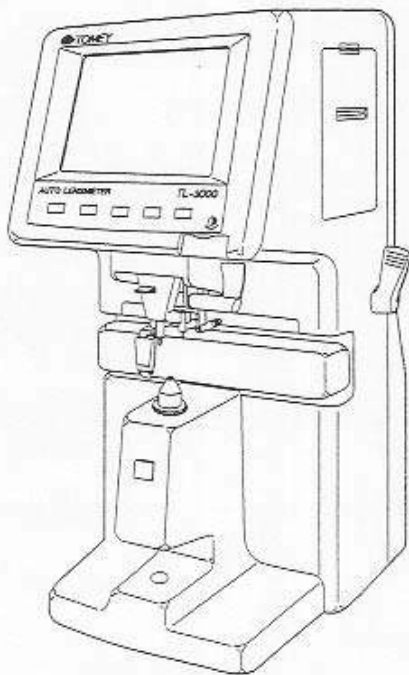


OPERATOR MANUAL

AUTO LENSMETER

TL-3000



-
- Read this Operator Manual carefully before using this instrument in order to operate it properly and safely.
 - Do not use procedures other than those specified in this manual.
 - Keep this Operator Manual handy when operating this instrument.
 - For any questions about this instrument or about this manual, contact your Tomey representative or local distributor.
-



IMPORTANT PRECAUTIONS



- *Never install this instrument near locations where explosive materials or flammable materials are used or stored. Such installation may result in a fire or an explosion.*

THE STRUCTURE OF THIS OPERATOR MANUAL

The structure of this Operator Manual is as follows:

1. PRIOR TO USE

Explanation of precautions and confirmation items related to installing and using this instrument.

2. LIST OF COMPONENTS AND FUNCTIONS

Explanation of the names and functions of the components.

3. METHOD OF OPERATION

Explanation of vital information needed for installing and using this instrument.

4. MAINTENANCE AND INSPECTION

Explanation of routine replacement of spare parts, routine maintenance and inspections by users.

5. TROUBLESHOOTING

Explanation of how to solve problems.

6. SPARE PARTS

List of spare parts.

7. SPECIFICATIONS

Lists of the specifications for this instrument and of the approved international standards.

8. INDEX

Refer to the index as a guide, if necessary.

SYMBOLS USED IN THIS MANUAL

The symbols used in this manual represent the following messages:



- *This is a precaution that, if unheeded, will result in a hazardous situation where there is an imminent danger of serious injury or death.*



- *This is a precaution that, if unheeded, could result in a hazardous situation where there is a possibility of serious injury or death.*



- *This is a precaution that, if unheeded, may result in a situation where there is a possibility of minor or moderate injury or damage to property.*



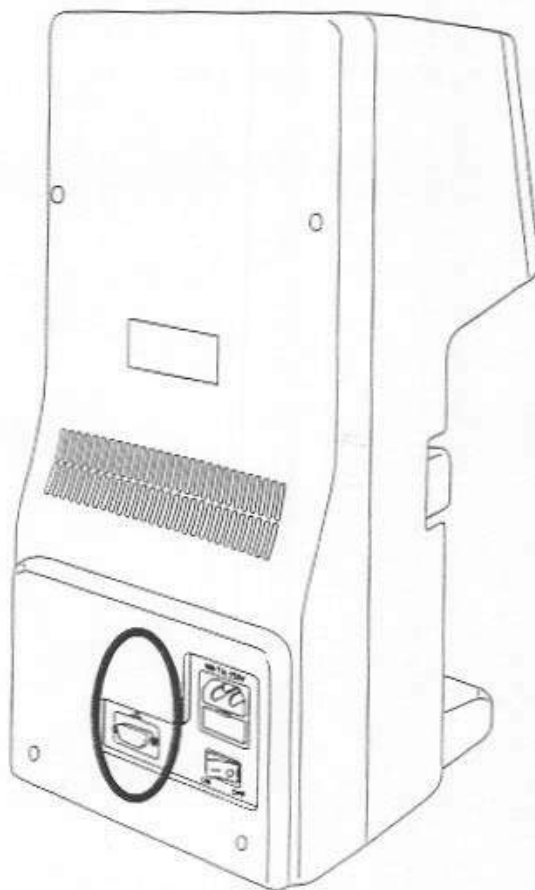
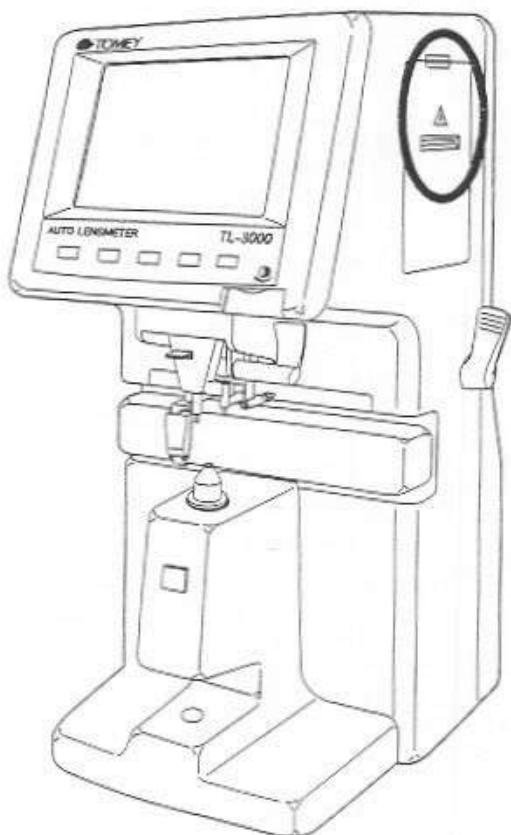
- *This is a special precaution on company policy related, either directly or indirectly, to the safety of personnel or to the protection of property.*

CAUTIONARY MARK

- There are two caution marks on the side and rear of the main unit .
-



- *Do not mutilate the caution mark.*
 - *The external output terminal is not isolated from the internal circuit. Before connecting any external devices, contact your Tomey representative. Otherwise, the internal circuit may be broken.*
 - *Do not touch the edge of the papercutter at the outlet of the printer paper.*
-



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1. PRIOR TO USE

Notes

- *Read this Operator Manual carefully before using this instrument in order to operate it properly and safely.*
 - *Do not use procedures other than those specified in this manual.*
-
-

1.1 Cautionary notes



- *Only well-trained personnel should operate this instrument.*
 - *When installing this instrument, observe the following items.*
 - Do not install this instrument in a location where it might be exposed to water or chemicals.
 - Do not install this instrument in a location where it might be subject to adverse influences, such as excessive atmospheric pressure, high temperature, excessive humidity, poor ventilation, direct sunlight, dust, salt or sulfur in the air.
 - Ascertain that factors such as excessive slope, vibration and impact will not endanger the instrument (including during transportation).
 - Do not install this instrument near the storage of chemical substances or in a location where gas may be generated.
 - Adhere to the specified mains frequency, voltage and allowable current (or allowable power consumption).
 - *During use of this instrument, observe the following:*
 - Do not move a coated lens when it is held with the clamp. This may result in damage to the coating. The clamp should be used only for marking.
 - Clean the cover glass under the nose piece often with a soft cloth.
 - Always keep the tip of the nose piece clean. Dust on it may result in scratches on a lens.
-



- *When cutting the printout, put the paper on the edge of the paper cutter, bend the paper on the upper side and tear off the printing paper pulling lateral direction. Otherwise, it may cause the paper jam or the malfunction of the printer. (for printer installed model).*
- *After using this instrument, keep the dust cover over it.*
- *When the instrument is not used for an extended period of time, unplug the power cord.*
- *After using this instrument, observe the following:*
 - *Do not apply excessive force when unplugging the cords.*
 - *Refer to the Section 4.4 "Storage" for storage instructions.*
 - *Clean the accessories and cords, and keep them together neatly in one place.*
 - *Be sure to clean this instrument after you use it for possible future use.*
- *If you suspect that this instrument is not functioning properly, do not attempt to repair it. Contact your Tomey representative or local distributor.*
- *Do not modify this instrument.*
- *Maintenance:*
 - *Inspect this instrument and its accessories periodically.*
 - *If this instrument has been idle for a long period of time, confirm that it is functioning properly and safely before using it again.*
- *Due to vibration while it's being transported and/or environmental changes of storage, the ink may leak out from its cartridge of the marking device. If you find the stain and/or the leakage of the ink at the tip of the marking device, wipe it off and make sure its function.*

1.2 Unpacking

Upon unpacking the shipment carefully, inspect that all the components are present and that there is no visible damage to each of them.

If there are any missing or damaged items, immediately contact your Tomey representative or local distributor.

- Notes** • *Be sure to retain all shipping and packing materials for reuse if the instrument will be transported or shipped.*
-
-

- Main unit of the AUTO LENSMETER TL-3000 1



- Power Cord 1
- CL (Contact Lens) Nose Piece 1
- Spare Fuse (250V, 1.0A) 1
- Printer Paper (One is already in the unit) 3
- Dust Cover 1
- Operator Manual (this book) 1

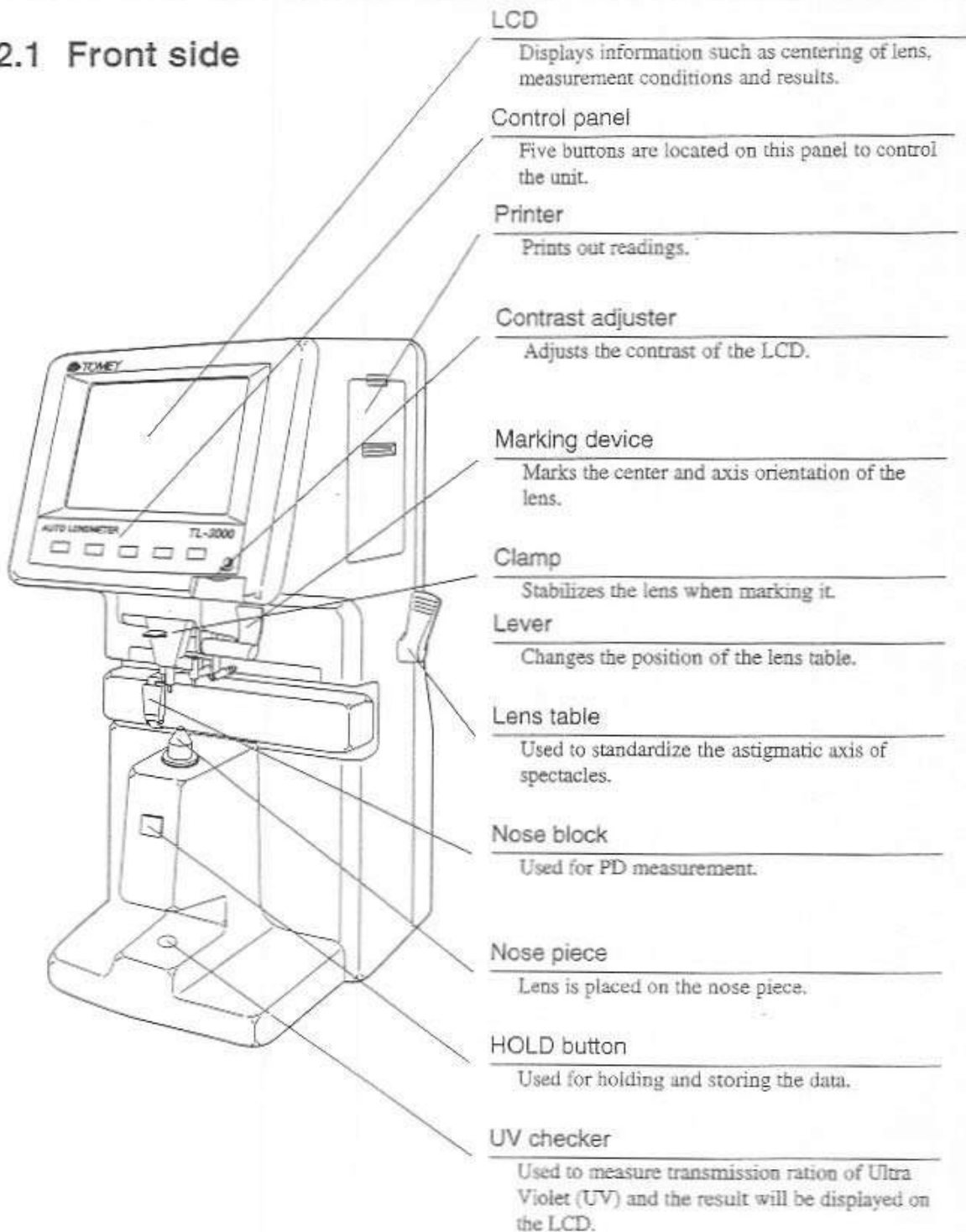
1.3 Explanation of terms

Main terms used in this manual are explained.

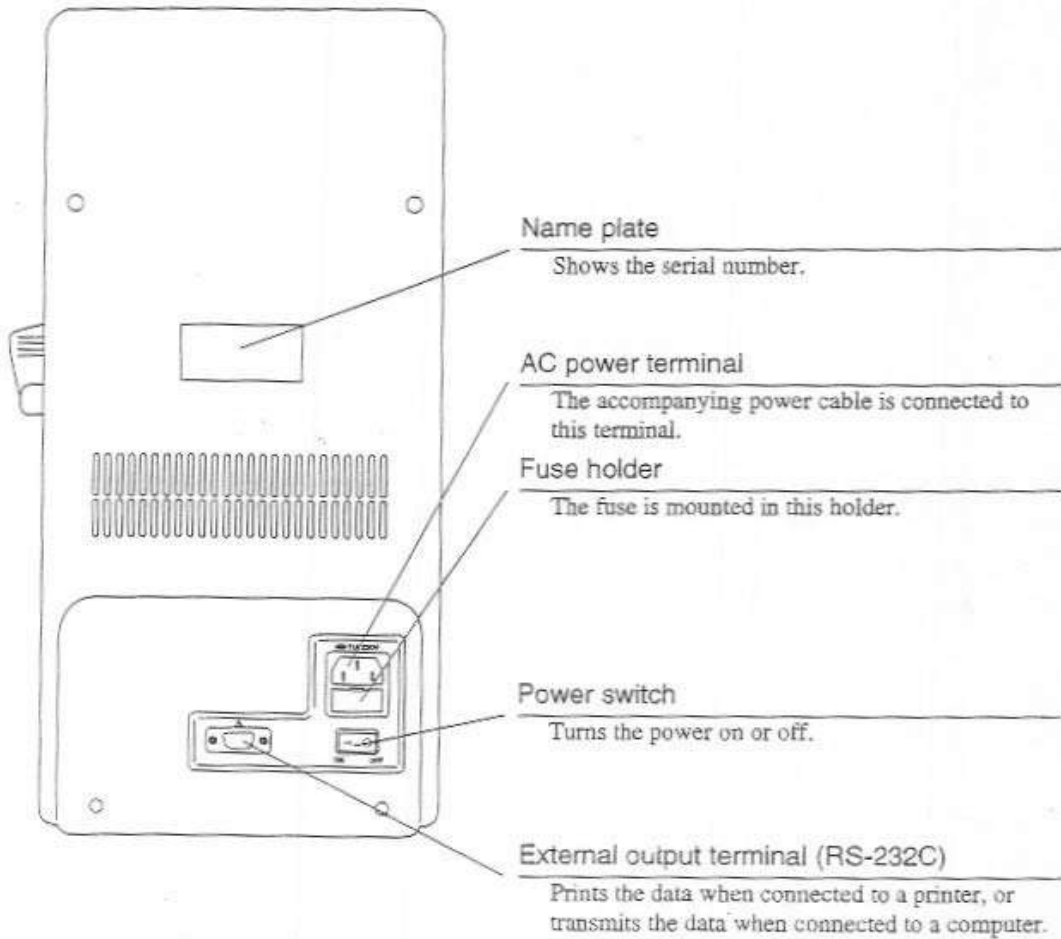
- D Diopter (a unit of measurement referring to the refractive power of a lens: reciprocal of the focal length of a lens in meters)
- Δ Prism diopter (a unit of the measurement of angular deviation in a lens)
- SPH (S) Spherical refractive power (unit: D, diopter)
- CYL (C) Cylindrical refractive power (unit: D, diopter)
- AXIS (A) The position of minimum optional power in a lens having cylinder power. Axis is measured in degrees and is used for orientation of a lens to correct astigmatism. (unit: degree)
- ADD Addition of a multi-focal lens including a progressive addition lens.
- Px, Py (in prism mode) Prism powers (Δ) in the horizontal direction (Px) and the vertical direction (Py) in rectangular coordinates. (unit: Δ)
- PSM (in prism mode) Absolute value of prism power in polar coordinates. (unit: Δ)
- BAS (in prism mode) Base direction of prism in polar coordinates. (unit: deg.)
- DCx, DCy (in Prism mode) .. Displacement from the optical center (unit: mm)
- CL Contact lens
- PROG mode Measurement mode for progressive addition lens
- HI mode Measurement mode for high index lens
- PD Pupillary distance (unit: mm)
- UV Ultra Violet (< 380 nm)
- Abbe number Number showing the dispersion of refraction according to the wavelength. The Abbe number of normal lenses is about 60 and that of high index lenses is about 30 to 45.

2. COMPONENT LIST AND FUNCTIONS

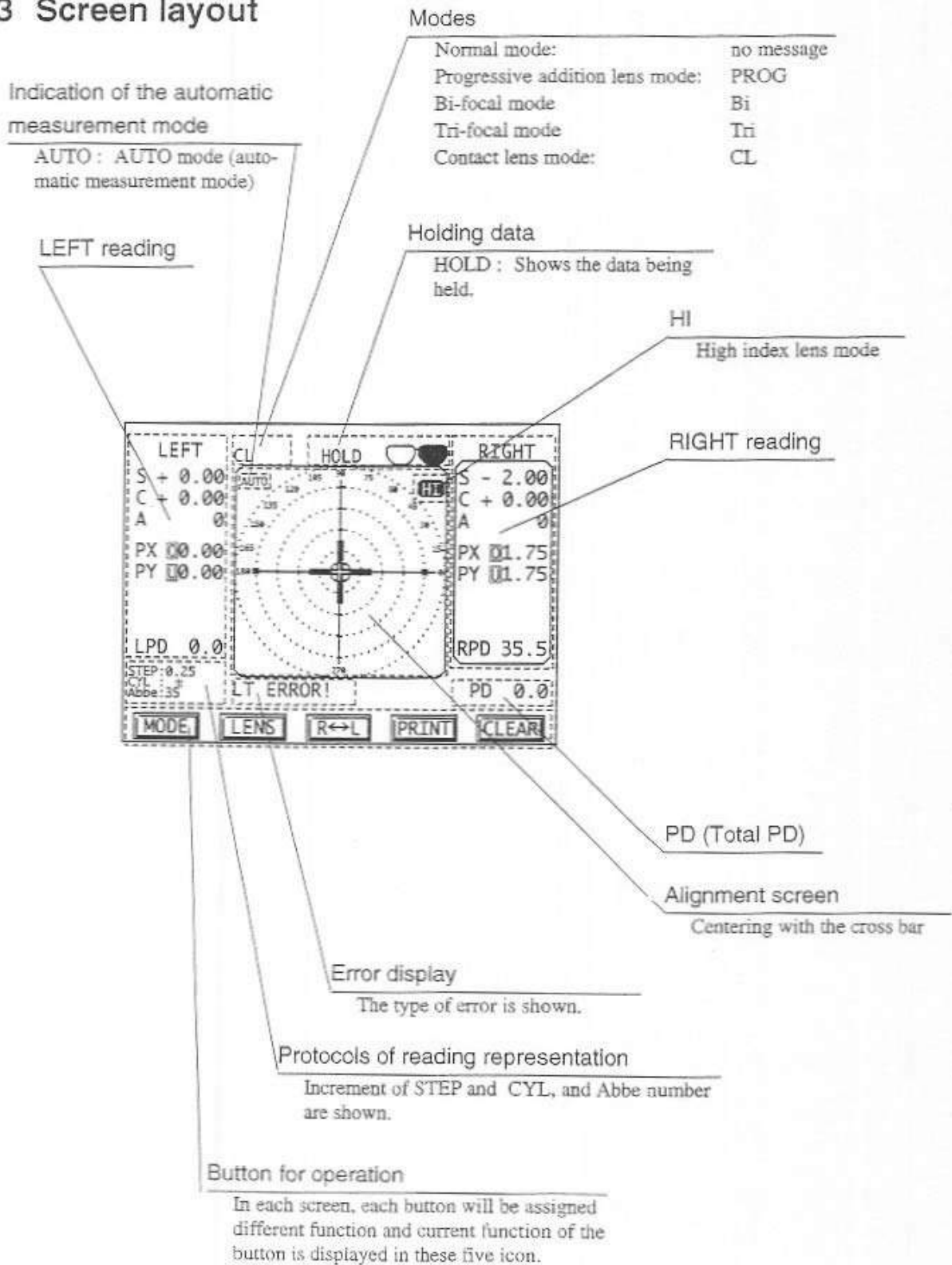
2.1 Front side



2.2 Back side



2.3 Screen layout



2.4 Buttons for operations

1) Mode 1

MODE **LENS** **R↔L** **PRINT** **CLEAR**

MODE: for switching between mode 1, 2 and 3.
LENS: for switching between Normal and Progressive mode.
R↔L: for changing S-mode to RL mode and RL of lens being measured.
PRINT: for recalling readings taken and printing of readings.
CLEAR: for clearing reading stored.
for returning S-mode from RL-mode if any readings are in the memory.

2) Mode 2

MODE **CYL** **STEP** **PRISM** **HI**

MODE: for switching between mode 1, 2 and 3.
CYL: for changing CYL mode (+, +/-, -).
STEP: for changing increment of readings.
PRISM: for setting ON or OFF of prism, and switching prism mode.
HI: for changing to HI mode.

3) Mode 3

MODE **UV** **CAL**

MODE: for switching between mode 1, 2 and 3.
UV: for using UV check function.
CAL: for calibration in UV check function (only appears in UV check function).

4) Menu button

By pressing MODE button for approximately 1 second, the screen is cleared once and returns to the menu setup mode.

3. METHOD OF OPERATION

3.1 Safety precautions



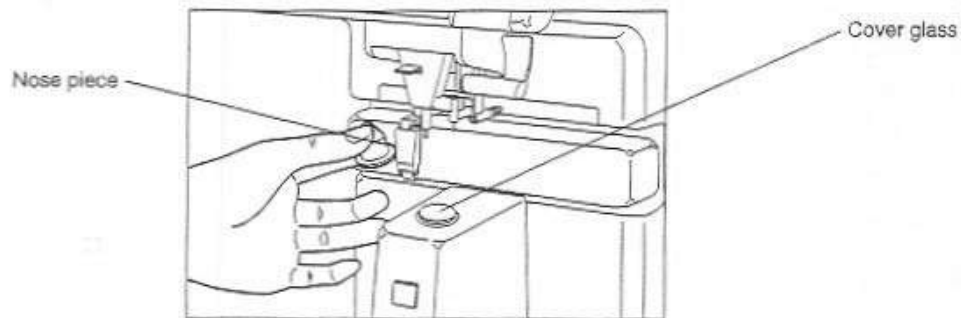
- *Do not move a coated lens held with the clamp. It may result in damage to the coating. The clamp should be used only for marking.*
 - *Clean the cover glass under the nose piece with a soft cloth.*
 - *Always keep the tip of the nose piece clean. Dust on the tip may damage the lens.*
 - *After using the instrument, keep the dust cover over it.*
 - *When the instrument is not in use for an extended period of time, unplug the power cord.*
-

3.2 Preparation for operating



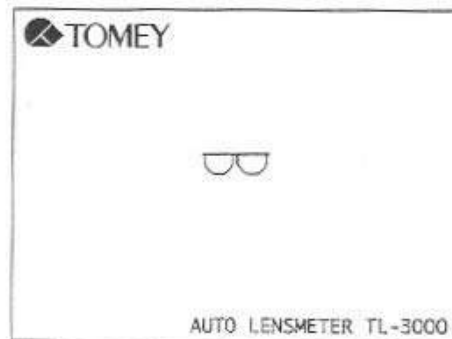
• Before turning on the power, check the following items:

- Is the cover glass under the nose piece clean?

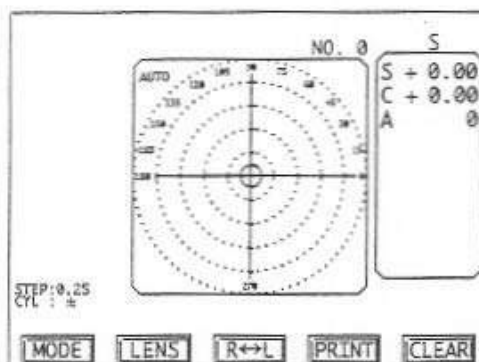


- Is the lens placed on the nose piece?
- Is the nose piece seated properly?

- 1) Plug the power cord into the receptacle.
- 2) Press the power switch ON.
- 3) The initial screen will appear for approximately five seconds.

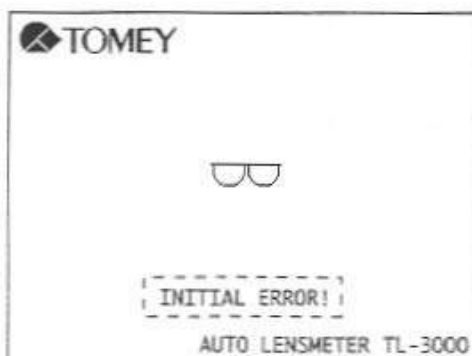


4) The measurement screen will appear.



Notes

- Place the lens onto the nose piece after the measurement screen comes up.
- Turning switch on with the lens on the nose piece initiates a beep sound and indicates "INITIAL ERROR" on the LCD. Remove the lens from the nose piece, then press any button to proceed.



- The LCD (liquid crystal display) may stay slightly dark immediately after the power is turned on, which does not imply a functional failure.

3.3 Measuring methods

3.3.1 Measuring single vision lenses

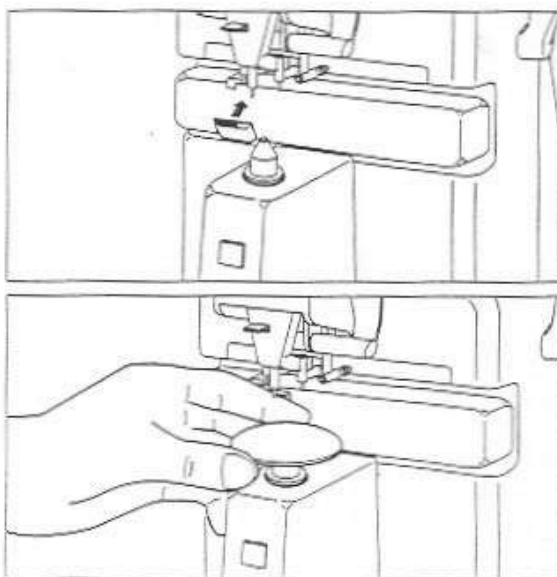
a) Measuring single lenses (S-mode)

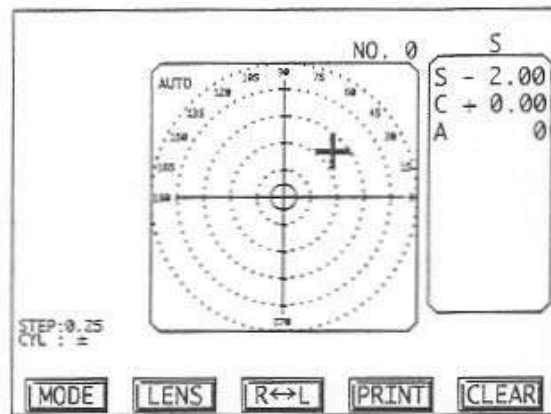
-
-
- Notes** • *In Auto mode, the reading will be automatically held when appropriate alignment is achieved. Changeover between AUTO and Manual can be achieved by pressing HOLD button continuously for approximately one second without a lens on the nose piece.*
-
-



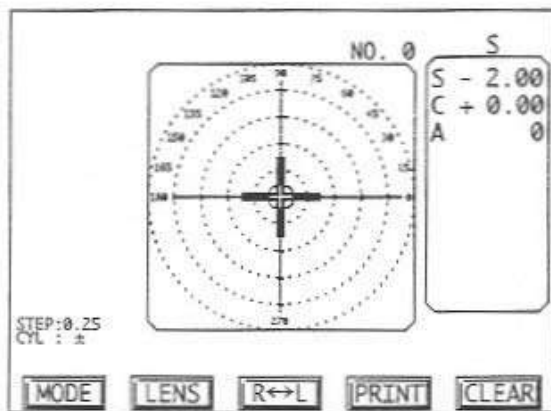
- *Care is to be taken not to push the lens against the nose piece with undue force or to move the lens abruptly, which may otherwise cause to damage the lens.*

-
- 1) If the Instrument is in the RL-mode, press the CLEAR button to change to the S-mode.
 - 2) The nose block for PD measurement must be locked to the side of the lens table, while it is being used (with the block as falling forward).
 - 3) Place the lens on the nose piece.

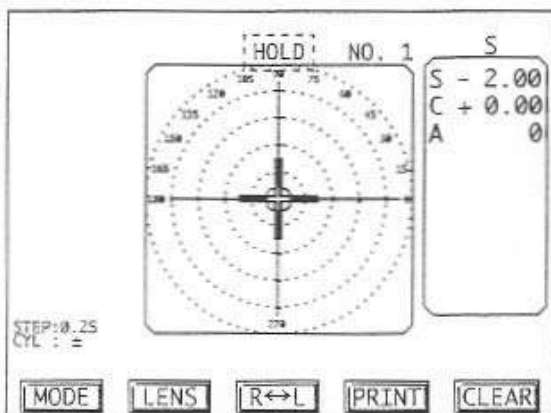




- 4) Move the lens gently right and left, back and forth to center the cursor (+).



- 5) Measured data are then displayed in the data in real time.
- 6) Press the HOLD button where the lens is aligned and next hold measured data. The memory display part will show HOLD, while the memorized data are displayed. Up to 50 data can be stored.



-
- 7) After removing the lens from the nose piece, the target ("+" mark) will disappear. When another lens to be measured is placed on the nose piece, data storing is released and the operation is then ready for measurement.
 - 8) Pressing of the PRINT button starts printing-out all the data that have been stored.
 - 9) The Instrument is now ready to measure the next lens.
-
-

Notes

- *Pressing HOLD button when the data are held will release the instrument from the holding condition.*
 - *Pressing of the CLEAR button erases all stored data.*
 - *In case the menu setting of SINGLE MODE is off, the S-mode cannot be obtained. If the S-mode is used for measurement, turn the setting of SINGLE MODE "ON".*
 - *If the menu setting of PRINT is off, no printing-out can be made.*
-
-

b) Measuring of framed lenses (RL-mode)

- Notes**
- *In the automatic hold mode, readings are automatically held when the lens is properly aligned.*
-



- *Care is to be taken not to push the lens against the nose piece with undue force or to move the lens abruptly, which may otherwise cause to damage the lens.*
-

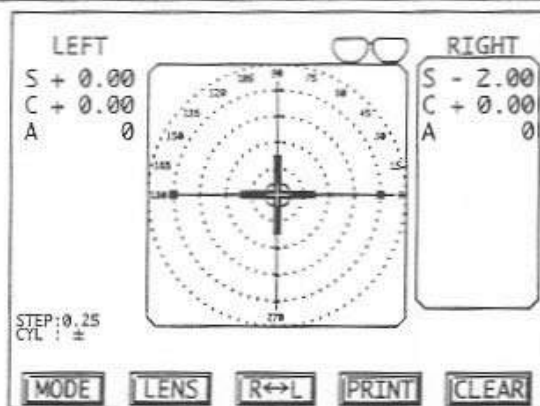
- 1) Press the R<->L button to change to the RL mode. The mode has been set to initially measure the right side lens (RIGHT). If the left side lens is measured before the right side lens, press the R<->L-button again.

-
- Notes**
- *Pressing of the R<->L-button does not change the mode of RIGHT/ LEFT while in the condition of PD measurement (by which the nose lock for PD measurement has not been set on the left end).*
-

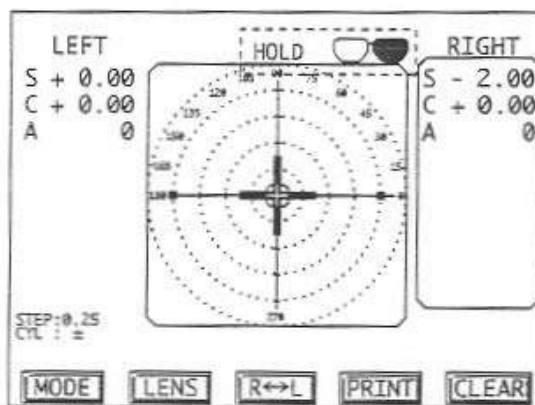
- 2) Place the lens on the measuring side on the nose piece by turning the upper side of the frame to the side of operator.



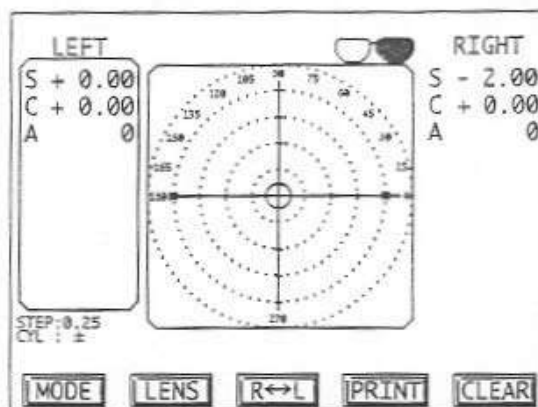
- 3) Move the lens back and forth to align the target ("+" mark) to be centered.



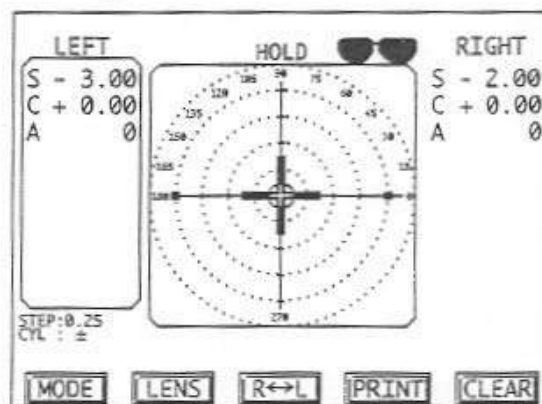
- 4) When this alignment is achieved, press the HOLD button. Measurement data are stored.
- 5) HOLD is shown in the memory display and the glasses-marked string side become dark.



- 6) When the lens is removed from the nose piece, the target ("+" mark) disappears. If the lens is next mounted on the nose piece again, data holding is released and the measuring condition is restored.
- 7) The operation is now ready for the lens on the opposite side (LEFT).



8) The lens on the opposite side is next measured.



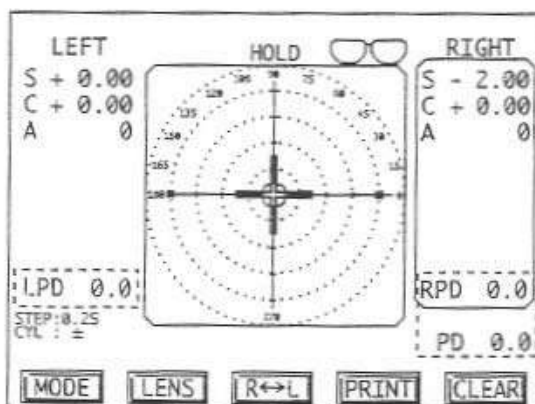
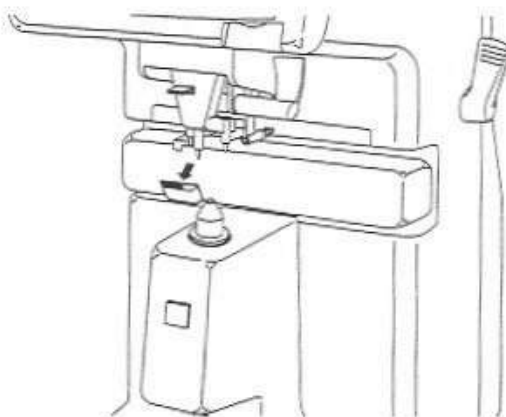
9) Then press the PRINT button so the measured data will be displayed again and printed out.

-
- Notes**
- If the HOLD button is again pressed in the holding condition, this condition is released
 - Pressing of the CLEAR button erases all data which have been stored for the left and right eyes.
 - While the menu setting of PRINT is off, no printout can be made.
-

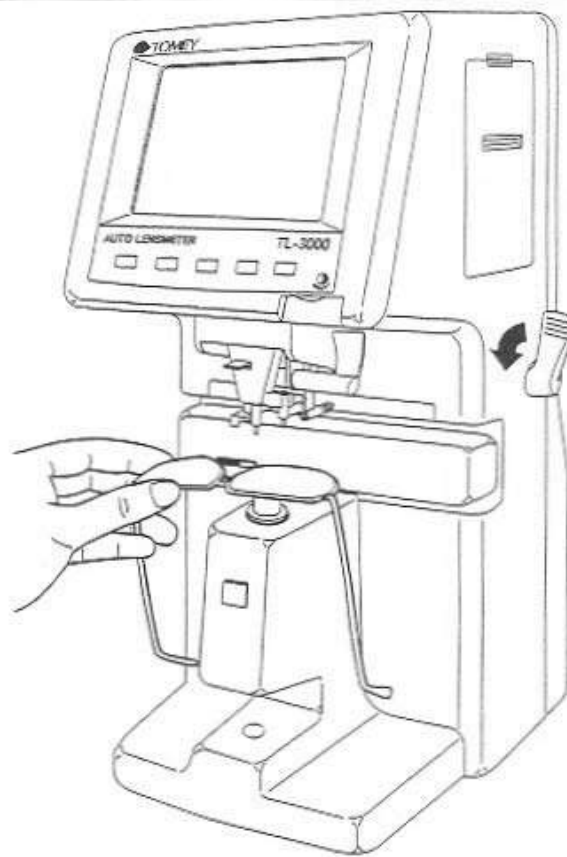
c) Measuring of PD (interpupillary distance)

Notes • *In the automatic hold mode, readings are automatically held when the lens is properly aligned.*

- 1) Press the R<->L button to change the RL-mode.
- 2) Unlock the nose block for PD measurement and next bring down the nose block forward. Next, unlock the nose block and slightly move it to the right to show PD data in the screen.



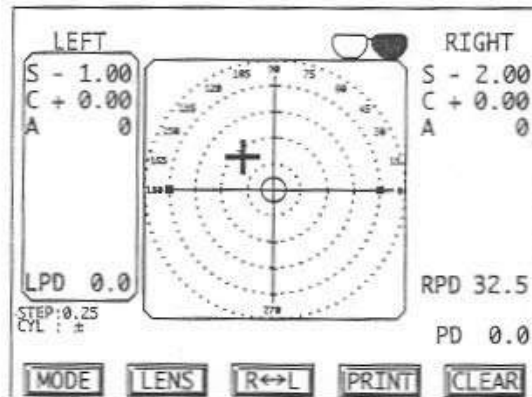
- 3) Turn the upper part of the frame to operator's side and place the nose block on the nose rest.



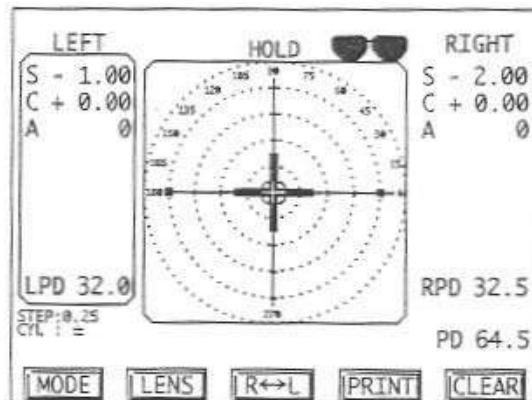
- 4) Place the lens to be measured on the nose piece.
- 5) Turn the lens table lever to apply the lens table to the lower ends of the left and right lens frames.
- 6) Changing over of the measuring side of RIGHT/LEFT is automatically actuated.
- 7) Move the lens back/forth and left/right to center the target ("+" mark) in the screen. For moving the lens back and forth, move the table at the same time so that the lower ends of the left and right lens frames touch the lens table.
- 8) Press the HOLD button under the condition that the target is centered.
- 9) Measured data are held and, at the same time, PD data taken on the measuring side are displayed.



- 10) Move the frame to the lens on the opposite side by applying the nose block to the nose rest of the frame. Measurement is automatically changed over for the measurement of left or right lens.



- 11) Measure the lens on the opposite side in the same procedure and then press the HOLD button.



- 12) Measured data are thus held and, at the same time, PD data taken on the lens measured and the total PD data (RPD + LPD) are displayed.

Notes

- *Securely attach the nose block to the nose rest of the frame for stable measurement. No correct PD measurement can be made with the loose nose block.*
 - *Give PD measurement by applying the lens table to the lower end of the frame. No correct PD measurement can be made with the frame as being tilted.*
 - *PD data are not displayed in real time, which, however displayed when the data are confirmed by HOLD button.*
 - *In case PD measurement is not taken, move the nose block to the left end and locked thereto.*
-
-

3.3.2 Measuring progressive addition lenses (PROG mode)

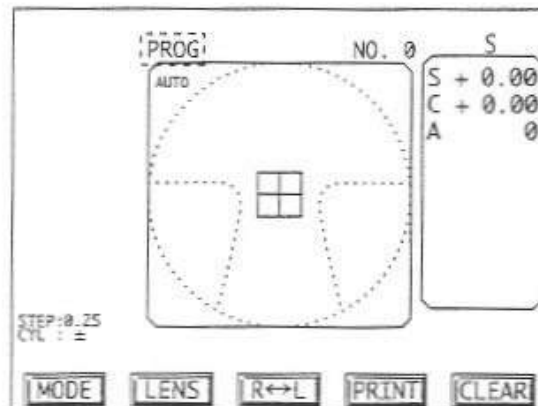
- Notes** • *If you cannot make a proper measurement of progressive addition lenses, refer to "5.1 TROUBLESHOOTING".*



- *Care is to be taken not to apply the lens to the nose piece with undue force or to move it abruptly, which may otherwise cause to damage lens.*

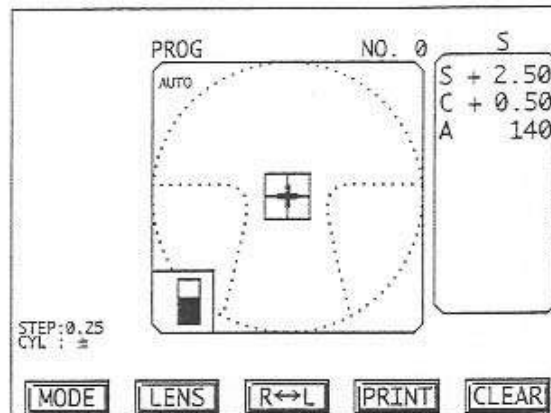
- Notes** • *When measuring the near point area in the AUTO mode, "ADD" data are held automatically. Continual pressing of the HOLD button for approximately one second alternately changes the AUTO/MANUAL mode without a lens on the nose piece.*

- 1) Press the LENS button. Successively pressing of the LENS button alternately changes the normal mode and PROG mode.
- 2) Change the display to the PROG mode.
- 3) Measure the progressive addition areas
 1. Place the lens on the nose piece in such a manner that the far point area faces to the front side of the Instrument.



2. A bar graph appears at the left lower part of the target area, which

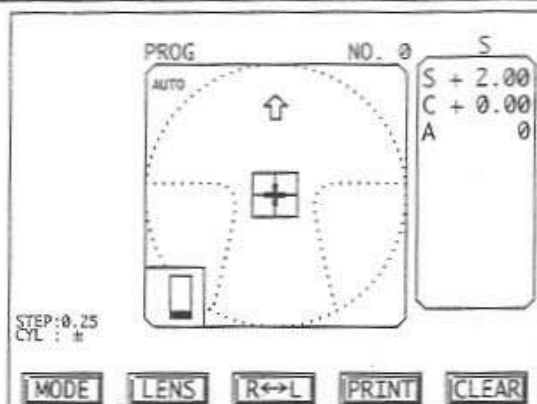
shows progressive extents.



3. Move the lens back/forth and left/right to adjust the target ("+" mark) to be centered. Since the progressive addition area is located in a place which is slightly lower than the center of the lens, adjust so that such area comes above the nose piece.
4. When centering of the target is achieved, a beep sounds and the display is changed to the measuring screen.

Notes • *In case of a lens with low addition, the target may not come to the center. In this case, take measurement around the center part of the lens and press the HOLD button.*

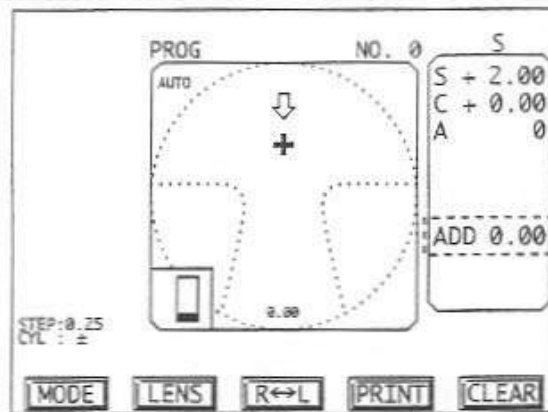
- 4) Measure the far point area.
 1. Move the lens back/forth and left/right so that the target ("+" mark) comes to the center of the lens. Since the far point area is located in the front side, move the lens backward, by referring to the arrow marked in the upper part of the target area.



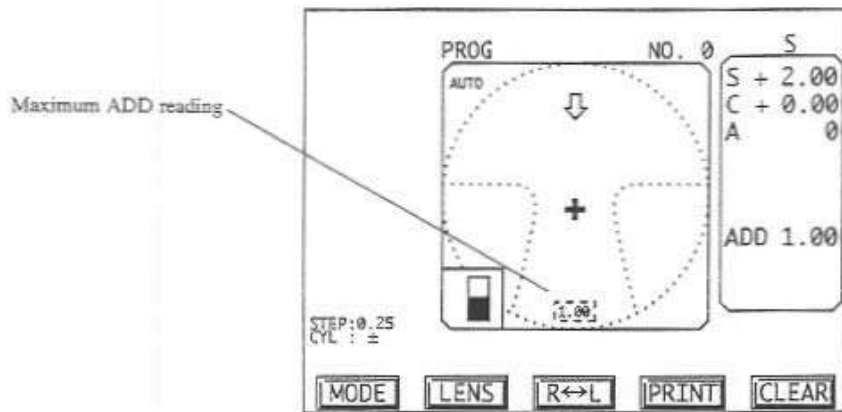
2. When centering of the target is achieved, a beep sounds and measured data of the far point area are held automatically.
3. The display is next changed to that for measurement of the near point area.

-
- Notes**
- *In case the AUTO FAR mode is set at OFF by setting the menu, data for far point area cannot be held automatically, even if the centering of the target is made. Press the HOLD button with the target to be centered. (See 3.5 Setting of the menu display.)*
 - *There are some lenses of which centering cannot be made. In case of such lens, move the lens back/forth and left/right in a position of approximately 6 to 10 mm above the center of the lens (in the center of the frame in case of a framed lens) and measure the far point area in the position where the variation of SPH and CYL values is less. Then press the HOLD button.*
-

- 5) Measuring at the near point area.
 1. Display the ADD values.
 2. Move the lens to your side by moving the lens left and right so that the target ("+" mark) can always come in the center of the progression zone.

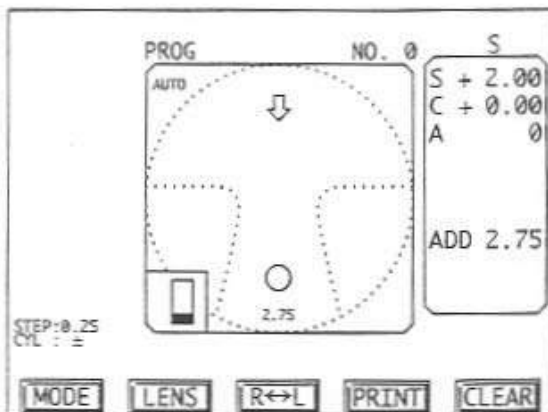


3. The maximum figure of the ADD values is displayed in the lower part of the target area.



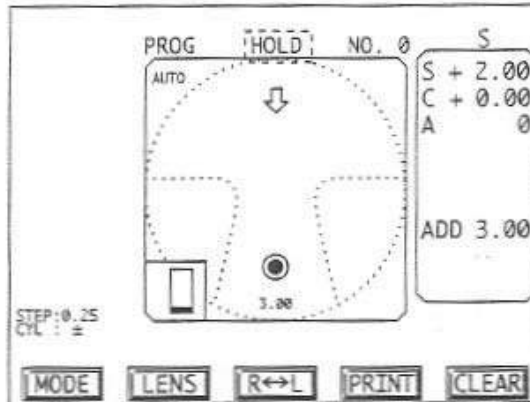
4. The "+" mark moves downward depending on the value of addition.

5. The "+" mark changes to the "○" mark near the near point area.



6. Move the lens to your side (or to the left or right) in this condition.

7. The target changes to the "●" mark.



8. In the AUTO mode, the buzzer beeps to automatically take and hold the value of addition. In the manual mode, press the HOLD button.

9. The display shows HOLD.

6) Remove the lens from the nose piece. After the target disappears, place the lens on the nose piece again, so the holding of data will be released to return to the condition of measuring the progressive area.

7) Measure the next lens:

-
-
- Notes**
- *There are some progressive addition lenses mounted in the frames which have their near point area close to the frame due to the type of glass making process. The target in such lens may sometimes not change the "+" mark to "○" furthermore followed by "●". If so, regard the maximum addition value in the condition that the target enters the progressive addition zone as the near point area and press the HOLD button.*
 - *When the lens is removed in process of measuring the far point area or the near point area, the display in the screen returns to the display of progressive addition measurement.*
-
-

3.3.3 Measuring bi-focal and tri-focal lenses

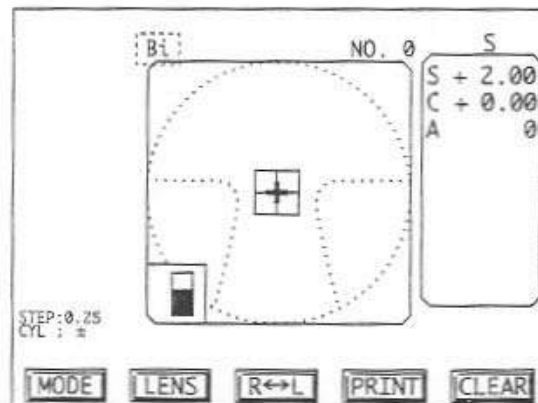


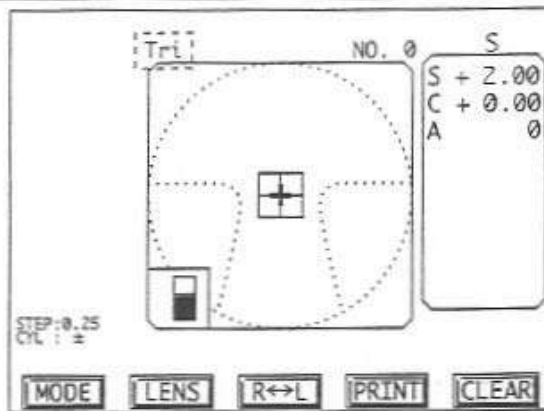
- Do not push the lens to the nose piece with undue force or abruptly move the lens, which may otherwise damage the lens.

Notes

- When measuring the near point area in the AUTO mode, the values of progressive addition are held automatically. Pressing of the HOLD button continuously for approximately one second changes the mode of AUTO/MANUAL.

- 1) Set the PROG MODE at "Bi-focal" or Tri-focal" in the setting of menu. (See 3.5 Setting of the menu display.)
- 2) Press the LENS button. Each press of the LENS button alternately changes the normal mode and the PROG mode.
- 3) Change the display of the screen to the PROG mode. The mode indicating part will thus show "Bi" or "Tri".





- 4) Place the lens on the nose piece in such a manner that the far point area comes on the side of operator.
- 5) Measure the far point area.
 1. Move the lens back/forth and left/right to adjust the target ("+" mark) to be centered.
 2. Centering of the target is achieved, a beep sounds and the value in the far point area is held.
 3. The display in the screen changes to the measuring mode.

Notes • *In case the AUTO FAR mode is set at OFF, the values in the far point area are not automatically held, even if centering is given. Press the HOLD button in the condition that the target is centered. (See 3.5 Setting of the menu mode.)*

- 6) Measure the near point area.
 1. Display the values of addition (ADD values)
 2. Draw the lens toward yourself and move the near point area onto the nose piece. In case a tri-focal lens, move the intermediate area onto the nose piece.
 3. The "+" mark moves downward depending on the value of addition.
 4. The "+" mark changes to the "●" mark in the near point area.
 5. In the mode of AUTO, the buzzer beeps to automatically take and hold the values of addition. In the MANUAL mode, press the HOLD button.

-
6. In case of a tri-focal lens, draw the lens more to your side and move the near point area onto the nose piece. Hold the second progressing addition.
 7. The display shows HOLD.
 - 7) Remove the lens from the nose piece . After the target disappears, place the lens on the nose piece again so that the holding of data is released and the operation is returned to the measuring condition.
 - 8) Measure the next lens.

Notes • *Removing of the lens during measuring the near point area automatically returns the display of the screen to that for the far point area.*

3.3.4 Measuring prism

Set the prism measurement mode in the menu mode, in accordance with "3.5 Setting of the menu mode" or press the MODE button and next the PRISM button in the mode 2. Prism values are displayed below the S, C, and A values.

Three prism modes are used for this Instrument. Set your desirable mode in the menu display or press the PRISM button

- PX, PY (Δ): Rectangular coordinates
- PSM, BAS(Δ , deg.): Polar coordinates
- DCX, DCY (mm): Displacement from the optical center (mm)

- Rectangular coordinate

Prism base direction is expressed as:

- O**: base out
- I**: base in
- U**: base up
- D**: base down

- Polar coordinate

PSM: absolute value of prism (prism diopter)

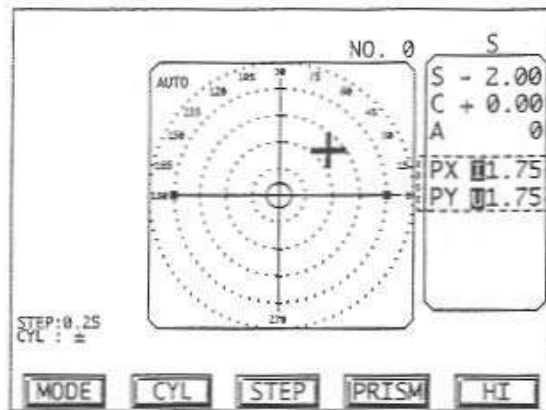
BAS: base orientation (angle, degree)

- Displacement from the optical center

Amount of displacement from the optical center are displayed in millimeter.

DCX: Horizontal displacement (mm)

DCY: Vertical displacement (mm)



3.3.5 Measuring high index lenses (HI mode)

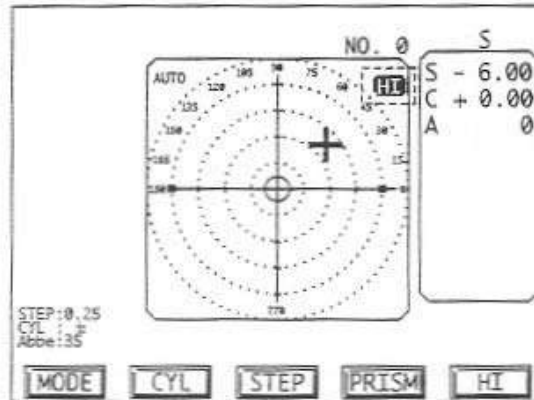
- Notes**
- *It is recommended to use the HI mode when measuring high index lenses.*
 - *The difference between the wavelength used as the measuring light for TL-3000 and the standard wavelength of the lenses to be measured may result in measurement errors when high index lenses are measured.*
-

1) Set the Abbe number in the MENU mode display. The Abbe number is normally set at 35, which has been set before being shipped..

Refer to the Section 3.5 "Setting up the MENU mode display" for setting the Abbe number.

2) Press the MODE button and then press the HI button.

3) "HI" is displayed at the upper right of the target area.



4) While "HI" is being displayed, the measured values are automatically corrected with the Abbe number set.

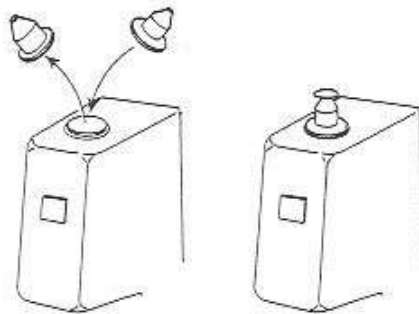
Follow the instruction in 3.3.1. Measuring of the single vision lenses regarding the measuring procedure.

- Notes**
- *To return the mode to normal, press the HI button again.*
-

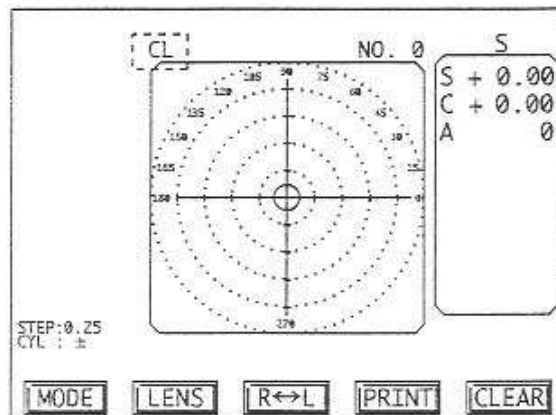
3.3.6 Measuring contact lenses (CL mode)

- Notes** • *Be sure to use Contact Lens mode (CL mode) when measuring contact lenses. Measuring in the normal mode (measurement mode for spectacles) may result in reading errors because the measurement conditions for contact lenses are different from those for spectacles.*

1) Use the nose piece for contact lens.



2) Change the menu from the normal mode to the mode for contact lens.



In case of the PROG mode, press the LENS button to change to the normal mode.

a) Hard contact lenses.

- 1) Place the contact lens with its front curve up on the nose piece.
- 2) Move the lens back/forth and left/right for centering. Take measurement in accordance with the procedure specified in "3.3.1 Measuring of single vision lenses"

b) Soft contact lens

Notes • *Due to the physical properties of soft contact lens, the reading may not be accurate. Some lenses may not be measured.*

- 1) Wipe off the water from the soft contact lens.
- 2) Place the lens with its front curve up on the nose piece.
- 3) Move the lens back/forth and left/right for centering.

Take measurement in accordance with the procedure specified in "3.3.1 Measuring of mono-focal lenses".

3.3.7 Auto hold mode

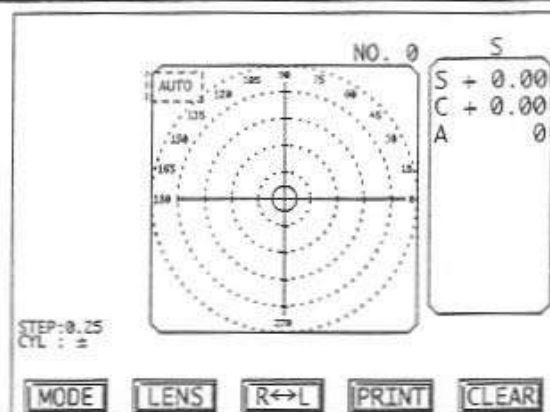
The operation of the Instrument is in the auto hold mode while "AUTO" is displayed left above the target area. If centering is made in the normal mode (the measuring mode for single vision lens), measured data are automatically held and stored in the memory.

In the PROG mode, ADD values are automatically held when measuring the near point area, of which measured data are stored in the memory.

1. Setting of the auto hold mode:

The auto hold mode can be set by either of the following two procedures.

- a) Keep pressing the HOLD button for approximately one second. When "AUTO" is displayed left above the target area, release the HOLD button.

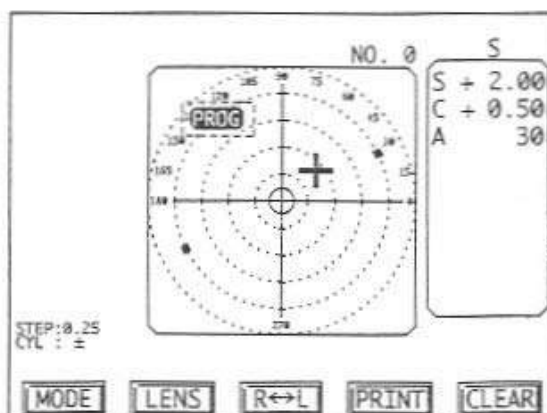


b) Set AUTO HOLD by setting menu. (See "3.5 Setting up the MENU MODE display ")

After setting AUTO HOLD by menu, the initial setting becomes in the AUTO HOLD mode at the time of Power ON. In case measurement is mainly given in the AUTO HOLD mode, the AUTO HOLD mode can conveniently be set by menu. It is also noted that the AUTO HOLD mode is released by keeping pressing the HOLD button for approximately one second.

3.3.8 Detecting progressive lenses

If measurement is given to a progressive addition lens in the normal mode, the lens is identified as a progressive lens by displaying "PROG" left above the target area. If the mode has been set in "AUTO PROG", it is automatically changed to the PROG mode.



Notes

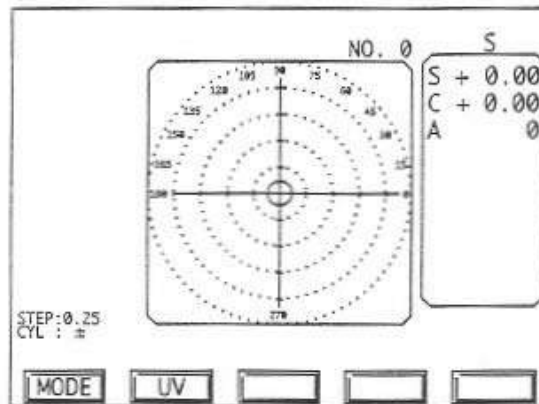
- Place the center of the lens onto the nose piece in order to properly detect the zone of progressive addition. Detection of the progressive addition cannot be made in the surrounding area of the lens, even if it is a progressive addition lens.

- Identification or detection of a progressive addition lens may be difficult when the ADD value of the lens is small.

3.3.9 UV checking function:

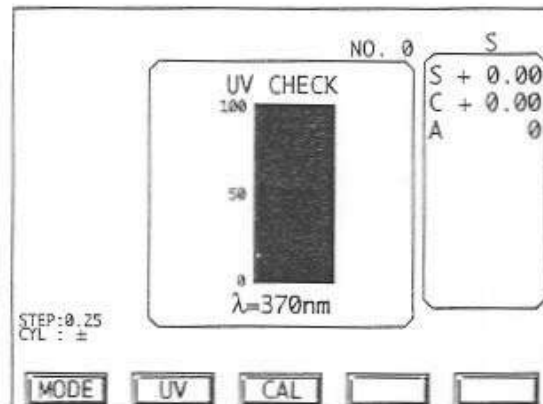
The transmittance of lenses at ultraviolet area (wavelength=370nm) is shown in a bar graph and the UV cut of the lens is checked by this UV checking function.

1. Press the MODE button twice to set at the operation button mode 3.

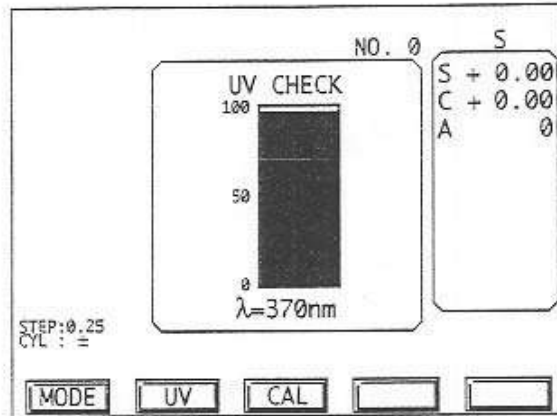


2. Press the UV button.

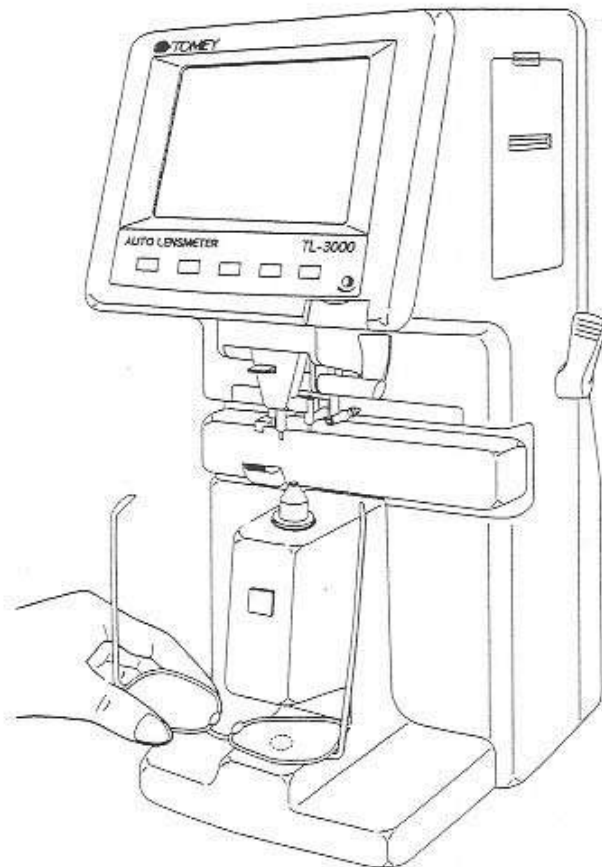
The bar graph is shown in the target area.



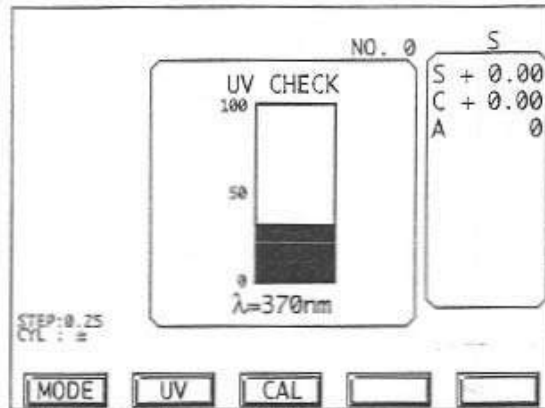
3. In case the bar graph is not 100% in the condition that the lens is not inserted in the UV checker, press the CAL button with the lens as not being inserted for the purpose of giving the calibration.



4. Insert the lens in the UV checker.



5. The transmittance is shown in a bar graph.



- Notes**
- The bar graph does not cover all the transmittance in the UV zone.
 - Take measurement in the center part of the lens. No correct measurement can be taken in the surrounding area.
 - Avoid direct sunlight when using UV check function, or the reading may not be accurate.

3.4 Operating the clamp, marking device and lens table

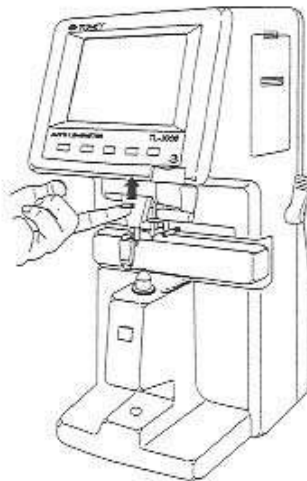
3.4.1 Clamp

Notes • Lower the clamp slowly.

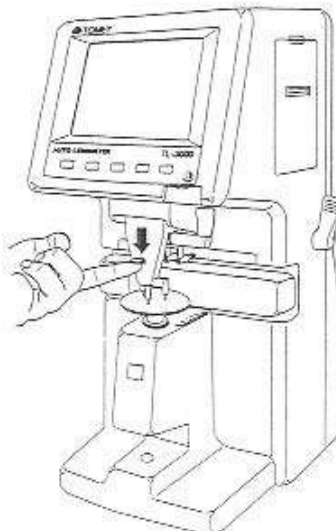
Quick lowering of the clamp may result in damage to lenses.

Use the lens clamp to fix the lens when marking the lens. (See "3.4.2 Marking device" in the next page.)

- 1) Raise the lens clamp with your finger. (Lock release)



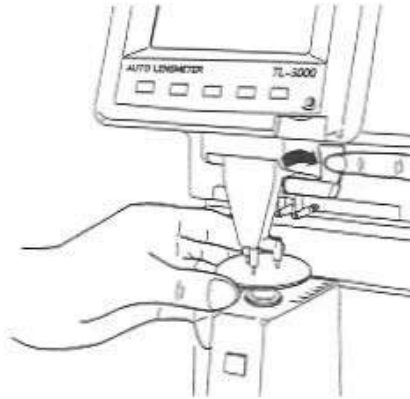
- 2) Place the lens clamp onto the lens carefully.



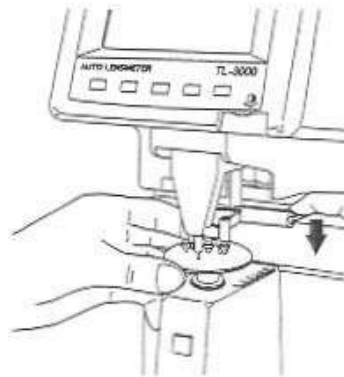
3.4.2 Marking device

The marking device places the marks in the center and in the axial direction (in case of astigmatism) of the lens with three ink pens.

- 1) Press and turn the marking lever, by which the pen descends and marks the lens surface.



- 2) Carefully release the marking lever, so it will return to its initial position by its spring force.

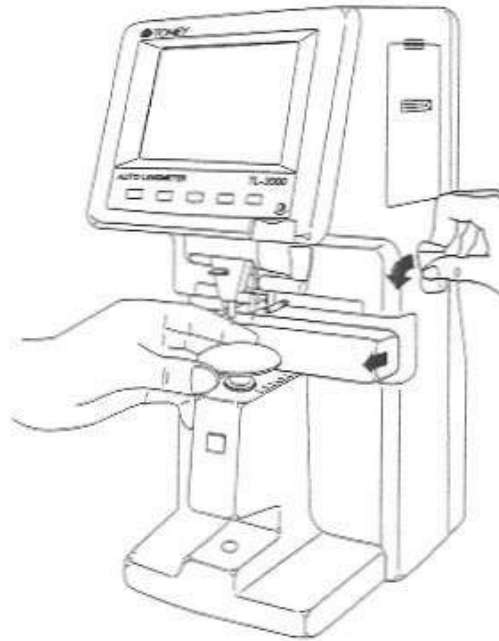


The three (3) marking pens are self-contained cartridges. When the ink supply becomes depleted, replace the cartridge. (See "4.3.2 Ink cartridge".)

3.4.3 Lens table

The lens table serves to standardize the axis of astigmatism lenses.

- 1) Turn the lens table lever provided on the right side of the unit to move the lens table so that the table hits the edge of the mono-focal lens or the left and right frames of the glasses.



- 2) The outer diameter of a circular lens is indicated on the scale printed at the upper part of the front cover.

3.5 Setting up the MENU MODE display

Indication units and measuring conditions, such as CYL mode, AUTO mode, and another condition are selected by menu modes.

- 1) Keep pressing the MODE button for approximately one second. After the display disappears once and the menu-set display appears, release the MODE button from pressure. Then the menu display appears, which consists of four modes. (MODE SET 1 - 4)
- 2) To change the menu to the next mode, press the NEXT button.
- 3) To return to the measuring display after the menu mode has been set, press the END button.

MODE SET 1				
PRISM :	NON	PXY	r/θ	DXY
CYL :	-	±		+
STEP :	0.25	0.12	0.01	
ABBE :	35 (in the HI mode)			
PRINT :	OFF	ON		
MODE	←	→	NEXT	END

MODE SET 2				
NORMAL MODE :	NORMAL CONTACT			
PROG MODE :	PROGRESSIVE Bi-focal Tri-focal			
MODE	↑	↓	NEXT	END

MODE SET 3

AUTO HOLD : OFF **ON**

AUTO R/L : OFF **ON**

AUTO FAR : OFF **ON**

AUTO PROG : **OFF** ON

MODE **←** **→** **NEXT** **END**

MODE SET 4

SINGLE mode : OFF **ON**

PROG mode start: **OFF** ON

PD measure : OFF **ON**

UV check : OFF **ON**

MODE **←** **→** **NEXT** **END**

[Menu mode 1 display]

Select the mode with the MODE button.

Select the conditions of the mode with the use of the "←" and "→" buttons.

Selected mode and conditions are displayed in a reverse order.

The modes which can be set by MODE SET 1 are as follows:

MODE SET 1				
PRISM :	NON	PXY	r/θ	DXY
CYL :	-	±		+
STEP :	0.25	0.12	0.01	
ABBE :	35 (in the HI mode)			
PRINT :	OFF	ON		
MODE	←	→	NEXT	END

a) PRISM (Prism mode)

Initial mode is set at the time of power ON:

NON:	No prism display
PXY:	PX, PY display (Rectangular coordinates)
r/θ:	PSM, BAS display (Pole coordinates)
DXY:	DCX, DCY display (Displacement from the optical center)

b) CYL (CYL mode)

Initial mode is set at the time of power ON.

-:	Minus reading
±:	Mixed reading
+:	Plus reading

c) STEP (Measuring unit change)

0.25:	0.25D step
0.12:	0.12D step
0.01:	0.01D step

d) ABBE (Setting of Abbe number)

Notes

- The Abbe number to be set here is that used for the HI mode. (If the HI mode is set, measured values are corrected with this Abbe number.)
 - The Abbe number in the normal mode is preset at 60.
 - The Abbe number can be set in 5 steps ranging from 30 to 60, which is set at 35 at the time of shipping of the instrument.
-
-

e) PRINT (Printout ON/OFF)

ON: Printout
OFF: No printout

[Menu mode 2 display]

Select the mode with the MODE button.

Select the conditions of the mode with the use of the "↑" and "↓" buttons.

Selected mode and conditions are displayed in a reverse order.

The modes which are set by MODE SET 2 are as follows:

MODE SET 2				
NORMAL MODE	:	NORMAL	CONTACT	
PROG MODE	:	PROGRESSIVE	Bi-focal Tri-focal	
MODE	↑	↓	NEXT	END

f) NORMAL MODE (Normal mode)

NORMAL: Normal glasses (spectacles)

CONTACT: Contact lenses

g) PROG MODE (PROG mode)

PROGRESSIVE: Progressive addition lenses

Bi-focal: Bi-focal lenses

Tri-focal: Tri-focal lenses

[Menu mode 3 display]

Select the mode with the MODE button.

Select the conditions of the mode with the use of the "←" and "→" buttons.

Selected mode and conditions are displayed in a reverse order.

The modes which are set by MODE SET 3 are as follows:

MODE SET 3				
AUTO HOLD	:	OFF	ON	
AUTO R/L	:	OFF	ON	
AUTO FAR	:	OFF	ON	
AUTO PROG	:	OFF	ON	
MODE	←	→	NEXT	END

b) AUTO HOLD

Initial mode is set at the time of power ON.

ON: Auto hold mode.

OFF: Manual mode.

i) AUTO R/L

ON: Automatic RIGHT/LEFT change
(when not measuring PD)

OFF: No automatic RIGHT/LEFT change
(when not measuring PD)

j) AUTO FAR

ON: Automatic holding of measured data for far point
area in the PROG mode.

OFF: Measured data for far point area are held by

HOLD.button.

k) AUTO PROG:

- ON: Automatic change to the PROG mode when identifying a progressive addition.
OFF: No automatic change to the PROG mode when identifying a progressive addition.

[Menu mode 4 display]

Select the mode with the MODE button.

Select the conditions of the mode with the use of the "←" and "→" buttons.

Selected mode and related conditions are displayed in a reverse order.

The modes which can be set by MODE SET 4 are as follows:

MODE SET 4			
SINGLE mode	:	OFF	ON
PROG mode start	:	OFF	ON
PD measure	:	OFF	ON
UV check	:	OFF	ON
MODE	←	→	NEXT
			END

l) SINGLE MODE

- ON: The single lens mode (S-mode) is used.
OFF: The single lens mode (S-mode) is not used.

m) PROG mode start:

- ON: The start display at the time of ON power supply is changed to the PROG mode.
OFF: The start display at the time of ON power supply is changed to the normal mode.

n) PD measure:

- ON: PD measurement is given.
OFF: No PD measurement is given.

o) UV check:

- ON: The UV check function is used.
OFF: The UV check function is not used.

-
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- Notes**
- *Since the information which has been set is stored in the memory, it needs not to be reset after the power is turned off.*
 - *If changing the information, set the new information by the procedure mentioned above.*
-
-

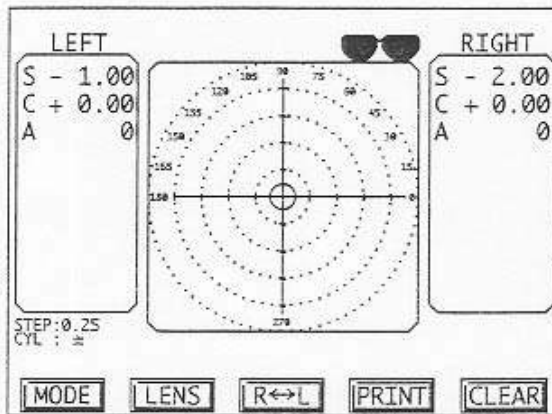
3.6 Printout (Re-display)

- 1) Set the PRINT mode ON by setting the menu. (See "3.5 Setting of menu display".)

Notes • *No printout is obtained if the setting of PRINT is OFF.*

- 2) Measure the lens and hold measured data by HOLD button so that they are stored in the memory.
- 3) Press the PRINT button. Measured data are printed out.

In the case of RL mode, data which have been stored in the memory are re-displayed in the screen.



-
- Notes** • *If the PRINT button is pressed in the condition that data are not stored in the memory, feeding is carried out.*
- *If the data are not stored in the auto hold mode or by pressing the HOLD button after the last printing-out has been made, the same data are printed out each time when pressing the PRINT button. If any new data are stored after printout is made, the previous data will be automatically erased.*
-

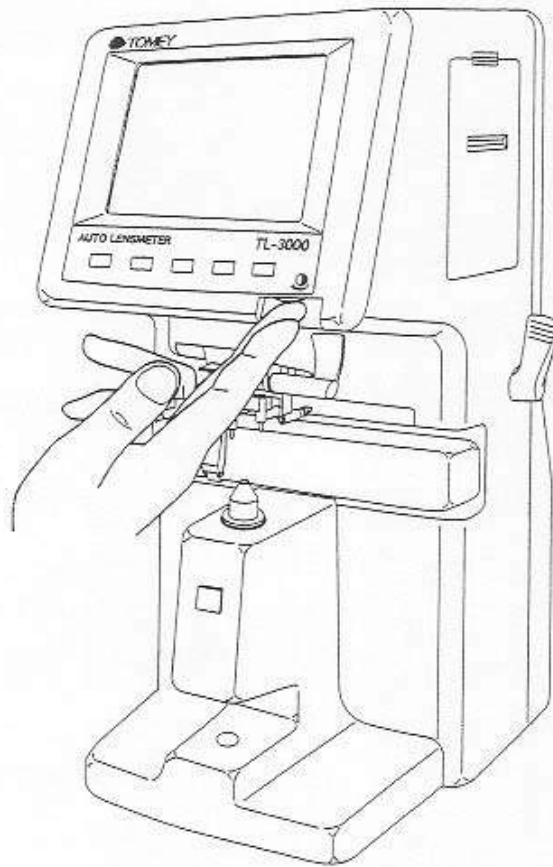
3.7 Data communication (RS-232C)

When connecting the external output terminal, communications bt computer or alike will be possible.

Notes • *The external output terminal is not isolated from the inner circuits. The wiring mode may ruin the inner circuits. Be sure to contact your TOMEY representative or a local distributor for wiring instructions.*

3.8 LCD contrast adjustment

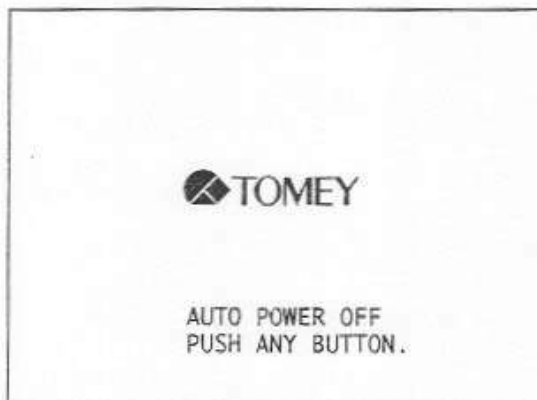
Adjust the LCD contrast by turning the contrast adjuster provided in the right lower part of the operation panel.



3.9 AUTO POWER OFF (Automatic power saving function)

The power saving function is automatically actuated to turn off the internal motor, the back light of the LCD screen, and the light source, when the Instrument is not used for measurement for more than 10 minutes.

- 1) When the Instrument is not used for more than 10 minutes (in such a condition that the lens is not placed on the nose piece and, in addition, the operation button is not pressed), the back light of the display screen is turned off; the internal motor and the light source is turned off; and then the following screen is displayed.



- 2) Press either of the operation buttons when starting your measurement.
The display on the screen is returned to that for measurement.

-
- *Turn off the power switch when you do not intend to use the Instrument for a long period of time.*

Notes

4. MAINTENANCE AND INSPECTION

4.1 Warranty

One-Year Limited Warranty

Seller warrants this product to be free from defects in material and workmanship under the normal use of this product for one year from the date of invoice issued by Seller to the original purchaser.

This warranty shall apply only to the original purchaser and shall not, in any way, be transferable or assignable to any other party than the original purchaser.

Lamps, paper and other consumable items shall not be covered by this warranty.

This warranty also shall NOT apply if the product has not been installed, operated or maintained in accordance with the OPERATOR MANUAL of Tomey Corporation (hereinafter called "Tomey"). Neither Seller nor Tomey shall be liable for any damages caused by purchaser's failure to follow instruction for proper installation, use and maintenance of the product.

This warranty is only applicable to the new product and DOES NOT cover any damage resulting from or caused by accident or negligence, abuse, misuse, mishandling, improper installation, improper repair or improper modification of this product, by persons other than personnel duly authorized by Tomey, nor to a product whose serial number or batch number is removed, altered or effaced.

THIS WARRANTY IS EXPRESSLY IN LIEU OF ANY AND ALL OTHER WARRANTIES, EXPRESS OR IMPLIED (INCLUDING SPECIFICALLY, WITHOUT LIMITING THE GENERALITY OF THE FOREGOING, ALL WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE), AND ALL OTHER OBLIGATION AND LIABILITY ON THE PART OF SELLER AND TOMEY. NEITHER SELLER NOR TOMEY SHALL BE LIABLE FOR INCIDENTAL, CONSEQUENTIAL OR SPECIAL DAMAGES UNDER ANY CIRCUMSTANCES OR FOR MORE THAN REPAIR, REPLACEMENT OR REFUND OF THE PURCHASE PRICE OF DEFECTIVE GOODS.

4.2 Routine maintenance

- Notes**
- *Do not touch the optical parts, such as the cover glass, with your fingers. Keep them clean. Accuracy of the reading may be adversely affected by dust or skin cuticles.*
 - *Do not use organic solvents, such as thinners, which may cause damage to the surface of the instrument.*
-
-

- Keep the dust cover over the instrument when the instrument is not in immediate use.
- Use a dry cloth to clean the cover, screen or the front panel. Use diluted non-organic detergents for any heavy stains.
- Disconnect the power cord when the instrument is not in use.

4.2.1 Cleaning cover glass

Clean the cover glass periodically.



- *Never scratch the cover glass. Scratch on the cover glass may result in inaccurate readings.*
-

- 1) Remove the nose piece.
- 2) Clean the cover glass.

Remove the dust on the cover glass by using blower.

When the dirt still remains, wipe it off using the soft cloth (i.e. lens cleaning paper) softly.

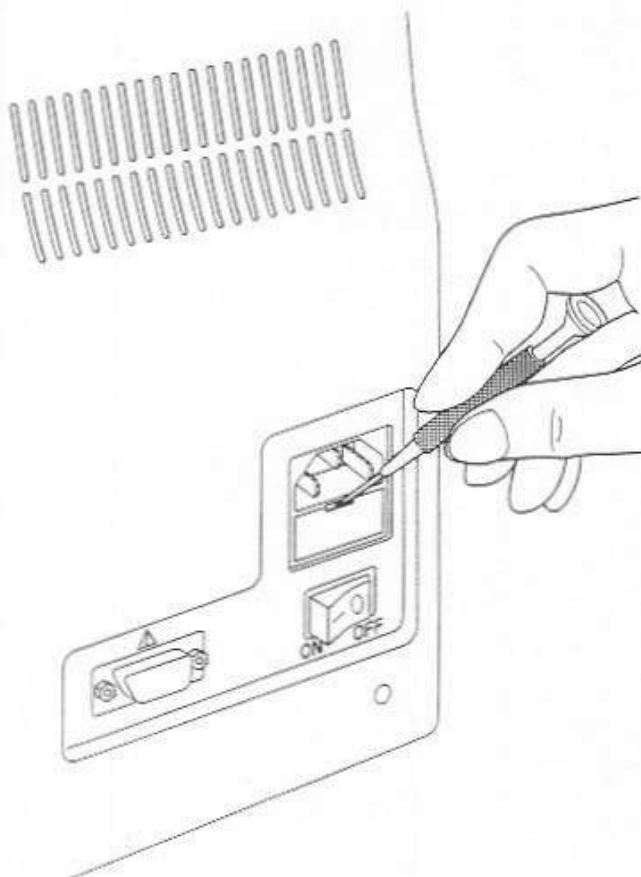
4.3 Replacing spare parts

4.3.1 Fuse



- *Disconnect the power cord immediately if the problems persist after replacing the fuses. Contact your Tomey representative or local distributor.*
-

- 1) Turn off the power of the unit.
- 2) Unplug the power cord.
- 3) As shown in the diagram below, remove the cover of the fuse holder on the back side of the unit by using a flat screwdriver.
- 4) Remove a broken fuse from the fuse holder.
- 5) Place a new fuse into the fuse holder.
- 6) Push the fuse holder back in place.



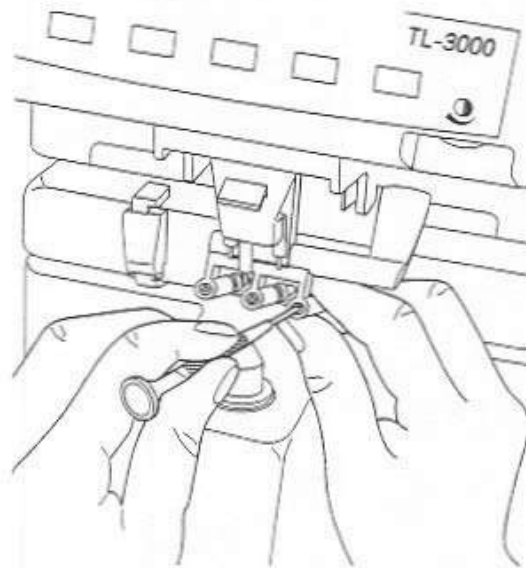
4.3.2 Ink cartridge

Replace the ink cartridge with a new one when ink is low. It can be obtained from your Tomey representative or local distributor.

Notes • *Be sure to use the genuine ink cartridge (as specified in this manual).*

- 1) Lift up the clamp.
- 2) Lower the marking device straight downward.
- 3) Remove the screw from the ink cartridge.

While holding the ink cartridge, remove the screw by turning it counter clockwise with a Philips screwdriver.



- 4) Remove the ink cartridge and the spring from the marking device.
- 5) Place a new ink cartridge and the spring in the marking device.



- 6) Firmly attach the cartridge to the marking device with the screw.



- *Do not touch the tip of the pen while replacing the ink cartridge. Touching the tip may result in damage and the spots marked on the lense may not be accurate.*
- *Do not fasten the screw too much. It may result in damage to the ink cartridge. Use the accompanying screws and springs only. If the screws and/or the springs are lost , contact your Tomey representative or local distributor.*

5. TROUBLESHOOTING

Before calling service personnel, check the following and restart the unit again.

-
-
- Notes**
- *Do not attempt measures other than those described below.*
 - *If the problems persist after checking the following, stop using the unit and immediately contact your Tomey representative for inspection or repair.*
-
-

5.1 Troubleshooting guide

<General operation>

1) The LCD does not come up after turning ON.

Cause 1: Failure in connecting the power cord.

Action: Insert the plug of the power cord securely into the AC inlet terminal of the instrument.

Insert the power cord securely into the receptacle on the AC outlet.

Cause 2: The fuse is blown.

Action: Replace with a new fuse (Refer to Section 4.3.1 "Fuse").

Cause 3: Improper adjustment of the screen contrast.

Action: Adjust contrast of the screen properly by using the contrast adjuster on the back side of the instrument (Refer to Section 3.8 "Controlling the LCD contrast").

2) Freezes at the initial screen.

Cause 1: There is an object on the nose piece.

Action: Remove the object from the nose piece.

Cause 2: The nose piece is not seated properly.

Action: Seat the nose piece properly.

Cause 3: The cover glass under the nose piece is not clean.

Action: Remove the nose piece and then clean the cover glass.

3) "INITIAL ERR!" is displayed.

Cause: A lens was on the nose piece when the power was turned on.

Action: Remove the lens and press any button.

Cause: The nose piece is not seated properly.

Action: Seat the nose piece properly and press any button.

Cause: The cover glass under the nose piece is not clean.

Action: Turn off the power. Remove the nose piece and clean the cover glass. Turn on the power again.

4) a) The S, C or A value is not ZERO (0.00) with no lens on the nose piece.

b) The readings are inaccurate.

Cause 1: The nose piece is not seated properly.

Action: Seat the nose piece properly.

Cause 2: The cover glass under the nose piece is not clean.

Action: Turn off the power. Remove the nose piece and clean the cover glass. Turn on the power again.

5) Printer does not work when the PRINT button is pushed.

Cause 1: "PRINT" setting is OFF.

Action: Set "PRINT" parameter "ON". (Refer to Section 3.6)

Cause 2: Printer paper has been installed incorrectly.

Action: Correct the side of the paper. (Refer to Section 4.3.4)

6) Print density is too light or too dark.

Cause 1: Print paper is old.

Action: Replace it with new paper (Refer to Section 4.3.3
Replacing the printing paper)

Cause 2: Print paper is not the genuine paper.

Action: Use the genuine printing paper.

7) PD values are not displayed when moving the nose block.

Cause 1: The nose block has not been reset.

Action: Move the nose block to the left end (stopper position) once before starting PD measurement..

Cause 2: "PD measure" setting is OFF.

Action: Set "PD measure" parameter ON. (Refer to Section 3.6)

<Progressive addition lens measurement>

1) The cursor can not be centered in the progressive area .

Cause 1: With the progressive lenses which have small power difference between far point area and near point area, aligning the cursor to the center may not be achieved.

Action : Progressive area is located in approximately the center of the lens or the center in the frame. Take measurement around that position and press the HOLD button.

2) The cursor can not be centered in the far point area.

Cause 1: There are the lenses dispensed for intermediate and near point area. In those lenses, the progressive area extends to the far point area and it is hard to accurately measure the far point area.

Action: Take a reading at the area where is located approximately 15 mm above the eye mark of far point.

If it is still difficult to align the lens, slightly move the lens back and forth, right and left, at approximately 10 - 15 mm above the eye mark of far point (around the center in the frame). Regard the area where the SPH value varies the least as the measurement of the far point area.

3) The near point area is not detected. (The cursor does not change to "○" or "●" .)

Cause 1: The near point area is NOT automatically detected if the ADD power is less than 1.0 diopter because it may result in an inaccurate reading.

Action: Press HOLD button when judging the highest addition value when the cursor is in the progressive zone.

Cause 2: The near point area in the frame lenses with the long progressive zone may be positioned very near the edge of the frame or even outside of the frame. It may not be possible to detect the near point in such lens.

Action: Press HOLD button when judging the highest addition value when the cursor is in the progressive zone.

Cause 3: The near point area in the small frame lenses may be positioned at very near to the edge of the frame or even outside of the frame. It may not be possible to detect the near point area in those lenses.

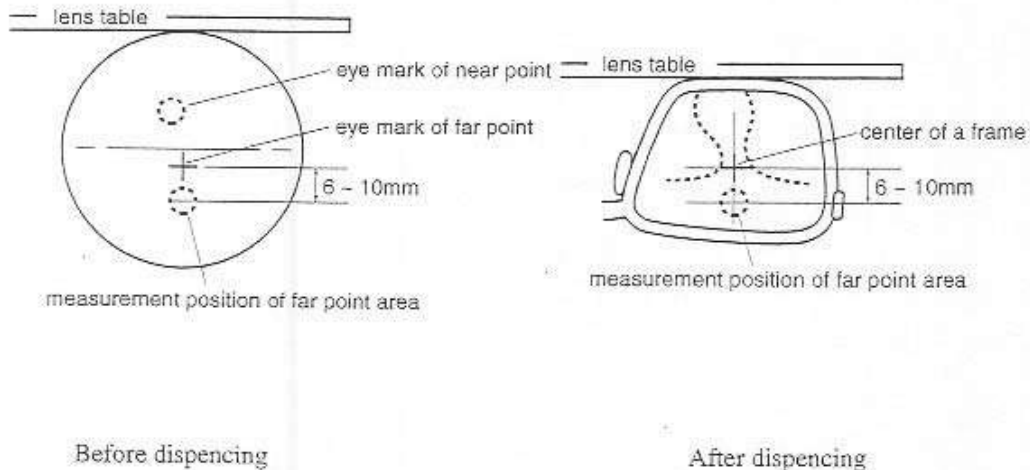
Action: Press HOLD button when judging the highest addition value when the cursor is in the progressive zone.

**4) The ADD readings vary more than 0.5 diopters.
The ADD readings are significantly lower (over 0.5 dipters)
than the nominal values.**

Cause 1: The far point area was not measured properly.

Action : With some lenses, the far point area may not be measured accurately if AUTO FAR mode is used. Disable the AUTO FAR mode in the menu screen, and measure the far point area manually. Read "Measurement position of the far point area." If it is still difficult to measure, slightly move the lens back and forth, right and left to measure the portion where variation of SPH readings is minimum and press HOLD button.

[Measurement position of the far point area]



Cause 2 : With the lenses having low minus (-) power, i.e. -1.00 to -2.00 diopters, at the far point area, the total power may be zero (0) diopters in the progressive zone as proceed. As result, lower ADD reading may be taken because the portion where the reading become zero is regarded as the near point.

When a lens with SPH reading of -2.00 diopters and the add reading of 3.00 diopters is measured, there is a spot where the reading becomes zero (0) diopters. At this proximity, there is a possibility of acquiring ADD readings of between 2.00 and 2.50 diopters. Special attention should be given to those kind of lenses with the CYL because this error can easily occur.

Action : Use manual mode for these lenses.

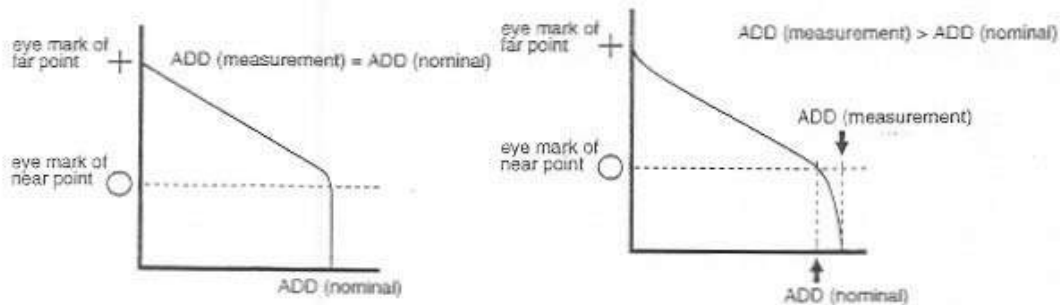
If the cursor changes twice from "+" to "○" (or "⊙"), use the highest ADD reading.

If the cursor changes once, take the highest ADD reading while the cursor stays "○" (or "⊙").

5) ADD readings are higher than the nominal values.

Cause: Some progressive lenses may have a peak of ADD below the eye mark of the near point. With these lenses, the ADD readings may be higher than the nominal values.

[Additional curve]



mono design

multi design

Horizontal axis : ADD value (D)

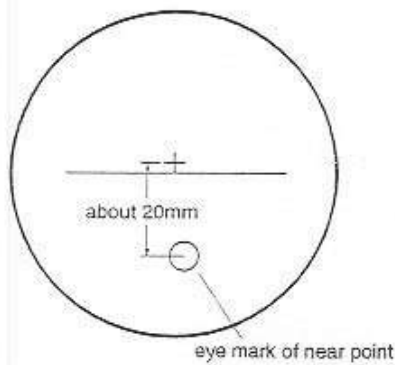
Vertical axis : location

Action: The ADD reading should be taken at the eye mark at the near point marked on the lens blank. (The cursor may not change to "O".)

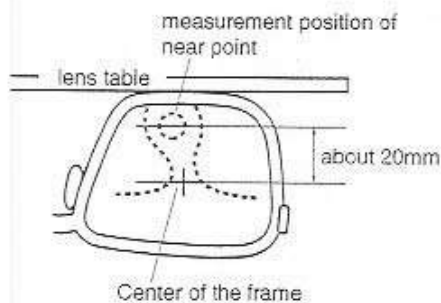
After dispensing, an eye mark does not exist and take a reading of ADD at the spot locating 20 mm below the center of the frame.

In both cases, make sure to take the ADD reading while the cursor stays in the progressive zone.

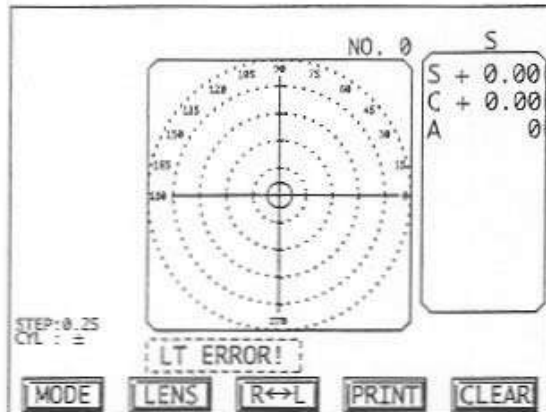
[The position of the eye mark of the near point]



[The measurement position of the near point]



5.2 Error messages and corrective actions



1) LT ERROR!

Cause: Amount of light is not sufficient.

Action: Clean the lens to be measured and the cover glass located under the nose piece.

Heavily tinted lenses may not be measured.

Make sure that the frame of the spectacle does not cover the nose piece.

2) MT ERROR!

Cause: Malfunction of the DC motor.

Action: Contact your Tomey representative or local distributor.

3) OVER FLOW!

Cause: Over/Under flow

Action: The power of the lens is out of the measuring range.

4) PR ERROR!

Cause: Paper jam.

Action: Remove jammed paper.

5) INITIAL ERROR

Cause: Initial error.

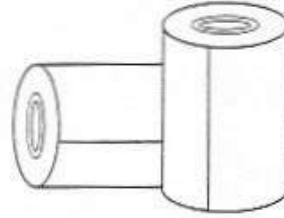
Action:

1. Remove the lens to be measured on the nose piece and press any button.
2. Seat the nose piece properly and press any button.
3. Clean the cover glass located under the nose piece and press any button.

6. SPARE PARTS

The following spare parts can be purchased from your Tomey representative or local distributor.

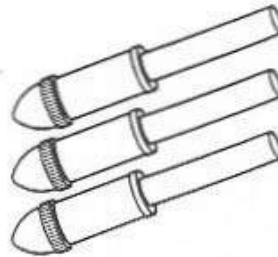
- Printer Paper



- Spare fuse (250V, 1.0A)



- Ink cartridges



- Dust cover

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7. SPECIFICATIONS

7.1 Measurement

- Range
 - Spherical power (S reading): $\pm 25D$
 - Cylindrical power (C reading): $\pm 10D$
 - Axis of cylindrical power (A reading): 0 to 180 degrees
 - Addition reading (ADD reading): 0 to 10 D
 - Prism power (P reading): 0 to 10 Δ
- Units
 - Diopter: 0.01/0.12/0.25 D
 - Prism: 0.01/0.12/0.25 Δ
- Modes
 - Cylinder: + / \pm / -
 - Prism: Rectangular
Polar coordinates
Displacement
- Sampling speed: 0.035 seconds
- Measurement wavelength: 660 nm
- Diameter of the beam: \varnothing 3 mm
- Pupillary Distance (PD): 50 to 86 mm
- Lens diameter: \varnothing 20 to 100 mm
- Lens types: Spectacles and contact lenses
- Abbe numbers: 30 to 60 (5-unit increment)
(30,35,40,45,50,55,60)

7.2 Data control

- Display: Monochrome LCD display
(320 x 240 pixels)
- Alignment: Cross cursor
(Thickens when lens is aligned.)
- Printer: Thermal printer (MTP type)
- External communication port: RS-232C

7.3 Physical dimensions and electrical requirements

- Dimensions: 220 (W) x 259.5 (D) x 437.5 (H) mm
(8.7 (W) x 10.2 (D) x 17.2 (H) inch)
- Weight: approx. 6.1 Kg (13.4 lbs)
- Main supply voltage: 100 to 240 V AC
(automatically adjusted)
- Power consumption: 50 VA
- Frequency: 50/60 Hz

7.4 Environmental conditions

- Installation site: indoor
- Operating temperature range: +10°C to +40°C
maximum relative humidity 80% for temperatures up to 31°C decreasing linearly to 50% relative humidity at 40°C
- Main supply voltage fluctuations: $\pm 10\%$ of the normal voltage
- Installation Category: II
- Pollution degree: 2 (based on IEC664)

7.5 Approved international standards

- Electrical safety: IEC -1010-1; +A1; +A2
- Electromagnetic compatibility: EN55011 (Group 1 Class B)
EN61000-3-3
EN61000-4-2
EN61000-4-3
EN61000-4-4
EN61000-4-5
EN61000-4-6
EN61000-4-8
EN61000-4-11
FCC (Part15 Class B)

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