) Right, Left selector keys

Remote Controller Key	Function
RIGHT	Enables the Remote Vision only for the right eye. The measurement data for the right eye is illuminated on the lens chamber display. An occluder is placed on the left eye side in the single-eye mode*.
LEFT	Enables the Remote Vision only for the left eye. The measurement data for the left eye is illuminated on the lens chamber display. An occluder is placed on the right eye side in the single-eye mode*.
R&L	Enables the Remote Vision for both the right and left eyes. The measurement data for both right and left eyes is illuminated on the lens chamber display.

* Single-eye mode: An occluder is automatically placed in the sight aperture on the inactive eye side when either the RIGHT or LEFT key is pressed. In this state, a recos plate for open, occlusion, retinoscopy, ±0.5 fixed cross cylinder, or pinhole is inserted and the chart keys for single-eye tests are enabled.

* BI (Binocular) mode: A mode in which no occluder is placed automatically when either the RIGHT or LEFT key is pressed. The Auto-optester Remote Vision is in this mode when a recos plate for a polarizing filter, Maddox lens, 6U/10L, R&G filter, or prism preset is inserted.

(2) Setup key for lens replacement using jog key

Remote Controller Key	Function
PD	Sets the jog dial mode to PD (Pupil Distance). When this key is pressed, cross-hair reticles for PD measurement are placed in the sight apertures for both eyes and the corneal distance pilot lamp is illuminated to identify the PD measurement mode. The PD data display also flickers to indicate that the Auto-optester Remote Vision is in the PD measurement mode.
ADD	Sets the jog dial mode to ADD. The Auto-optester Remote Vision automatically enters the convergent state and readies itself for ADD value measurement. The ADD data display flickers to indicate that the Auto-optester Remote Vision is in the ADD measurement mode. When the OFF key is pressed, the current ADD measured values are saved before the ADD lens is removed, which lets the Auto-optester Remote Vision exit from the convergent state. Once the ADD measured values are saved, the lens relevant to these values is loaded and the Auto-optester Remote Vision enters the convergent state when the ADD key is pressed again.
PRISM (horizontal) (vertical)	Sets the jog dial mode to the horizontal (vertical) prism mode. The Auto-optester Remote Vision automatically enters the R&L drive mode in which the prism is placed evenly for both eyes. The selectable horizontal (vertical) prism data display flickers to indicate that the Auto-optester Remote Vision is in the horizontal (vertical) prism measurement mode. When OFF key is pressed again, all the current prism measured values are saved before the prism lens is removed. Once the prism measured values are saved, they are loaded when the PRISM key is pressed again.
SPH	Sets the jog dial mode to spherical power mode. The selectable spherical power measurement data display flickers to indicate that the Auto-optester Remote Vision is in the spherical power measurement mode.
CYL	Sets the jog dial mode to the cylindrical power mode. The selectable cylindrical power measurement data display flickers to indicate that the Auto-optester Remote Vision is in the spherical power measurement mode.
AX	Sets the jog dial mode to the cylindrical axis mode. The selectable cylindrical axis measurement data display flickers to indicate that the Auto-optester Remote Vision is in the cylindrical axis measurement mode.

You can change the step unit of the jog dial as summarized below by pressing the step selector switch at the center of the jog dial. The standard step unit is selected when you press the step selector switch again or when the measurement mode is changed.

(Measurement mode)	(Standard step unit)		(Step unit after being switched)
PD	0.5mm	⇔	0.1mm
SPH, ADD	0.25D	⇔	0.125D
CYL		0.25D	
AX	5°	⇔	1°

(3) Cross cylinder key

Remote Controller Key	Function
1 (2)	<CYL measurement mode> The cross cylinder lens is loaded in such an orientation that the cylindrical power increases (decreases). <AX measurement mode> The cross cylinder lens is loaded at 45° (135°) degrees with respect to the cylindrical axis.
AUTO	The auto cross lens is loaded accordingly in the CYL or AX mode.
OFF	The cross cylinder lens and auto cross lens go out of the measuring window. The OFF key lets the Auto-optester Remote Vision exit from the ADD and PRISM measurement modes.

When the cross cylinder lens is loaded, the XC display in the lens chamber lights and the operating mode of the cross cylinder lens is indicated on the dot display (Figure 8).

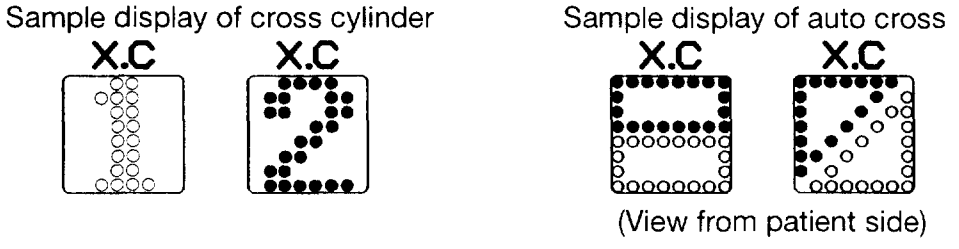


Figure 8

<Cylindrical power measurement using a cross cylinder lens>
Instruct the patient to compare the sight conditions of the cross cylinder lens in conditions "1" and "2" and:

Turn the jog dial counterclockwise if the sight in condition "1" is better than that in condition "2."

Turn the jog dial clockwise if the sight in condition "2" is better than that in condition "1."

Repeat the above step until the sight conditions are about the same.

<Cylindrical power measurement using an auto cylinder lens>
After identifying the loading state of the auto cylinder lens on the dot display, instruct the patient to examine the sight conditions of the auto cylinder lens and:

Turn the jog dial counterclockwise if the sight identified by the green dot display is better than that identified by the red dot display."

Turn the jog dial clockwise if the sight identified by the red dot display is better than that identified by the green dot display."

The cross cylinder keys are disabled in the BI and R&L modes. The state of the cross cylinder can be reset either by pressing the RIGHT, LEFT, or R&L key, by pressing a recos plate key, or by pressing a chart key other than the cross cylinder keys.

(4) Program key

Remote Controller Key	Function
NEXT	Advances the examination step according to the predefined program sequence.
BACK	Returns the examination program to the preceding step.

(5) Recos plate key

Pressing these keys loads the corresponding auxiliary lenses and illuminates the recos plate indicator on the lens chamber.

Remote Controller Key	Function
○ Open	Loads the "open" recos plate in the sight aperture.
● Occlusion	Loads the "occlusion" recos plate in the sight aperture.
Ⓡ Retinoscopy	Loads the retinoscopy lens (+1.5 or +2) in the sight aperture. The lens power is selected using a step selector key (R2/1.5) (see Page 22).
±5 fixed cross cylinder	Loads the ±0.5D cross cylinder for presbyopia in the sight aperture (with the minus axis set in the 90° direction and the plus axis in the 180° direction).
Ⓟ Polarizing filter	Loads a polarizing filter in the sight aperture (with right polarization axis set to 135° and left polarization axis set to 45°). The Auto-optester Remote Vision is placed in the BI mode*.
Ⓟ Polarizing filter	Loads a polarizing filter in the sight aperture (with right polarization axis set to 45° and left polarization axis set to 135°). The Auto-optester Remote Vision is placed in the BI mode*.
Ⓑ Ⓑ 6U, 10I	Loads the sight aperture with: the 6△BU (BASE UP) recos plate prism in the right eye active mode. the 10△BI (BASE IN) recos plate prism in the left eye active mode. The Auto-optester Remote Vision is placed in the BI mode*.
Horizontal Maddox Vertical Maddox	Loads the sight aperture with: the horizontal red Maddox lens (the light spot appears as a red vertical beam) in the right eye active mode. the vertical red Maddox lens (the light spot appears as a red horizontal beam) in the left eye active mode. The Auto-optester Remote Vision is placed in the BI mode*.
Ⓡ Ⓖ R, G filters	Loads the sight aperture with: the R (Red) filter in the right eye. the G (Green) filter in the left eye. The Auto-optester Remote Vision is placed in the BI mode*.
● Pinhole	Loads a pinhole in the sight aperture.
△ PRESET	When no prism is inserted or when the horizontal prism is enabled, loads the right eye recos plate with a 6U, adds a prism power of 10 to 20 BI (selectable from 10, 15, and 20 at initialization time) for the left eye, and places the Auto-optester Remote Vision into the left eye drive mode. When the vertical prism is enabled, loads the left eye recos plate with a 10I, adds a prism power of 6 to 8 BU (selectable from 6, 7, and 8 at initialization time) for the right eye, and places the Auto-optester Remote Vision into the right eye drive mode. The Auto-optester Remote Vision is placed in the BI mode*.
○○ Both Eyes Open	Places the Auto-optester Remote Vision into both eye open mode.

(6) Data memory key

Remote Controller Key	Function
REF (autorefraction)	Loads the measured data that is obtained in the autorefraction mode.
LM (Lens Meter)	Loads the measured data that is obtained through the lens meter. The user can enter the old prescription data from the keypad if no data has been presented from the automatic lens meter.
F1 (Far 1)	Resets the data and turns on this mode immediately after a power-on, print, or AC operation. When the Auto-optester Remote Vision has already had data (once this mode is used), loads the lens that is associated with that data.
F2 (Far 2)	Pressing this key when no data is saved copies the data that has been established immediately before the key is pressed as F2 data. When the Auto-optester Remote Vision has already had data (once this mode is used), loads the lens that is associated with that data.
N1 (Near 1) N2 (Near 2)	Places the Auto-optester Remote Vision into the convergent state (at PD of 54 mm or greater). Pressing this key when no data is saved copies the data that has been established immediately before the key is pressed as N1 (or N2) data. When the Auto-optester Remote Vision has already had data (once this mode is used), loads the lens that is associated with that data.

The data memory LED provides different kinds of information depending on its state:
Flickering: Shows the data that is currently loaded in the sight aperture.
Staying on: Shows the data that is simply stored (instead of being loaded in the sight aperture).

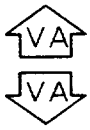
(7) Step selector key

Remote Controller Key	Function
R2／1.5	Sets the power of the retinoscopy lens to +2D or +1.5D.
XC.25／.5	Sets the power of the cross cylinder lens (excluding that for the auto cross cylinder) to ±0.25 or ±0.5.
1D45°	Increases the step unit of the jog dial. SPH, CYL, ADD → 1D increment AX → 45° increment Prism → Single-eye 1△ increment PD → 1 mm increment The standard step unit is selected when this key is pressed again or when the measurement mode is changed.
C+／−	Starts cylindrical power conversion.
△ XY／BS	Switches the prism display modes between XY and r θ when a prism is used.

(8) EXC key

Remote Controller Key	Function
EXC	Pressing this key when CYL is set to 0D places the Auto-optester Remote Vision into the EXC mode. The Auto-optester Remote Vision cycles through the following steps as you turn the jog dial counterclockwise: ⇒ Sets the minus axis to 180°. ⇒ Sets the minus axis to 90°. ⇒ Sets the minus axis to 45°. ⇒ Sets the minus axis to 135°. ⇒ Turns on the "no cross cylinder lens" mode. When it is found that the patient can see better when he or she wears a cross cylinder lens and if you press the CYL or AX key at the axis at which the patient answers "best," a C-0.25D is loaded at that axis. If a ±0.5D cross cylinder lens is used, a C-0.5D is loaded at the axis at which the patient answers "good." The Auto-optester Remote Vision exits the EXC mode when the EXC key is pressed again or when the CYL or AX key is pressed.

(9) VA key

Remote Controller Key	Function
	Proposes the best visual acuity chart and shows the visual acuity data on the lens chamber display. The visual acuity data that has been established immediately before the visual acuity chart is changed is saved. If this key is used with a mask turned on, the chart is switched in conjunction with the mask.Proposes the best visual acuity chart and shows the visual acuity data on the lens chamber display.

(10) Program Set key

You can program the visual chart (including the mask), auxiliary lens, left/right eye mode, measurement mode, and recruitment lens for each examination step. The Auto-optester Remote Vision allows the user to define a maximum of three examination programs. He or she can also use predefined examination programs (see Page 27).

Remote Controller Key	Function
1, 2, 3	Starts the examination program with the specified program ID. This key is used to specify the program ID when defining an examination program. Used to confirm the examination step during executing program.
SET	Used to define examination programs (see Page 27). Used to stop the program during executing program.

(11) Print key

Remote Controller Key	Function
PRINT (Print)	(Press the key twice in succession.) Prints the data in the predefined format, transmits the data if programmed so, and initializes the Auto-optester Remote Vision and clears the display. The Auto-optester Remote Vision preserves the old data until the next key input is presented, Until then, pressing this key causes the same data to be printed.
COPY (Copy)	Prints only the data that is currently being displayed.
PRINT	Produces an eye print (a diagram that shows the refraction status). Once the PRINT key is pressed, it remains valid until another key is pressed. The Auto-optester Remote Vision produces an eye print for the F1 data. If the PRINT key has not been pressed, the Auto-optester Remote Vision generates an eye print for the lens data that is currently being displayed.

(12) Contact lens key

Remote Controller Key	Function
C.L	Converts the measured values for a contact lens (VD is set to 0). The preset VD values are restored when this key is pressed again or another key action (other than COPY) is taken.

(13) SET & IN key

Remote Controller Key	Function
SET & IN	Places the Auto-optester Remote Vision into a mode in which when jog key and jog dial are actuated, only the display changes and no lens is inserted. Pressing this key again causes the currently displayed lens to be inserted.

(14) Clear key

Remote Controller Key	Function
AC	Clears all data (press the key twice in succession).
C	Clears only the data for which jogging is enabled and clears no other data.

(15) Chart key

Remote Controller Key	Function
Chart key	Causes the LED on the key to flicker and enables the chart keys. Each chart key enables the operation that is illustrated above the key. If no key input has been presented for longer than 3 minutes since the beginning of LED flickering, the LED is turned off and the operations that are illustrated above the chart keys are enabled. If this key is pressed when the LED is flickering, the LED on the key is turned off and the operations that are illustrated above the chart keys are enabled.

The chart key's mode switching feature is not available on the Exclusive Remote Controller for Remote Vision. Exclusive chart selector keys are used for charting.

7. Sample Printouts

Measurement date — Measurement start time — Measurement end time

```
'00.01.01  10:20-10:25AM
Name
```

Patient's name will be printed when enter the name in Auto Ref mode.

```
[VAN]
  R 0.3   L 0.4   R&L 0.4
```

VAN: visual acuity value of naked eye

```
[FAR1]      PD R32.0 L32.5
     SPH      CYL    AX    VA
R - 2.25  - 0.50  180   1.2
L - 1.75  - 0.50  175   1.2
                      R&L 1.5
     ADD       PX      PY
R + 2.00    1.0BI  0.5BU
L + 2.00    1.0BI  0.5BD
```

FAR 1
(Example: Completely corrected power)
VA: Visual acuity value

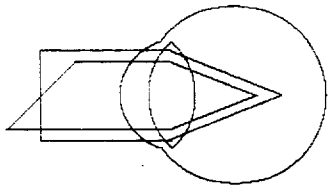
```
[FAR2]      PD R32.0 L32.5
     SPH      CYL    AX    VA
R - 2.25  - 0.50  180   1.2
L - 1.75  - 0.50  175   1.2
                      R&L 1.5
     ADD       PX      PY
R + 2.00
L + 2.00
```

FAR 2
(Example: Power with spectacles on)

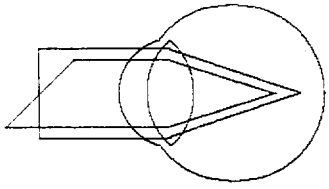
```
[NEAR1]     PD R32.0 L32.5
     SPH      CYL    AX    VA
R - 0.25  - 0.50  180
L + 0.25  - 0.50  175
```

NEAR 1

```
  [FAR1 eye print]
  [R]  SPH     CYL    AX
       - 2.25  - 0.50  180
```



```
  [L]  SPH     CYL    AX
       - 1.75  - 0.50  175
```



Eye print (FAR 1)
Eye print of FAR 1 will be printed when PRINT key is pressed soon after finishing printout.

* You can select the data to be printed in initial setting mode.

Figure 9

8. Programming an Examination Seguence

The Auto-optester Remote Vision allows the user to employ up to three different examination programs. These programs come pre-installed from the factory. For users who wish, it is possible to customize an existing program, or create a completely new examination sequence. Functions and tests which can be customized include visual test charts (including the masks), auxiliary lenses, left/right eye mode, and measurement mode.
When the NEXT key is pressed at the last examination step in an examination program, the central dot display section indicates "E" to let you know that the examination sequence is completed. When the NEXT key is pressed again in this state, the Auto-optester Remote Vision exits from the program mode to the normal measuremnet mode. When you want the Auto-optester Remote Vision to exit from the program mode while performing a programmed measurement, you can press the SET key to return the equipment to the normal measurement mode.
After the SET key is pressed, you can either resume the programmed measurement or perform a normal measurement other than the program sequence.
When you want to restart the programmed measurement, you can press the NEXT key to resume the step immediately after the one at which you stopped the measurement.
When you press the BACK key to resume the programmed measurement, you can return to the beginning of the step before the one at which you stopped the measurement (the measured data is also returned to the previous values).

Setup Procedure

The operator can define the items listed below for each examination step using the keypad (the Auto-optester Remote Vision can record two or more functions assigned to the function keys). For items that the operator does not define, their old values that are defined for a previous step are assumed. A single examination program can store a maximum of 30 steps.
The Remote Vision does not operate with the test chart key (see page 34) if this key is pressed when a measurement sequence is programmed (you can set the equipment arbitrarily for your use).

(1) Test chart	: The mask key function can also be specified.
(2) Auxiliary lens	: Auxiliary lenses can be selected arbitrarily for measurements you want to perform.
(3) Left/right eye switching	: You can select either RIGHT, LEFT, or R&L mode (including the automatic occlusion function).
(4) Measurement mode	: You can select the measurement mode from SPH, CYL, AX, PRISM, ADD, and PD.
(5) ADD power	: You can set the initial ADD power that is necessary for the measurement. Use the jog dial to set the initial value. Example: Fog lens, prism lens, etc.
(6) Others	: You can switch between F1, F2, N1 and N2 as well as you can set the power increment, AXC, and XC.

* The Auto-optester Remote Vision enters the pause state during a save operation when you press either P1, P2, or P3 key while defining or modifying a setup item. Any key actions performed when the Auto-optester Remote Vision is in the pause state are not saved. The Auto-optester Remote Vision exits the pause state and gets ready for saving setup items for the next step when you press the NEXT key.

Lens Chamber Display States in the Program Mode

	Recos Plate LED	Center Dot Display
When an examination program is used	All LEDs are illuminated. Only the LED associated with the active item flickers.	Displays the current step number temporarily (red numeral in the green background) when the step is switched. Subsequently, the center dot display indicates the status of the individual functions.
When an examination program is defined or modified		Shows the step number (red numeral in the green background) and the status of a function alternately. When the Auto-optester Remote Vision is in the pause mode, the center dot display shows the pause mark (two green vertical lines) and the status of a function alternately.

(1) Modifying a program

Step	Key Action	Explanation
1	SET→ "Program ID" → SET	The Auto-optester Remote Vision enters the program rewrite mode in which the operator can rewrite the program with the specified program ID. The program ID is illuminated in orange in the display window at the center of the lens chamber display to indicate that the Auto-optester Remote Vision has entered the program rewrite mode. The display automatically turns red and indicates the step number.
2	NEXT(BACK)	The number of the next (preceding) step is displayed. Advance the step until the desired examination step appears.
3(a)	Key in a new setting.	The display is replaced with the new contents of the examination step.
3(b)	AC → SET	The optometry step that is being displayed disappears. The step numbers of the subsequent steps are shifted to the smaller numbers.
3(c)	SET & IN → Key in additional data	The operator can insert a step before the examination step that is currently being displayed. The contents of the optometry step that is being displayed is added to the Auto-optester Remote Vision.
4	Repeat steps 2 and 3 above to modify all the desired steps.	
5	SET → SET	The modified program is saved, the Auto-optester Remote Vision exits the program rewrite mode and enters the normal measurement mode.

- To abort program modification, press the ◉ PRINT key. The Auto-optester Remote Vision will then exit the program rewrite mode and enter the normal measurement mode.

(2) Erasing a program

Step	Key Action	Explanation
1	SET → "Program ID" → AC → SET → SET	All setup data for the examination program with the specified program ID is erased.

(3) Resetting a program

Step	Key Action	Explanation
1	SET → "Program ID" → SET & IN → SET → SET	The examination program with the specified program ID is reset to the initial settings.

9. Initialization

The operator can reset the setup items described below as desired.

1) Initialization procedure

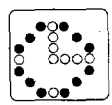
NEXT → BACK → NEXT → Step selector switch immediately after power-on (at the center of the jog dial)

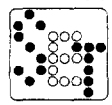
Places the Auto-optester Remote Vision into the initialization mode.

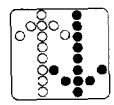
⇩

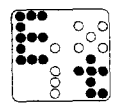
NEXT (BACK)

Used to select an item type.


Set time


General initialization


Communication setup


End

⇩ ⇩ ⇩

Step selector switch (at the center of the jog dial)

Used to establish the item type. Choosing "Exit" causes the Auto-optester Remote Vision to exit the initialization mode.

⇩

NEXT (BACK)

Used to select an item (select an item number).

⇩

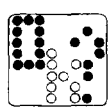
Jog dial

Used to select settings.

⇩

Step selector switch (press twice)

Used to establish the settings.


OK to write

- Pressing the AC or C key returns the Auto-optester Remote Vision to the step for selecting the item type.
- If you press the PRINT key when the Auto-optester Remote Vision is in the setup mode, the Auto-optester Remote Vision prints the current settings in the format shown below.

Sample Printout

[SET UP DATA]	(5) retino : 1.5D	(3) VA Link : on
1. Time set	(6) XC : Auto	(4) Chart ID : 1
(1) print Data : D.M.Y.	(7) XC C/A : Ax	(5) Ch.1 : NNKE
(2) print Time : 24H	(8) XC Value : 0.25D	(6) Ch.1 Speed : 9600
(3) Time :	(9) VA : 1.0	(7) Ch.1 Out : off
'97.7.7. 8:30	(10) PRESET H : 10BI	(8) Ch.2 : NK
2. Initial set	(11) PRESET V : 6BU	(9) Ch.2 Speed : 9600
(1) print Out : subj	(12) XC Exit : Auto	(10) Ch.2 Out : off
(2) auto Sph : on	3. Communication set	(11) Data in : ONE
(3) PD: SPLIT	(1) Chart Model : NP34	(12) Retinomax ID : 1
(4) VD : 12.0	(2) Printer : in	(13) R.C ID : 1

2) Setup Items

Setup-time display

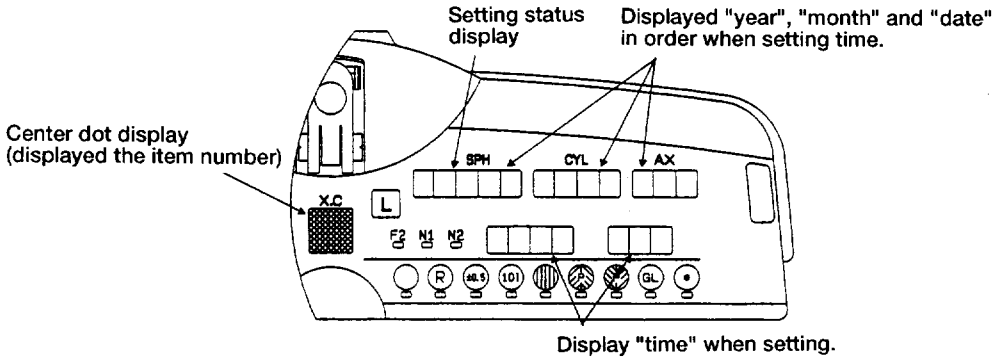
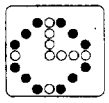


Figure 10

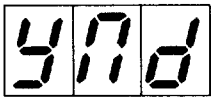
Figure in the circle below shows item number.

(1) Time set

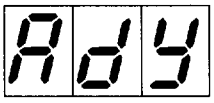


① Setting the print format (date)

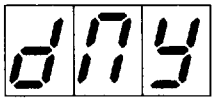
You can select the format for the date from the following three formats:



Year, month, day (y = YEAR, n = Month, d = DAY)



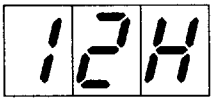
Month, day, year



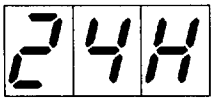
Day, month, year

② Setting the print format (time)

You can select the format for the time from the following two formats:



12-hour system

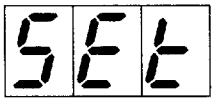


24-hour system

(When you select the 12-hour system, the suffix A (for a.m.) or P (for p.m.) appears after the minute in the current time value.)

③ Setting the current time

You can set the current date and time.



Step selector switch

⇩

NEXT(BACK)

Used to select the year, month, day, hour, and minute (the order and format of these items are determined by the setup items ① and ② above.)

⇩

Jog dial

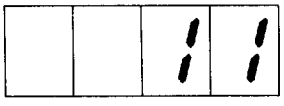
Used to switch the data that is flickering.

⇩

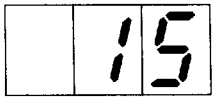
Step selector switch (press twice)

Used to establish the setting.
The date and time data is saved.
* Pressing the AC or C key brings you back to the item type selection step.

Year (last two digits of the calendar year)

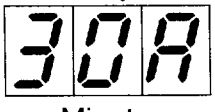


Month



Day

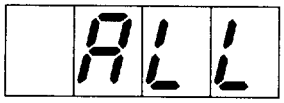
Hour



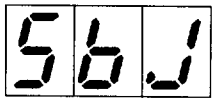
Minute

(2) General initialization steps

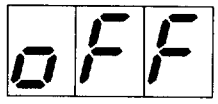
① Setting the print format (data)
You can select the format for the data from the following three formats:



Subj (subjective) + Obj (Objective)

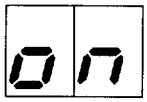


Subj (subjective)

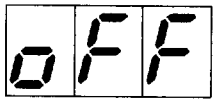


No prints

② Setting the spherical equivalent correction (when measuring X.C)
You can specify whether to use the function to automatically decrease the Sph. power by 0.25D when the Cyl. power is moved by 0.5D during X.C measurement.

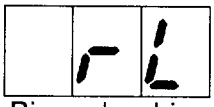


Automatic correction enabled

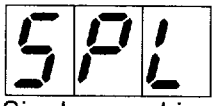


Automatic correction disabled

③ Setting the PD drive format
You can set the PD drive format to either binocular drive (50 to 80 mm) or monocular drive (25 to 40 mm).

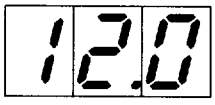


Binocular drive
(RL in print mode)

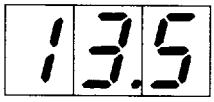


Single-eye drive
(SPLIT in print mode)

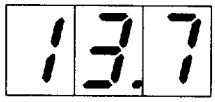
④ Setting the reference VD
You can select the normal measurement VD value that serves as the reference value for calculating the VD = 0 value using the C.L key.



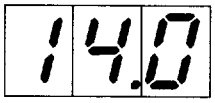
VD12.0



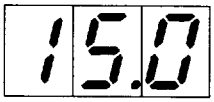
VD13.5



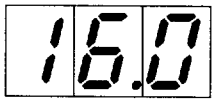
VD13.75



VD14.0

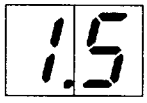


VD15.0



VD16.0

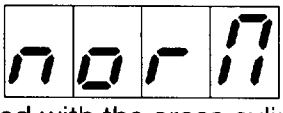
⑤ Setting the power of the retinoscopy lens
You can set the power of the retinoscopy lens on the recos plate.



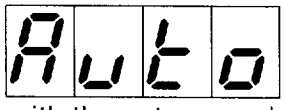
1.5D

2.0D

⑥ Setting the associated X.C
You can select either cross cylinder lens or auto cross lens that is to be loaded in conjunction with the chart.



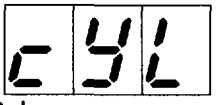
Used with the cross cylinder lens
(normal in print mode)



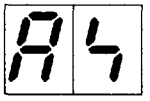
Used with the auto cross lens

⑦ Setting the priority X.C

You can select either the Cyl. or Ax. measurement mode to be turned on when the cross cylinder key is pressed during an operation other than astigmatism measurement.



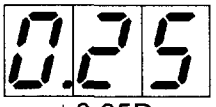
Cyl. measurement mode
(cyl in print mode)



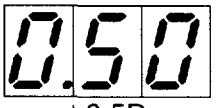
Ax. measurement mode
(Ax in print mode)

⑧ Setting the XC value

You can select the power of the cross cylinder lens for astigmatism measurement.



±0.25D

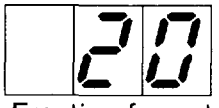


±0.5D

⑨ Setting the VA display format

You can select the VA display format.

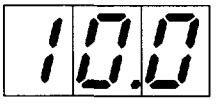
Decimal point format



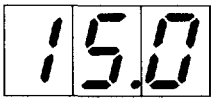
Fraction format

⑩ Setting the prism preset value (horizontal)

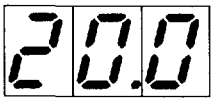
You can select the initial value of the horizontal prism to be used when the △PRESET key is pressed.



10△BI



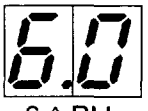
15△BI



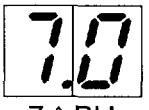
20△BI

⑪ Setting the prism preset value (vertical)

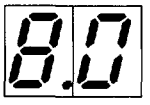
You can select the initial value of the vertical prism to be used when the △PRESET key is pressed.



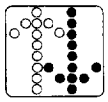
6△BU



7△BU



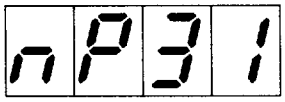
8△BU

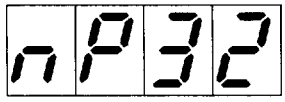
(3) Communication setup 

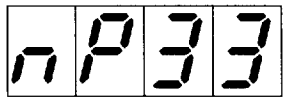
Contact our sales representative serving your locality for the settings that are required to connect the Auto-optester Remote Vision to other equipment.

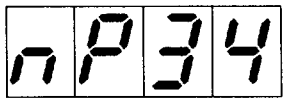
① Setting the visual acuity chart model

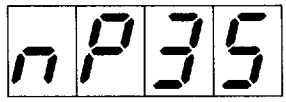
You can select the model of the visual acuity to be used with the Auto-optester Remote Vision.

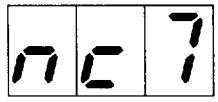

NP-3S (kana)

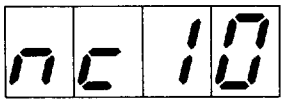

NP-3S (multiple)

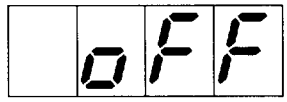

NP-3S (number)

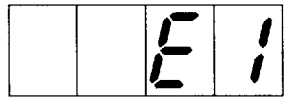

NP-3S (Europe II)

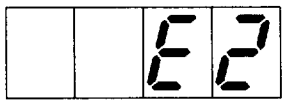

NP-3S (Snellen)

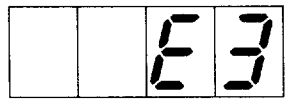

NC-7


NC-10


Not used


Spare 1


Spare 2


Spare 3

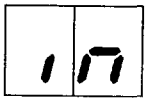

Spare 4

- When interlocked operation with a visual acuity chart device is defined, the Remote Vision operates in conjunction with that device as summarized in the table below as the chart is manipulated.

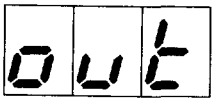
Chart	Remote Vision interlocked operation when the left chart is called up	Remote Vision interlocked operation when switching from the chart to another chart occurs
	The Auto-optester Remote Vision is loaded with the XC lens whose power is defined in (2)-⑥ and enters the astigmatism measurement mode (defined in (2)-⑦).	Not changed.
Another binocular chart	The Auto-optester Remote Vision is loaded with a polarizing lens for the auxiliary lens and enters the BI mode.	The polarizing lens is pulled out and the Auto-optester Remote Vision exits the BI mode.
Worth's four-dots test	The Auto-optester Remote Vision is loaded with red and green filters for the auxiliary lens and enters the BI mode.	Red and green filters are pulled out and the Auto-optester Remote Vision exits the BI mode.

② Selecting the printer

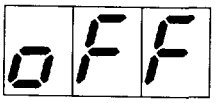
You can select the printer that is connected to the Auto-optester Remote Vision.



Built-in printer

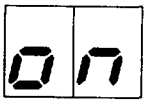


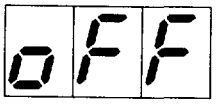
Retinomax printer



No printer

③ VA interlocked operation



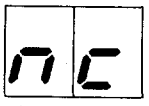


④ Setting for chart signal transmission

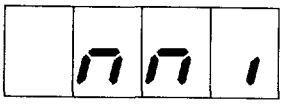
Match the signal format of the Auto-optester Remote Vision with that of the chart device main unit so that the interlocked chart device can receive signals from the Auto-optester Remote Vision.

Signal format 1 ~ Signal format 4⑤ Setting the RS-232C channel 1 communication mode

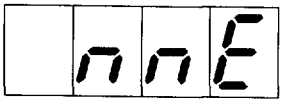
You can select the communication mode for RS-232C channel 1.



NK mode

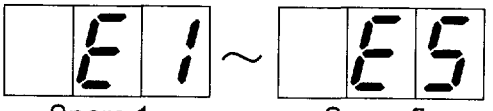


NNK1 mode



NNKE mode

Personal computer

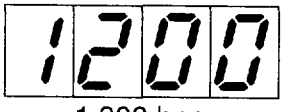


Spare 1 ~ Spare 5

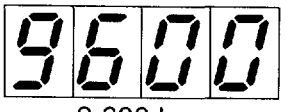
- The NK, NNK1, and NNKE communication modes are unique to Nikon. They must be used according to the characteristics of the counterpart device.

⑥ Setting the RS-232C channel 1 transmission speed (valid only when the communication mode is set to personal computer in the item ⑤)

You can select the transmission speed of RS-232C channel 1.

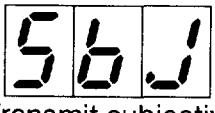


1,200 bps

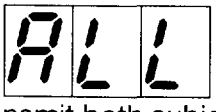


9,600 bps

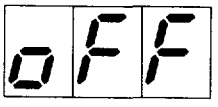
⑦ Setting the transmit data for RS-232C channel 1 (valid only when the communication mode is set to personal computer in the item ⑤)



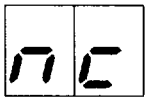
Transmit subjective data only

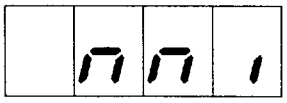


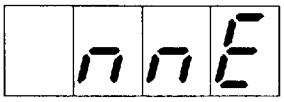
Transmit both subjective and objective data

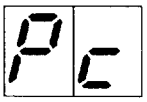


⑧ Setting the RS-232C channel 2 communication mode
You can select the communication mode for RS-232C channel 2.


NK mode


NNK1 mode

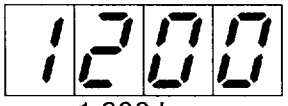

NNKE mode

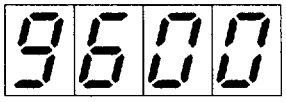

Personal computer


Spare 1 ~ Spare 5

- The NK, NNK1, and NNKE communication modes are unique to Nikon. They must be used according to the characteristics of the counterpart device.

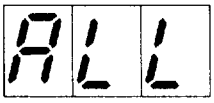
⑨ Setting the RS-232C channel 2 transmission speed (valid only when the communication mode is set to personal computer in the item ⑧)
You can select the transmission speed of RS-232C channel 2.

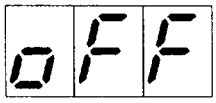

1,200 bps


9,600 bps

⑩ Setting the transmit data for RS-232C channel 2 (valid only when the communication mode is set to personal computer in the item ⑧)


Transmit subjective data only

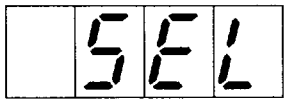

Transmit both subjective and objective data



⑪ Setting the data entry mode
You can select the mode for receiving data from the auto refraction.
One data direct-in mode: The Auto-optester Remote Vision takes in the latest data (1 item) and is loaded with the corresponding lens when the REF (auto refractor) is pressed.


(ONE in print mode)

8 data mode : The Auto-optester Remote Vision takes in the latest data (8 items) and shows the identification number on the lens chamber display when the REF (auto refractor) is pressed. It is loaded with the lens that is associated with this data when the operator selects the identification number with the jog dial and press the REF again.

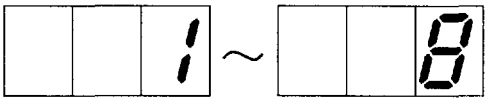

(SELECT in print mode)

⑫ Setting for wireless communication with the Retinomax
Match the signal format of the Auto-optester Remote Vision with that of the Retinomax main unit so that it can receive signals from the Retinomax in the wireless communication mode.


Signal format 1 ~ Signal format 4

⑬ Setting for remote controller signal reception

Match the format of the Auto-optester Remote Vision with that of the remote controller so that it can receive signals from the remote controller (a number is displayed in orange on the dot display at the center of the lens chamber when power ON).



Signal format 1 ~ Signal format 8

10. Remote Controller Models

1) Nikon Chart Projector NP-3S (Europe II)

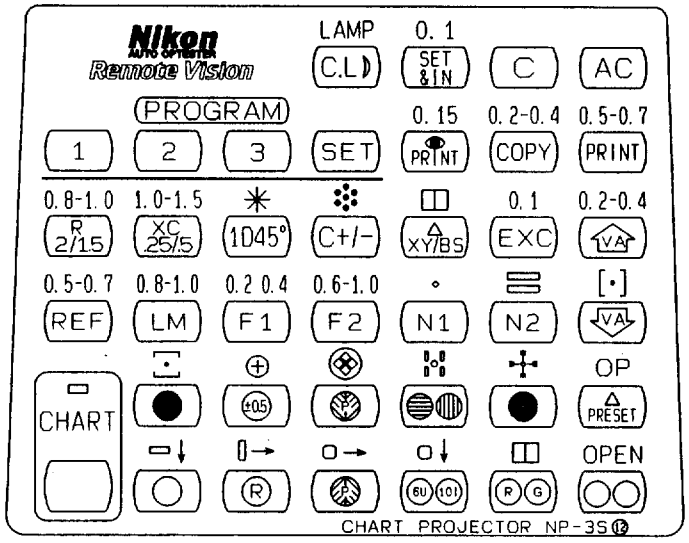


Figure 11

2) Nikon Chart Projector NP-3S (Multiple)

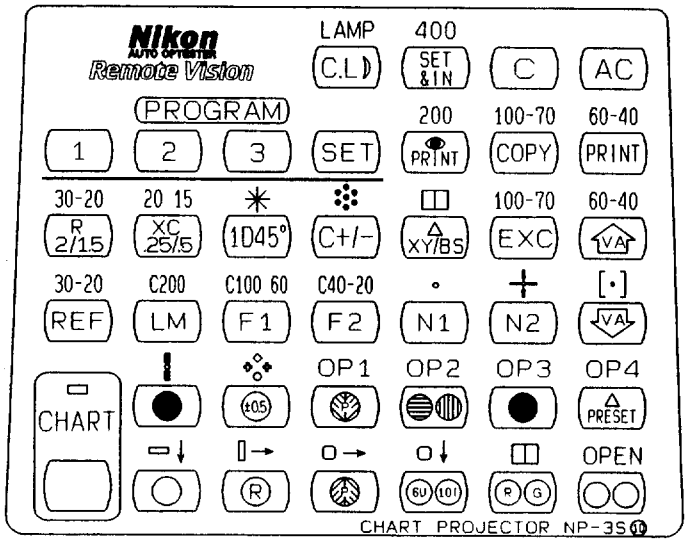


Figure 12

3) Nikon Chart Projector NP-3S (Numbers)

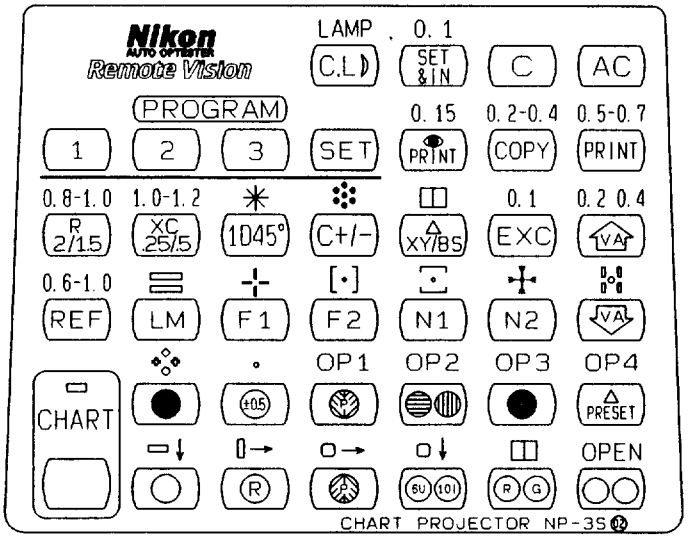


Figure 13

11. Maintenance

1) Replacing the Fuses

⚠ Caution

When inspecting the fuses, be sure to turn off the power switch and unplug the power cord from the power outlet.

If the Auto-optester Remote Vision will not turn on when you set the Power switch to ON, it indicates that a fuse may be blown. Disengage the left and right latches of the fuse holder base using a thin flat-top screwdriver and pull the fuse holder out (see Figure 14).
Remove (two) fuses from the fuse holder and check for a blown fuse. Replace any blown fuse.

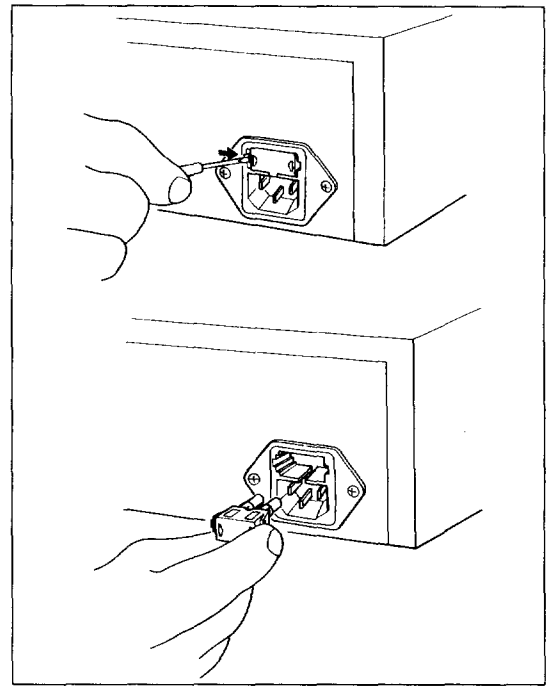


Figure 14

Use the recommended fuses only:
Please place an order with your sales representative for spare replacement fuses.
For AC100V/120V input:
Time-Lag fuse T3.15AL/250V ϕ5×20mm
"Nagasawa Electric Works Ltd. Type ES3-3150"
or "Schurter AG, Type FST0034.3122"
For AC230V/240V input:
Time-Lag fuse T1.6AL/250V ϕ5×20mm
"Nagasawa Electric Works Ltd. Type ES3-1600"
or "Schurter AG, Type FST0034.3119"

2) Cleaning the Forehead Rest

Clean the forehead rest periodically. Wipe the surface of the forehead rest with a soft cloth or tissue paper moistened with lens cleaning liquid or ethyl alcohol (available on the market).

3) Cleaning the Measuring Window

The measuring window is fitted with a dustproof glass. If any dust on the glass is visible from the patient side, use the blower to remove the dust by powerfully blowing air several times. If the dust still persists, gently wipe the measuring window with a soft and clean cotton cloth (such as gauze) moistened with pure alcohol (available on the market).
For details on cleaning instructions, consult with your sales representative.

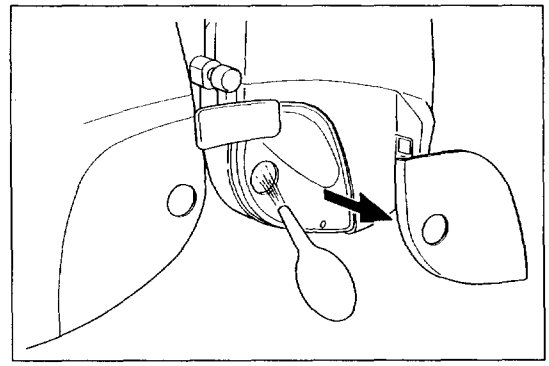


Figure15

4) Replacing the Remote Controller Battery

The remote controller battery is likely to be exhausted (or being used up) if the chart will not move or takes time to move when you press keys on the remote controller. The remote controller runs on three commercial AA Batteries. Alkaline cells are recommended for long-term use of the remote controller.

(1) Slide the battery cover off the back panel of the remote controller while pressing it with a finger (see Figure 16).
(2) Remove the old dry cells. Insert new dry cells in the correct orientation.
(3) Replace the battery cover.

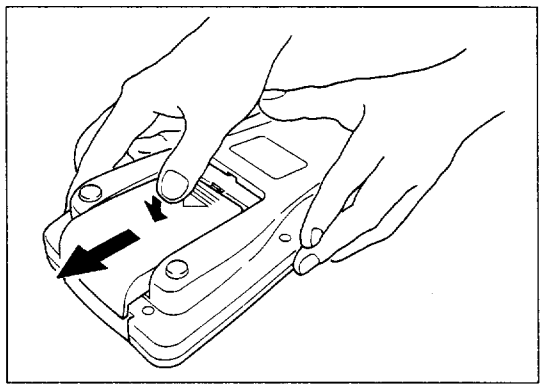


Figure 16

5) Replacing the Printer Paper

(1) When the print paper comes close to its end, a red line will appear on the paper. It is now time to replace the paper.
Remove the printer cover.
While lifting the lever up, remove the remaining paper (see Figure 17).
(2) Remove the securing tape from the new paper (see Figure 18).
(3) Pull out the paper one revolution of the roll and fold it (see Figure 19).
Gently cut the paper along the crease (see Figure 20).
(The purposes of this process are to avoid printing on the remaining adhesive after the securing tape has been removed and to make the paper roll easier to insert into the paper inlet).

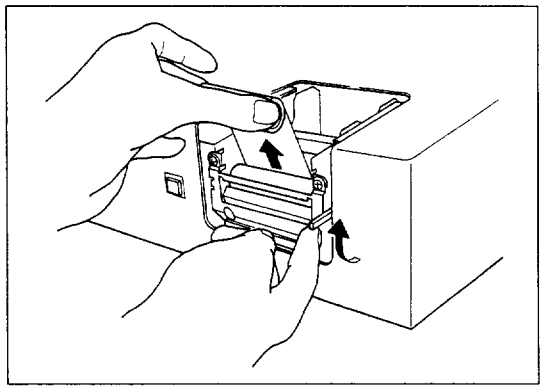


Figure 17

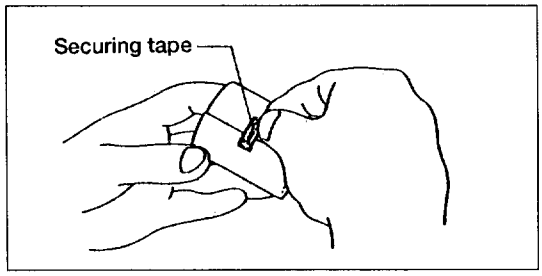


Figure 18

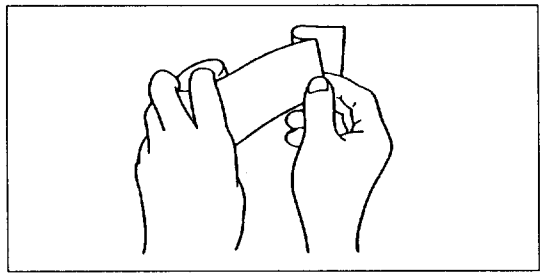


Figure 19

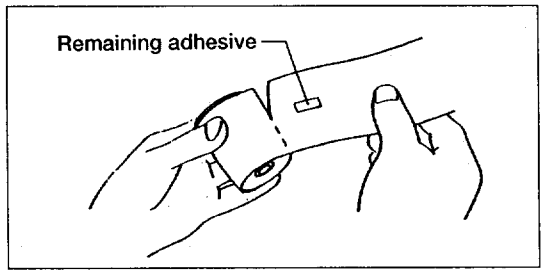


Figure 20

(4) Insert the leading edge of the paper into the paper inlet and lower the lever (see Figure 21).
(5) Press the FEED switch. The paper will be automatically fed. (If the paper is not fed properly, insert the leading edge of the paper deeper in the printer interior and press the FEED switch again (see Figure 22).

Adjust the paper position while lifting up the lever in the following cases:
- The paper is hard to insert.
- The paper is fed skewed.

After adjusting the paper position, lower the lever.

(6) After routing the paper through the paper outlet in the printer cover, replace the printer cover (see Figure 22).

- Do not insert the paper up side down (see Figure 23).

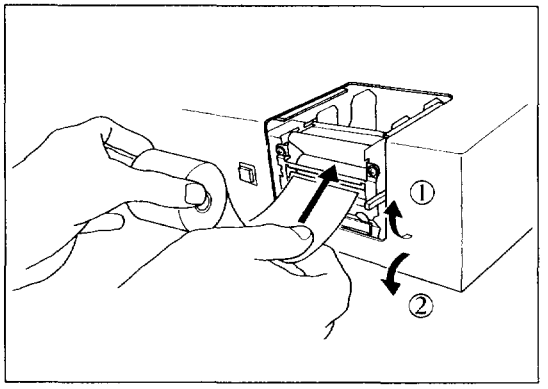


Figure 21

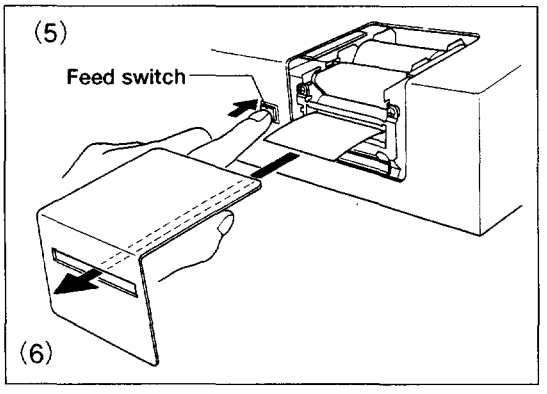


Figure 22

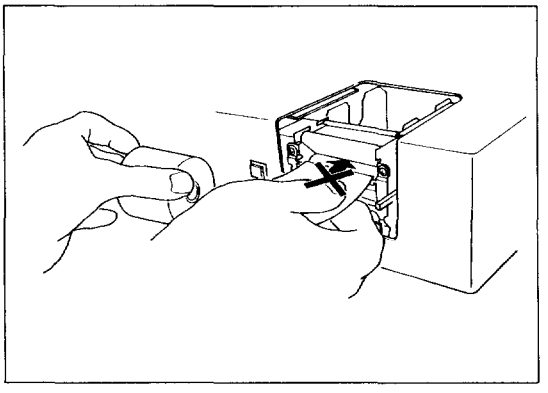


Figure 23

12. Connecting to an External Device

The power supply of the Auto-optester Remote Vision is provided with a connector to connect the Auto-optester Remote Vision to an external device. The connector conforms to the EIA RS-232C interface standard. Through this connector, the Auto-optester Remote Vision can send and receive data to and from an external device such as a Nikon auto refractometer or commercial personal computer.

When connected to a Nikon auto refractometer, the Auto-optester Remote Vision can automatically be loaded with auto refraction measurement data (lens power) at the beginning of a subjective test. This speeds up the process of visual acuity measurement.

The Auto-optester Remote Vision can perform cordless (or optical) communication with the Nikon hand-held Retinomax. For details on the optical interface, call your sales representative.

13. Major Specifications

Lens Chamber

(1) Spherical power

Measurement range: −29.00D to +26.75D
Measurement interval: 0.25D (selectable from 0.125D, 0.25D, and 1D)
(−29.00D ≦ S + C/2 + (auxiliary lens) ≦ +26.75D
−19.00D ≦ S + C/2 + (auxiliary lens) ≦ +16.75 when prisms or auto cross lenses are used.
The 0.125D interval is disallowed when:
−19.00D > S + C/2 + (auxiliary lens) and +16.75 < S + C/2 + (auxiliary lens).)

(2) Cylindrical power

Measurement range: −7 to +7D
Measurement interval: 0.25D

(3) Cylindrical axis power

Measurement range: 1 to 180°
Measurement interval: 5° (selectable from 1°, 5°, and 45°)

(4) Prism

Measurement range: 0 to 21△ (all directions)
Measurement interval: 0.5△ increment, one eye (selectable from 0.25△, 0.5△, and 1△)
The measurement range totals to 0△ to 20△ when the 6U10I recos plate is used.

(5) Cross cylinder

Auto cross: ±0.25D
Cross cylinder: Selectable from ±0.25D and ±0.50D

(6) Recos plate

11 types

For Left Eye	For Right Eye
Open	
Occlusion	
Retinoscopy lens +1.5/2.0D	
Presbyopia cross cylinder ±0.5D	
Maddox (red), vertical	Maddox (red), horizontal
Polarizing plate, 135°	Polarizing plate, 45°
Polarizing plate, 45°	Polarizing plate, 135°
Prism 10△BI	Prism 6△BU
Green filter	Red filter
Cross-hair reticle for PD	
Pinhole, 1.2 mm dia.	

(7) Effective field angle	Approx. 36°
(8) Reference wearing distance	12 mm or 13.75 mm
(9) Distance between dust-proof glass in measuring window and corneal distance (reference wearing distance)	8.5 mm (for 12 mm reference wearing distance)
(10) Cheek rest	Detachable (magnet type)
(11) P. D. adjustment	Variable range: 50 to 80 mm in 0.5 Interval: 0.5 mm (selectable from 0.1 mm, 0.5 mm, and 1 mm)
(12) Convergence	Optical axis inclined at 400 mm in front of eye (mechanical type) Convergence disallowed at PD values of 54 mm and less
(13) Longitudinal forehead rest adjustment	15 mm or longer
(14) Main unit tilt angle	3° or greater on both left and right sides
(15) Volume control	For buzzer volume control
(16) Dimensions	367 mm × 431 mm × 147 mm (height × width × depth) (at PD of 64 mm)
(17) Weight	Approx. 8 kg

Remote Controller (including the input functions)

(1) Keys	57 keys maximum (plus 40 keys in the shift mode)
(2) Jog dial	10 clicks/360°, a tact switch provided at the center
(3) Power source	AA Battery (3 pcs.)
(4) Data memory	Can store 6 types of data: auto refraction, lens meter, distance 1, distance 2, near 1, and near 2
(5) Program memory	Can store 3 types of optometry programs
(6) Acuity value entry	Can receive acuity values in either decimal point or fraction format according to the type of chart
(7) Dimensions	223 mm × 120 mm × 57 mm (height × width × depth)
(8) Weight	Approx. 470 g (including dry cells)

Power Control Unit

(1) Rated voltage	AC 100V/120V/230V Can be switched by using the voltage selector and by replacing fuses.
Rated frequency	50/60 Hz
(2) Rated current	1.5A/1.5A/0.7A
(3) Fuse	T3.15AL/250V (AC 100/120V area) T1.6AL/250V/(AC 230V area)
(4) Classification	Protection class I, TYPE B
(5) External interface	RS-232C compatible interfaces (2 pcs.)
(6) Printer	Thermal line dot printer
(7) Dimensions	191 mm × 270 mm × 100 mm (height × width × depth)
(8) Weight	Approx. 5.5 kg