

Nikon
AUTOMATIC LENSMETER NL-30
INSTRUCTIONS

NIKON CORPORATION

Ver. 2.01 ~

Notes on Use

1. Observe the following requirements when you select a location for this lensmeter.
 - o Install this lensmeter in a dry flat place.
 - o Do not expose this lensmeter to direct sunlight.
 - o Do not put this lensmeter where an air conditioner will blow directly on it.
2. Since this lensmeter is a precision optical instrument containing many electrical parts, take great care when handling it.
3. Do not disassemble this lensmeter.
4. Keep the lens table clean. Even a speck of dust may affect the measurement accuracy.
5. Take care not to scratch the glass surface of the lens table, doing so will affect the measurement accuracy.
6. Store printout in a cool place where it will not be exposed to direct sunlight and other bright light, otherwise it will become discolored. If printout must be stored for a long time, we recommend that you make a copy and store the copy.
7. When measuring a mirror lens, the light reflected from the mirror lens may deviate the measured values somewhat.
8. Wipe off any dirt on this lensmeter with a soft dry cloth or a gauze infiltrated with alcohol. Never use other organic solvents such as thinner, acetone, or ether.
9. After use, turn OFF the POWER switch and put the vinyl cover over the NL-30 body.
10. After turning on the power switch, do not place a lens on the lens table or do not depress another switch before the initial screen (-> P.1) appears.

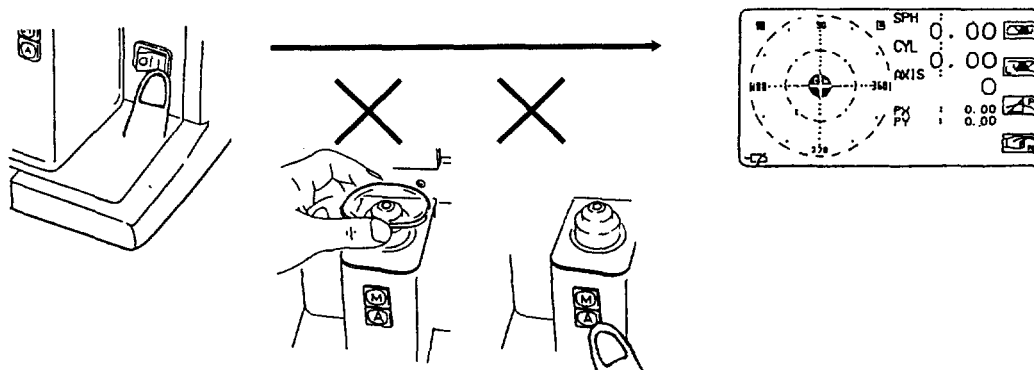


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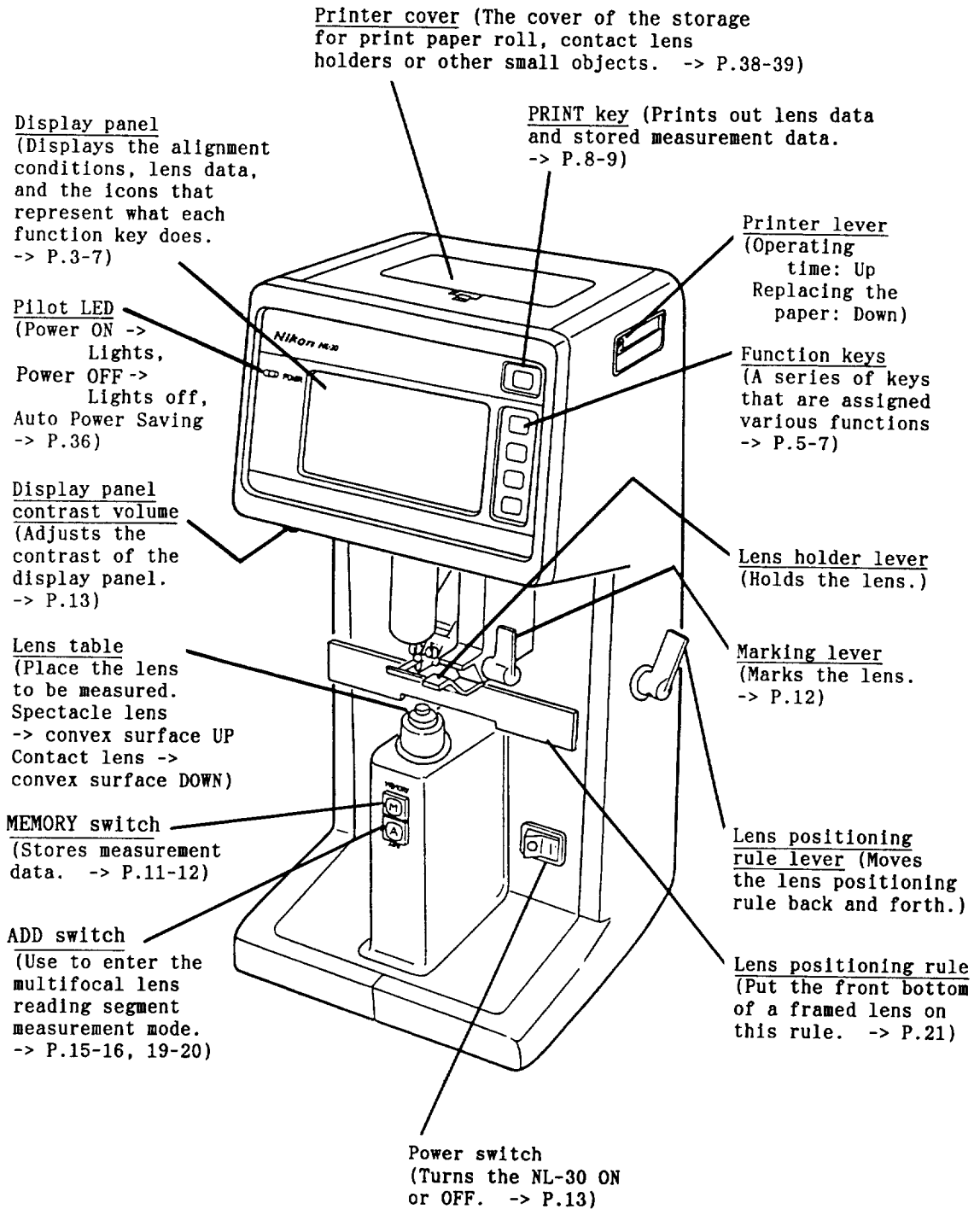
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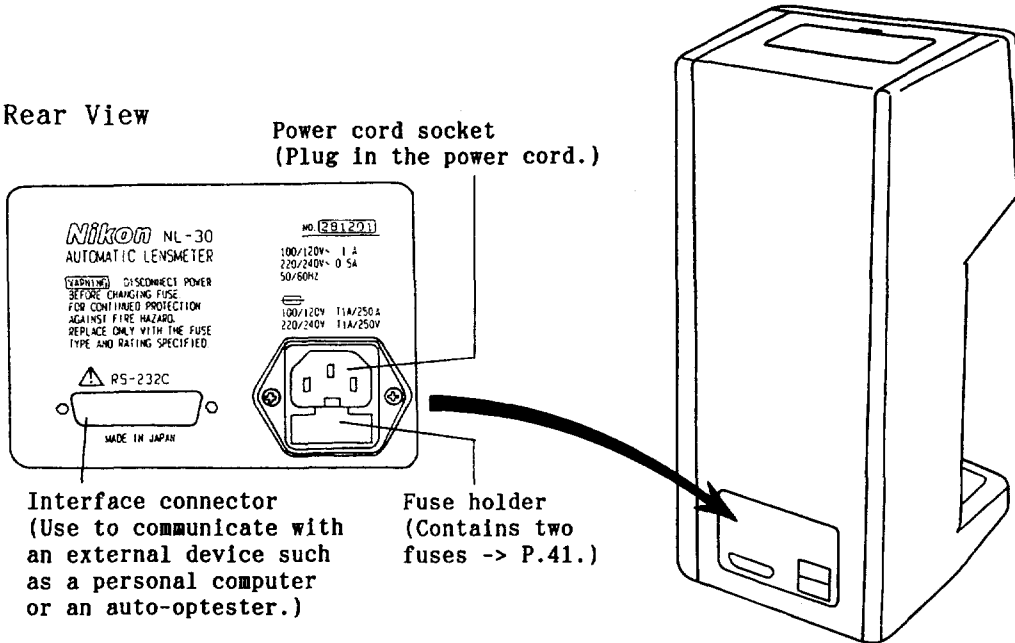
1. NOMENCLATURE

1-1. Nomenclature and Functions

Front View



Rear View



The NL-30 can be used at any input voltage within the range of from 100V to 240V (It is not necessary to modify the internal parts of NL-30). However, use the UL-listed-cord-type for power cord whose plug will meet your power outlet. If the correct UL power cord is not available, the below three types of cords are available from us, and contact the below address:

Customers in U.S.A. ⇒ Nikon Inc.

1300 Walt Whitman Road, Melville
N.Y. 11747-3064, U.S.A.

or

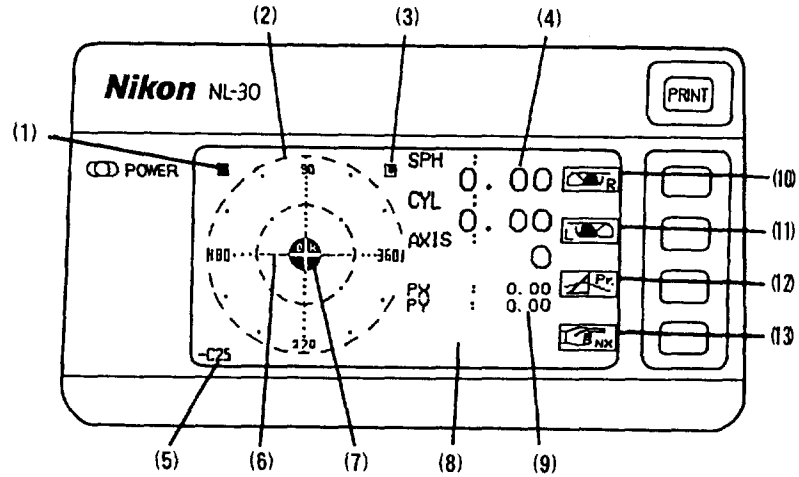
Nikon Inc., Los Angeles Branch
19601 Hamilton St., Torrance
C.A. 90502, U.S.A.

Customers in Japan ⇒ Ophthalmic Div. of Nikon Corporation
Fuji Bldg., 2-3, Marunouchi 3-chome
Chiyoda-ku, Tokyo 100, Japan

Customers in other area ⇒ Nikon distributor at your place.

For 115V area				
For 220V area				
For 240V area				

Display Panel Screen



(1) Data buffer indicator

This indicates whether data is stored in memory.

■ : Data is stored.

□ : No data is stored.

(2) Lens alignment indicator

Since the NL-30 aligns a lens by using an eccentric distance, this indicator does not show a prism power and is to be used for alignment only.

(3) R&L mode indicator

This indicates whether the NL-30 recognizes the set lens as a right lens, a left lens or a single lens.

☐ : Right lens

☐ : Left lens

Blank: Single lens

(4) Measured value display area

This area displays the measured values of SPH (spherical power), CYL (cylindrical power) and AX (cylindrical axis power).

(5) Mode indicator

This shows the cylindrical power mode and the minimum step.

±□ : Mixed cylindrical power mode	25: Minimum step 0.25 dp
+□ : Positive cylindrical power mode	12: Minimum step 0.12 dp
-□ : Negative cylindrical power mode	

(6) Target

This is a cross that shows the current lens position; it tilts according to the angle of the cylindrical axis.

(7) Alignment indicator

This indicates to what extent the lens is aligned.

⊙ : indicates that the lens is not aligned.

⊙^{OK} : indicates that the lens is aligned well enough to measure it.

⊙^{OK} : indicates that the lens is aligned well enough to mark it.

(8) Message line

This line displays information such as an error message.

(9) Prism display area





This area displays the X-Y prism power, the resultant-singular prism power, the eccentric distance, or the addition power, in normal-sized numbers. This display can be blanked.

(10)-(13): Switch function icon





These are the icons that represent the functions assigned to the switches on the right.

These switches work differently in the five screens described below and their functions are represented by the four icons displayed along the right edge of each screen. The following show the icons for the switches 1 through 4, and describe the names and functions.





1) Initial screen

- Switch 1  Right lens key
(Specifies that the right lens is to be measured. When already specified, this switch cancels the specification.)
- Switch 2  Left lens key
(Specifies that the left lens is to be measured. When already specified, this switch cancels the specification.)
- Switch 3  Prism power mode key
(Invokes the prism power mode screen, which Allows you to change the prism power mode.)
- Switch 4  Next key
(Invokes the second screen.)


2) Second screen


- Switch 1  Contact lens measurement key
(Enters contact lens mode.)
- Switch 2  Power transposition key
(Changes the display form of the cylindrical power.)
- Switch 3  Step key
(Changes the minimum step.)
- Switch 4  Return key
(Returns to the initial screen.)


3) Prism mode screen


- Switch 1  XY Prism display key
(Represents the eccentric distance of the lens by the X- and Y-component prism powers.)
- Switch 2  Resultant-singular prism display key
(Represents the eccentric distance of the lens by a prism power and an angle.)
- Switch 3  Distance display key
(Represents the eccentric distance of the lens by the X- and Y-component distances (mm).)
- Switch 4  Return key
(Returns to the initial screen.)

4) Hard contact lens measurement mode screen


Switch 1  Right contact lens key
(Specifies that the right contact lens is to be measured. When already specified, this switch cancels the specification.)


Switch 2  Left contact lens key
(Specifies that the left contact lens is to be measured. When already specified, this switch cancels the specification.)


Switch 3  Soft contact lens mode key
(Enters the soft contact lens mode.)


Switch 4  Return key
(Returns to the initial screen.)

5) Soft contact lens measurement mode screen


Switch 1  Right contact lens key
(Specifies that the right contact lens is to be measured. When already specified, this switch cancels the specification.)

Switch 2  Left contact lens key
(Specifies that the left contact lens is to be measured. When already specified, this switch cancels the specification.)

Switch 3  Hard contact lens mode key
(Enters the hard contact lens mode.)


Switch 4  Return key
(Returns to the initial screen.)


6) Special setting mode screen


To enter this mode, turn on the power switch and wait for mark of Nikon. While the "Nikon" mark is moving on the screen, press the  switch. After about 20 seconds, the icons described in the below 6-1) will appear.




6-1) Printing method mode screen

Switch 1  Do not press this key in normal use.
(For data transmission to external device only.)


Switch 2  Do not press this key in normal use.
(For data transmission to external device only.)

Switch 3  Printing method selecting key
(You can choose the printing method either roll or label.
You can see the entered message in the bottom of screen.

MESSAGE : ROLL IS SELECTED
 LABEL IS SELECTED)


Switch 4  Next key
(Invokes the Nikon mark print & prism indication selecting mode screen.)




To enter the 6-2) mode, press switch 4  of the 6-1) screen. The icons described in the below 6-2) will appear.




6-2) Nikon mark print & prism indication mode screen


Switch 1  Nikon mark print selecting key
(You can choose either Nikon mark print or non-print.
You can see the entered message in the bottom of screen.

MESSAGE : PRINT NIKON
 NOT PRINT NIKON)

Switch 2  Prism indication selecting key
(You can choose either prism indication/print or non-indication/non-print.
You can see the entered message in the bottom of screen.

MESSAGE : PRINT PRISM
 NOT PRINT PRISM)

Switch 3  No use.

Switch 4  Return key
(Returns to the initial screen)

1-2. Printer

(1) Content of printout

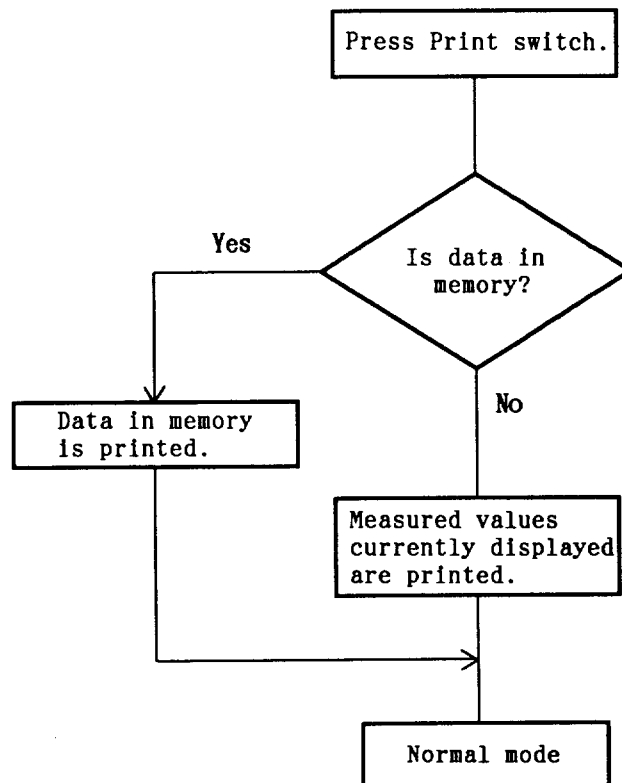
If the NL-30 is set up so that the printer can be used (usual set up at the factory), pressing the **PRINT** switch prints out data. The printer prints the data below.

- 1) The measured values currently displayed on the screen
- 2) Data stored in memory.

(When data is printed out from memory, the present measured values on the screen are not printed.)

After printout;

- 1) If data is printed in reading segment mode, the NL-30 returns to the distance part mode or normal mode.
- 2) Data in memory is cleared.



Information output to the printer is

- Spherical power (S)
- Cylindrical power (C)
- Cylindrical axis power (AX)] Data of the S, C, and AX is always printed.

- Addition power (AD) Data of AD is printed only when the reading segment of a lens was measured.

- Prism power Data of the selected mode among the following is printed.
 - 1) The horizontal and vertical prism powers
 - 2) The resultant-singular prism power and base direction
 - 3) The horizontal and vertical eccentric distances.

- Left and Right (R, L) "Left" or "Right" is printed when the condition is either 1) or 2).
 - 1) When "Left" or "Right" lens is specified.
 - 2) When the NL-30 senses which lens is on the lens positioning rule.

When the horizontal and vertical prism powers mode is selected, the signs preceding the prism powers vary for the right and left lenses.
(-> P.26-27)
The signs of prism power are as follows:

Signs	Meanings
IN	-> IN
OT	-> OUT
DN	-> DOWN
UP	-> UP

(2) Printer Hardware Information

This printer has a heat-sensitive head, which touches heat-sensitive paper to print data.

(3) Printer lever

To bring the head into contact with the paper, use the printer lever located at the left of the paper exit.

Pushing down the printer lever lifts the head off the paper, so you can operate manually. Operate when you are to:

- . Replace the paper roll.
- . Pull out the end of the paper.

Pushing up the printer lever makes the printer ready to operate.

When the lever is set down, printing is disabled. If you press the switch with the printer lever down, the printer head error message is displayed on the display panel screen and the printer does not operate.

1-3. Memory

(1) Memory function

The NL-30 has a memory, so measured values can be stored and later output all together to the printer. The memory can store various measured values, such as the spherical power, for up to 200 lenses. Data is output as specified and the original format of data is ignored.

For example, even if the format of stored data is "step 0.25, positive cylindrical power, and horizontal and vertical prism powers", you can output the data changing the format as "step 0.12, negative cylindrical power, and eccentric distances".

All stored data is output in a common format.

(2) Memory Procedure

To store data, press the M switch. If you press this M switch twice, two versions of the same data are created. The data buffer indicator tells you whether data is stored.

: indicates that some data is stored.

: indicates that no data is stored.

The M switch can be pressed 200 times.

If you attempt to store the 201st set of data, a warning message is displayed and the data is not stored. For more information about storing data for each type of lens, see the section for each lens.

1-4. Marking and Alignment

The NL-30 allows you to align the center of a lens with the optical axis in real time by viewing the display panel screen. In conventional automatic lensmeters, the target moved according to the prism power. The NL-30 moves the target by monitoring actual movement of the lens in case of more than ± 1 Dpt. Therefore, a constant feeling of alignment can be achieved. (In case of lenses within ± 1 Dpt., the target moves by monitoring the prism power.)

The marking indicator at the center of the lens target shows the extent of alignment.

- ⊙: alignment is incomplete.
- ⊙^{OK}: the lens is aligned well enough to measure it but not enough to mark it.
- ^{OK}: the optical axis is aligned well enough to mark the lens.

An alignment enabling marking means that the center of the lens is aligned with the optical axis with a deviation of 0.3mm or less.

An alignment enabling a measurement means that the center of the lens is aligned with the optical axis with a deviation of 0.25Δ or less.

NOTE: When aligning a lens that is possibly scratched, such as a non-coated lens, set the lens holder up.

2. TURNING ON THE NL-30

- (1) Connect the power cord socket to A.C. wall outlet with the power cord provided.
- (2) To turn ON the NL-30, press the power switch located at the lower right corner of the front surface.
Press the side of the power switch marked "|".
- (3) When the NL-30 is turned ON, the green LED lamp at the upper right corner of the display panel lights.
- (4) A few seconds later, the back light of the LCD brightens.
- (5) When the display of page 3 appears, the NL-30 is ready to start measuring.

Do not place a lens on the lens table during this time.

When turning ON the NL-30, pay attention to the following:

- (i) Do not place a lens on the lens table.
- (ii) Check the lens table for any dust, moisture, fingerprint or other contamination. If necessary, wipe the table clean with a cotton cloth moistened with solvent.
If the table is dirty, accurate measurement is not assured.

NOTE: When the screen is blank (Pilot LED lamp lights) Although the NL-30 is started up and the pilot LED lamp is on, the screen may remain blank. In most cases, this is not an error and is caused because the contrast is not properly adjusted. Turn the contrast volume at the bottom left of the display panel until you can see the display clearly.

3. BASIC MEASUREMENT

With the NL-30 you don't have to press any switches to measure a lens after power on. You just place a lens on the lens table, and the NL-30 will reports the measured values.

But, there are many types of lens and each type requires appropriate steps for measuring it and for storing or printing data. This chapter describes the operations involved in measuring each type of lens.

(1) Measuring one frameless lens

- 1) Place the lens on the lens table and align it.
- 2) Read the measured values and press the switch to print them.

(2) Measuring several frameless lenses

- 1) Place the first lens on the lens table and align it.
- 2) Press the switch to store the measured value into memory.
- 3) Perform Step 1) with a new lens.
- 4) Perform step 2). Repeat Steps 4) and 5
- 5) Press the switch to print the measured values of the lenses.

(3) Measuring frameless one pair of lenses

- 1) Press the switch to enter right lens mode.
- 2) Place the right lens on the lens table and align it.
- 3) Press the switch to store the measured values into memory.
- 4) Press the switch to enter left lens mode.
- 5) Place the left lens on the lens table and align it.
- 6) Press the switch to store the measured values into memory.
- 7) Press the switch to print the measured values of both the lenses.

(4) Measuring one frameless multifocal lens

- 1) Place the distance part of the lens on the lens table and align it.
- 2) Press the switch to enter reading segment mode.
- 3) Place the reading segment of the lens on the lens table and align it.
- 4) Read the measured values and press the switch to print them.

(5) Measuring several frameless multifocal lenses

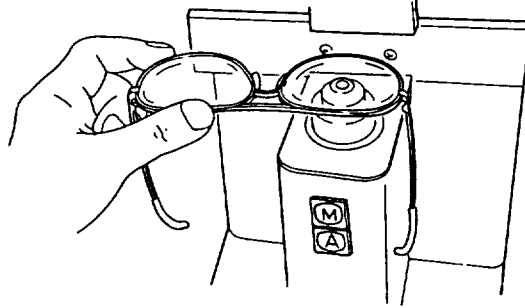
- 1) Place the distance part of the first lens on the lens table and align it.
- 2) Press the switch to enter reading segment mode.
- 3) Place the reading segment of the first lens on the lens table and align it.
- 4) Press the switch to store the measured values into memory.
- 5) Perform Step 1) with a next lens.
- 6) Perform Step 2).
- 7) Perform Step 3).
- 8) Perform Step 4). Repeat Steps 5) through 8).
- 9) Press the switch to print the measured values of the lenses.

(6) Measuring the frameless multifocal one pair of lenses

- 1) Press the switch to enter right lens mode.
- 2) Place the distance part of the right lens on the lens table and align it.
- 3) Press the switch to enter reading segment mode.
- 4) Place the reading segment of the right lens on the lens table and align it.
- 5) Press the switch to store the measured values of the right lens into memory.
- 6) Press the switch to enter left lens mode.
- 7) Place the distance part of the left lens on the lens table and align it.
- 8) Press the switch to enter reading segment mode.
- 9) Place the reading segment of the left lens on the lens table and align it.
- 10) Press the switch to store the measured values of the left lens into memory.
- 11) Press the switch to print the measured values of both the lenses.

(7) Measuring the framed spectacle lenses

- 1) As shown in the figure below, put the frame so that its front bottom comes into contact with the lens positioning rule and align the right lens.



- 2) Press the M switch to store the measured values of the right lens into memory.
- 3) Put the frame so that its front bottom comes into contact with the lens positioning rule and align the left lens.
- 4) Press the M switch to store the measured values of the left lens into memory.
- 5) Press the PRINT switch to print the measured values of both the lenses.


(8) Measuring framed multifocal spectacle lenses

- 1) Put the frame so that its front bottom comes into contact with the lens positioning rule and align the distance part of the right lens.
- 2) Press the A switch to enter reading segment mode.
- 3) Place the reading segment of the right lens on the lens table and align it.
- 4) Press the M switch to store the measured values of the right lens into memory.
- 5) Put the frame so that its front bottom comes into contact with the lens positioning rule and align the distance part of the left lens.
- 6) Press the A switch to enter reading segment mode.
- 7) Place the reading segment of the left lens on the lens table and align it.
- 8) Press the M switch to store the measured values of the left lens into memory.
- 9) Press the PRINT switch to print the measured values of both the lenses.

4. MEASURING ONE FRAMELESS LENS

4-1. Measuring One Single Vision Lens

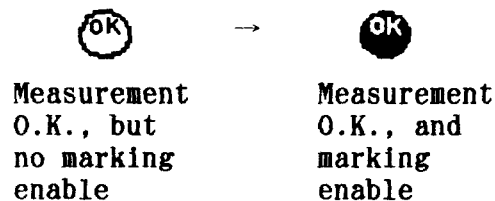
This is the most basic measuring method.

- (1) Make sure the values of S, C and AX on the screen are all "0".
- (2) Place the lens on the lens table.
- (3) Look at the alignment indicator to align the lens until the mark shown in the figure appears. 
- (4) When the alignment is completed, values are displayed in the S, C and AX fields. Read these values.
- (5) To print the data, press the switch.



To output the measured values for several lenses all together to the printer or a communication line, press the switch each time a lens is aligned. The measured values of each lens are stored and they can be output together later by switch.



When data is stored, the data buffer indicator at the upper left of the screen (-> P.3) changes to blue. Data for up to 200 lenses can be stored.

When the lens needs to be marked, align it until the mark changes to blue as shown in the figure below. This indicates that the optical axis is aligned with the center of the lens with a deviation of 0.3mm or less. In this condition, the lens can be marked at an allowably correct position.



If you want to mark the lens more accurately, change the prism power mode to the eccentric distances (-> P.28), and align the lens by using the eccentric distances rather than the marking indicator.

If a frameless lens needs to be defined as a right or left lens because it has a prism power, or simply for convenience, press switch 1  or 2  before measurement.

This allows the NL-30 to display and print the specified side ( or ) and the prism IN and OUT for the side. To cancel the specified side, press the same switch once more.

4-2. Measuring a Multifocal Lens

This section describes how to measure fused-type and ER-type multifocal lenses. Remember that the center of a multifocal lens does not have a prism power of 0 and that the center is often not the best place to measure. This is very important for accurate measurement of the addition power.

Use the following procedure to measure the multifocal lens:

- (1) Make sure the values of S and C on the screen are both 0 and place the distance part of the multifocal lens on the lens table.
- (2) Align the lens until the target is positioned near the center of the lens. The target cannot be aligned with just the center of the ER lens. Position the lens so that the reading segment does not get into the beam range.
- (3) When the distance part is aligned, press the A switch to store the measured values.
- (4) Look to see where the reading segment of the lens is and place it on the lens table.
 - If the beam does not go through completely within the reading segment, a cross (see the figure) appears at the marking indicator.



- If the beam goes through the reading segment or the distance part, a double circle (see the figure) appears. Read the values of the S, C, AX and ADD.



Press the switch to output the measured values to the printer. To store the data, press the switch after the reading segment is measured. To include information of R or L in the output to indicate whether the data is for the right or left lens, press the switch or before the measurement.

After the measurement, press the switch again to return to normal mode. Pressing the or the switch also causes the NL-30 to exit from reading segment mode and to return to normal mode.

In case of measuring the reading segment, place the lens on the lens table with the convex surface facing up, as well as in case of distance part.

5. MEASURING THE FRAMED LENS

The NL-30 can determine whether the lens placed on the lens table is for right or left by using the lens sensor installed in the lens positioning rule.

5-1. Measuring a Framed Single Vision Lens

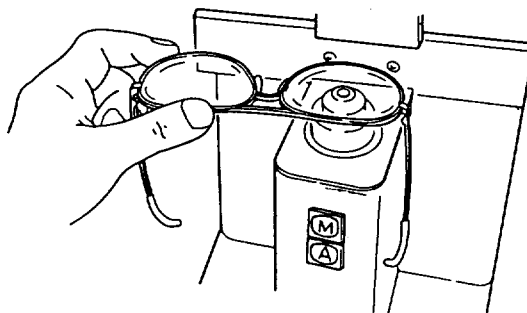
This is the most general measurement of spectacle lenses. In this section, the framed single vision lens is called the spectacle lens.

- (1) Before measurement, check the spectacle lenses for dirt and scratches. Wipe off fingerprints, dust, or any other mark.

If the lens is very stained or scratched, measured values may not be accurate.

- (2) Make sure the values of S and C on the screen are both "0".
- (3) Place the right or left lens on the lens table.

. Place the lens with the convex surface facing up.
. Place the lens with the brows side of the frame facing toward you.



- (4) Use the lens positioning rule lever at the right side of the NL-30 to project the lens positioning rule until it touches the front bottom of the frame.

The NL-30 senses the pressure of the spectacles against the lens positioning rule and automatically displays **R** or **L** on the screen.

- (5) Align the lens.
- (6) Press the **M** switch. The measured values are stored.
- (7) Next, measure the other lens in the same way.
- (8) Press the **M** switch. The measured values of both the lenses have been stored.

To output the values to the printer, press the **PRINT** switch.

You may measure the right or left lens first.
The information of right and left is stored as an attribute of the lens, so it won't get mixed up.

To cancel the specification of the right or left, press the same switch once more.

5-2. Measuring a Framed Multifocal Lens

- (1) Place the distance part of the right or left lens on the lens table with the convex surface facing up and with the brows side of the frame facing toward you, and then align the lens.

Please note, as mentioned before, the center of the multifocal lens may not be aligned with the optical axis (-> P.19).


- (2) When the alignment is completed, press the A switch to store the data of the distance part.
- (3) Then push down the lens positioning rule lever to project the lens positioning rule. Move the reading segment of the lens onto the lens table and align it.
- (4) When the alignment for the reading segment is completed, press the M switch to store the data of the reading segment.


This returns the NL-30 to distance part mode or normal mode.

Next, measure the other lens.

When the measured values of both the lenses have been stored, press the PRINT switch to output the values to the printer.

When reading segment mode is entered, the marking indicator changes as follows to indicate an alignment condition.

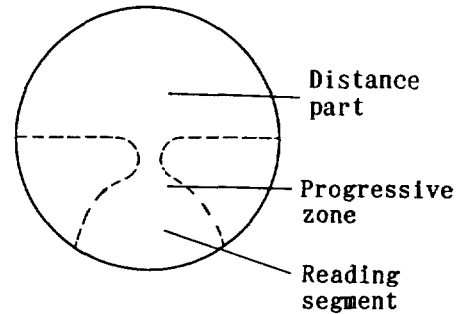
If the beam goes through completely within the distance part or reading segment of the lens, a double circle (see the figure) appears. 

If the beam goes across the distance part and reading segment or it misses the lens, a cross (see the figure) appears. 

In reading segment mode, align the lens by using these two marks (rather than the target).

6. MEASURING A PROGRESSIVE LENS

In principle, a progressive lens is measured in the same way as a multifocal lens. However, you can't see where the distance part and the reading segment are on the progressive lens. So it may be difficult to position the reading segment on a progressive lens within the measuring beam.



- (1) Place and align the distance part on the lens table. The distance part is easier to identify than the reading segment.

- . Single lens

Align the distance part by using the mark on the surface of lens imprinted at the lens factory.

- . Framed lens

The distance part is the half of the lens on the brows side.

Since a framed progressive lens may have a little prism power or since there may be a progressive-focal distortion around the center of the lens, it cannot be aligned by using the alignment mark on the display panel screen.

- . Vertical: Visually align a position about 5mm away from the center of the lens toward the brows side with the center of the lens table.
- . Horizontal: Align the lens so that the target on the screen is approximately centered.

When measuring a single lens, take care that the marked line on the distance part imprinted at the lens factory does not block off the measuring beam.

- (3) After aligning the distance part, press the A switch. The data of the distance part is stored.
- (4) Bring the reading segment onto the lens table and align it approximately.

. Single lens

Align the reading segment by using the mark on the surface of lens imprinted at the lens factory.

. Framed lens

Moving the lens toward you, look at the target on the screen.

Alignment mark when the progressive zone or the distance part is within the measuring beam:



Alignment mark when the progressive zone is out of the measuring beam:



↓

When the left alignment mark shown above appears, slowly move the lens toward you until the front bottom of the lens frame reaches the edge of the lens table.

↓

See the ADD value increasing on the screen as the lens is moved.

↓

Read the value of the reading segment after the ADD value increases.

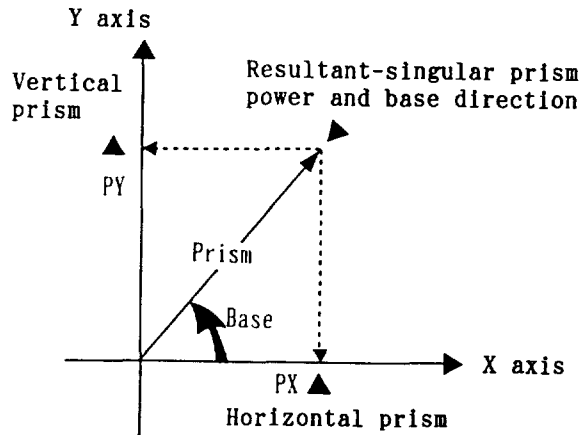
The measured value of a framed progressive lens may be less than the nominal value. This is caused because the near point on the lens was shaved when it was framed. Notice that the real power of the lens for spectacles wearer is the measured value rather than the nominal value.


7. MEASURING THE LENS WITH PRISM PRESCRIPTION

7-1. Measuring Prism Diopter



There are two prism diopter display form modes:

- (1) Horizontal and vertical prism powers
- (2) Resultant-singular prism power and base direction.



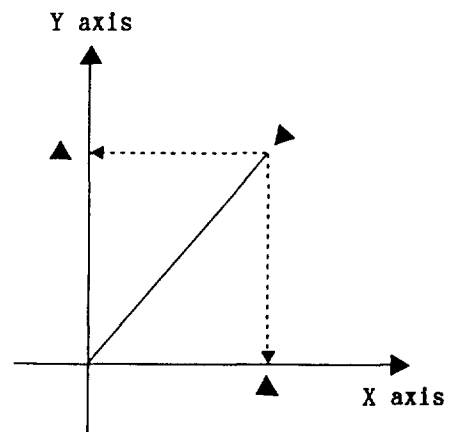
To select a prism diopter display form mode, first press switch 3 on the right of the icon  displayed in the initial screen (-> P.5). The third screen, the prism mode screen (-> P.6) appears.

The following are the switch function icons displayed in this screen and the functions of the corresponding switches.

Select a prism diopter display form mode. Press switch 1  or 2  (-> P.6). This selection is stored and is not canceled when the NL-30 is turned OFF.

Horizontal and vertical prism diopters

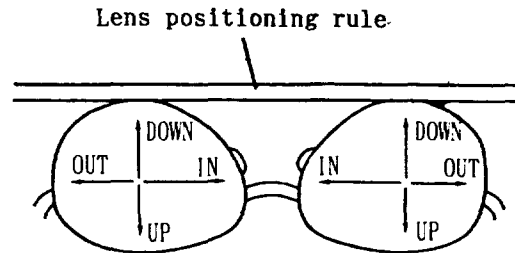
In horizontal and vertical prism diopter mode, a prism diopter is represented by rectangular coordinates. PX is the prism diopter horizontal to the lens positioning rule, and PY is the prism diopter vertical to the lens positioning rule.



For a single lens (without a right or left assignment), the direction is shown by the plus and minus signs. When a lens is defined as a right or left lens by the lens positioning rule or by pressing the switch 1 or 2, the directions are represented as follows:

Horizontal: IN and OUT
Vertical: UP and DOWN

IN and OUT are inverted for right and left.

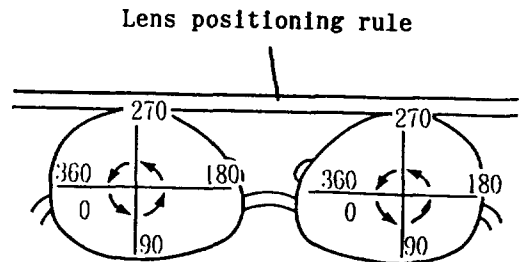
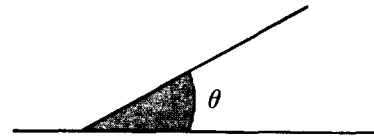


Prism power is measured in Δ units (prism diopter). Watch the prism diopter changing continuously on the screen while you move the lens until the desired prism diopter is reached. Do not use the target when measuring a lens with prism prescription because the target does not move according to the prism diopter.


Resultant-singular prism diopter

In resultant-singular prism power mode, prism power is represented by an absolute prism diopter and the base direction in polar coordinates. So the resultant-singular prism power is always 0 or a positive number; it must not be a negative number. The base direction is represented by an angle between 1° and 360° . (Since an angle is represented in the 360° mode, the prism power is not shown in 180° mode.)

Unlike the horizontal and vertical prism powers, the representation of the resultant-singular prism power for right and left lenses is common. The angle is measured always counterclockwise as the figure.



7-2. Measuring the Eccentric Distance

The NL-30 allows you to measure the eccentric distance from the optical center of a lens. Pressing switch 3  in the prism mode screen (-> P.6) displays the values of X and Y for the eccentric distances in millimeters in the prism display area.

These values are calculated from the diopter and prism power of the lens, so when you measure a lens of high aberration, the measured values will not be exactly equal to the actual distances. If the diopter of a lens is less than 1 dp, the eccentric distances are not calculated. In such a case, a question mark "?" appears in the screen. When you press switch 3 in the prism mode screen with a lens not placed on the lens table, a question mark "?" also appears. This is not a trouble of the instrument.)

To mark a lens accurately at the optical axis, mark the lens once and rotate it 180° using the eccentric distance values, then mark the lens once more. This allows alignment with a deviation of 1/10mm or less.

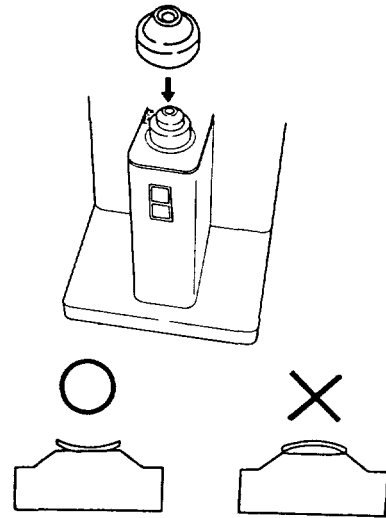
For a lens of low diopter or a for a cylindrical lens with zero spherical power, an eccentric distance also cannot be calculated because such a type of lens does not have the center. Notice that the eccentric distance values of these lenses are not displayed.

8. MEASURING THE CONTACT LENS



Since the beam of the NL-30 is smaller than those of conventional types of automatic lensmeter, the NL-30 can easily measure a contact lens, although the optical zone of contact lens is much smaller than that of a spectacle lens.

To measure a contact lens, use the contact lens holder. This holder has a concave lens seat to make it easier to align a contact lens.

- (1) Place the contact lens holder on the lens table.
- (2) Place a contact lens on the holder with the convex surface facing down.



8-1. Measuring a Hard Contact Lens

- (1) To measure a hard contact lens, first enter contact lens mode. Press switch 4  in the initial screen to move to the second screen. Press switch 1  in the second screen to enter hard contact lens mode. The hard contact lens mark "HARD CON." appears at the marking indicator in the screen.
- (2) Place the contact lens holder on the lens table. Fit the notch at the bottom of the contact lens holder to the projection of the lens holder to fix the holder. Now the NL-30 is ready to measure a hard contact lens.




- (3) Make sure the values of S and C on the screen are both "0" and place the hard contact lens on the lens holder with the convex surface facing down.
- (4) Align it until the target is at the center. When the alignment is completed, read the measured values.
- (5) If required, press the switch to print the data.

As in other lens modes, the measured values of a contact lens can be stored and right or left can be assigned. Press switch 1 or 2 on the hard contact lens mode screen to specify a right or left lens. This specification is used only as information included in the output.

For some types of contact lenses, the manufacturer's stamp on the lens may get into the measuring beam range. In such a case, an incorrect value may be displayed (a typical example is that the measured cylindrical power may be larger than the actual power). To correct this problem, slightly rotate the lens on the lens table and try again.

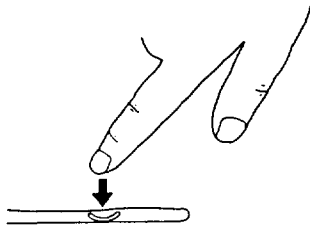
8-2. Measuring Soft Contact Lenses

Measuring a soft contact lens is basically the same as measuring a hard contact lens. To enter soft contact lens mode, press switch 3 in the hard contact lens mode screen.

When the initial screen is displayed, press the three switches , , and  in sequence. Use switch 3 to move between the hard contact lens mode screen and the soft contact lens mode screen. The soft contact lens mark "SOFT CON." appears at the marking indicator in the screen.

Since a soft contact lens is much wet, its water content should be partly absorbed before measurement.

- (1) Take the lens out of the solution.
- (2) Place it on a soft highly absorbent sheet of paper that does not produce fiber dust.
- (3) Fold the sheet of paper to cover the lens.
- (4) Pat the sheet of paper lightly with your finger a few times.
- (5) Take the lens out of the folded sheet of paper.



Then place the lens on the contact lens holder set on the lens table and align the lens.

Immediately read the measured values.

The most important thing is to complete the measurement before the soft contact lens dries. As soon as a soft contact lens is placed on the lens seat of the holder, moisture starts to decrease and accordingly the power of the lens changes. After the pre-treatment, align and measure the soft contact lens as quickly as possible. If it unexpectedly takes a long time to measure a soft contact lens, soak the lens again in physiological salt solution and start over once more.

When aligning a very thin soft contact lens, take great care not to wrinkle or distort it, otherwise accurate measurement cannot be done.

The NL-30 regards soft contact lenses as spherical surfaces and assumes that they do not have a cylindrical power. In fact, the cylindrical power of a soft contact lens varies depending on how it was placed on the contact lens holder because the lens is very flexible. Notice that the measured values for the cylindrical power and cylindrical axis power are always "0" in measuring soft contact lenses.



The methods of specifying the right or left lens and storing data for hard contact lenses also apply to soft contact lenses.

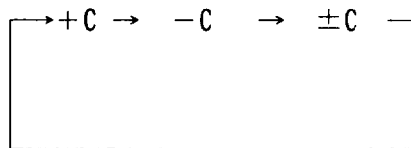
To return from hard or soft contact lens mode to normal mode (the initial screen), press switch 4 in each mode screen.

9. CYL DISPLAY FORM AND STEPS

9-1. Selecting CYL Display Form

When measuring an astigmatic lens, the cylindrical power can be displayed in a pre-selected form. A cylindrical power display form can be selected as follows. This selection can also be done during a measurement.

- (1) Press switch 4  in the initial screen to invoke the second screen shown in the left figure.
- (2) Pressing switch 2  cycles the +C25 at the lower left corner of the screen as follows:



The selected mode is retained after the NL-30 is turned OFF.

<Power transposition>

While measuring an astigmatic lens, invoking the second screen and pressing switch 2 converts the measured cylindrical power to another display form. Even a beginner, can certainly obtain the measured cylindrical power in the desired display form.

The power transposition is briefly described below:

- +C: Converts the cylindrical power to a positive component.
- C: Converts the cylindrical power to a negative component.
- +C: Add the same sign as that of the spherical power before the cylindrical power.

For example, the measured powers of the three lenses A through C change as follows, as the display mode changes from +C through +C.

Example 1

+C		-C		<u>+C</u>
S +4.00		S +5.00		S +4.00
C +1.00	→	C -1.00	→	C +1.00
AXIS 30		AXIS 120		AXIS 30

Example 2


+C		-C		<u>+C</u>
S -3.00		S -2.75		S -2.75
C +0.25	→	C -0.25	→	C -0.25
AXIS 150		AXIS 60		AXIS 60

Example 3

+C		-C		<u>+C</u>
S -1.00		S +0.50		S +0.50
C +1.50	→	C -1.50	→	C -1.50
AXIS 45		AXIS 135		AXIS 135

The NL-30 displays the cylindrical power of a mixed lens in the -C sign even if the +C mode is selected.

9-2. Selecting Display Steps

The NL-30 displays the values of diopter and prism power in the unit of 0.12 or 0.25. Pressing switch 3  in the second screen toggles the unit between 0.12 and 0.25. The selected unit is displayed at the lower left corner of the screen. This selection is retained after the NL-30 is turned OFF.

10. AUTOMATIC POWER SAVING

If a lens is not measured for about 5 minutes, the NL-30 automatically turns off the display and pauses. This feature is called automatic power saving. It turns off the display and the display back light and waits for you to reactivate the NL-30. Only the pilot LED remains on.

There are two ways to reactivate the NL-30.

- (1) The first is to turn OFF the NL-30 and turn it ON again.
- (2) A better, faster way is to press any switch, which immediately activates the NL-30 and sets it ready to measure a lens.

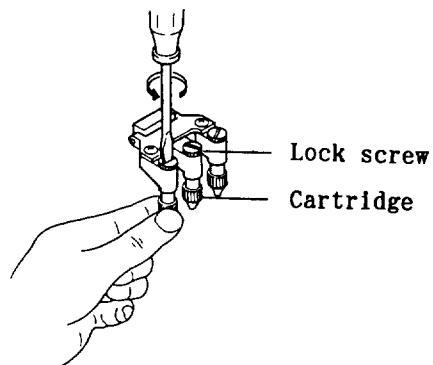
In either method, do not place a lens on the lens table during the reactivation.

The automatic power saving is very helpful. The NL-30 is ready to use but is not wasting electricity or wearing itself out.

11. MAINTENANCE

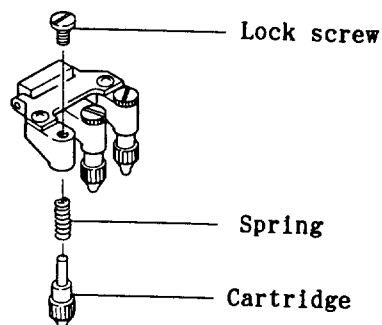
11-1. Marker

Replace the marker cartridge, when the stamping rubber at the tip of the marker is damaged or the ink is all gone.



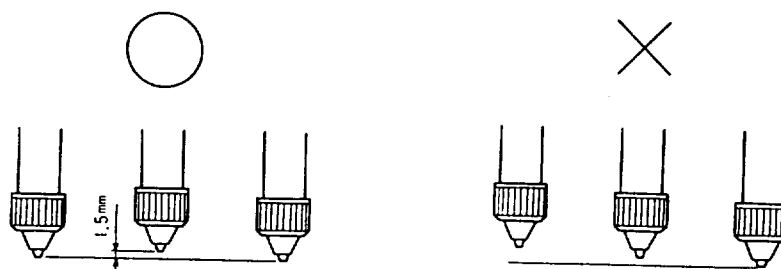
- (1) Hold the end of the cartridge with your fingers and remove the lock screw with a flat-head screwdriver to pull out the cartridge.

Take care because the spring inside may push the cartridge out.



Store the spring and lock screw in a safe place for later use.

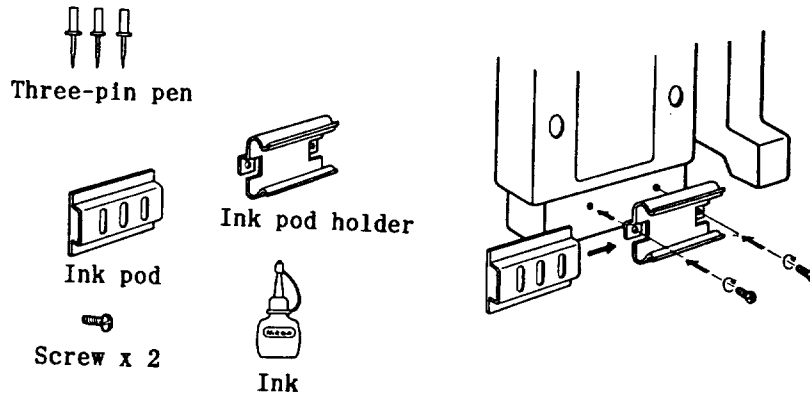
- (2) To install a new cartridge, install the spring, insert the cartridge into the holder, and tighten the lock screw.



(A) Correct cartridge positions (B) Bad cartridge positions

The optional three-pin pen and ink pod are available for use of dip pens.

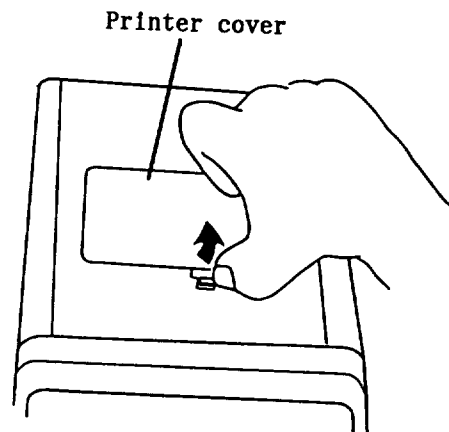
- Insert the three pins into the holders instead of the cartridges.
- To set the ink pod, remove the black screws as the figure below and instead install the ink pod holder with the screws provided.



11-2. Replacing the Printer Paper Roll

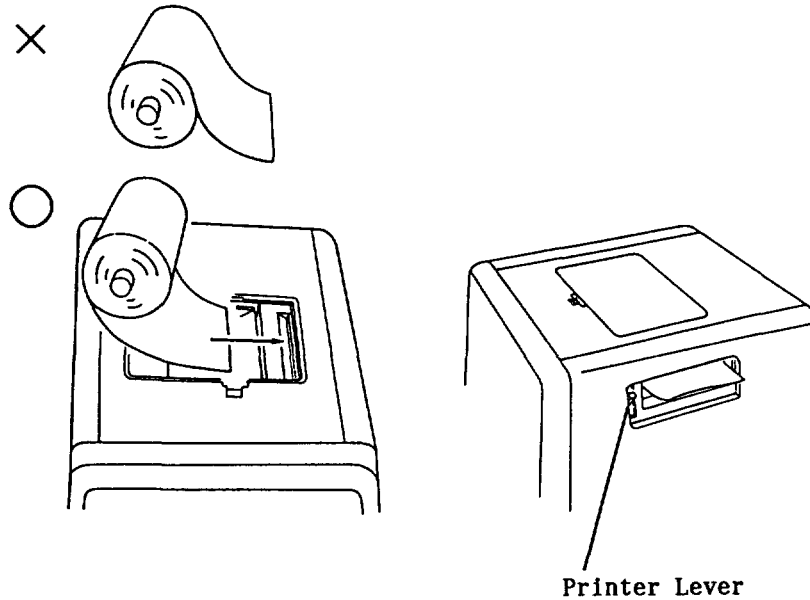
When print paper has run out, pressing the **PRINT** switch displays the error message for no paper, and printing does not take place. Replace the paper roll.

- (1) Push the click lock on the printer cover backward and lift and remove the cover.
- (2) Take out the paper roll core.
- (3) Pull the printer core rod out of the paper roll core.
- (4) Insert the printer core rod into the new paper roll core.
- (5) Remove the tape fixing the end of the paper.



- (6) Insert the paper roll end in the paper slot in the direction of arrow shown in the figure below.

Only one side of the paper is heat sensitive; printing is not possible on the wrong side of the paper.



- (7) Set the printer lever down to retract the heat-sensitive head.
- (8) Bring the end of the paper outside through the paper exit and push up the printer lever.
- (9) Push the paper roll into the paper roll housing.
- (10) Place the printer cover.

Use only the specified paper roll.

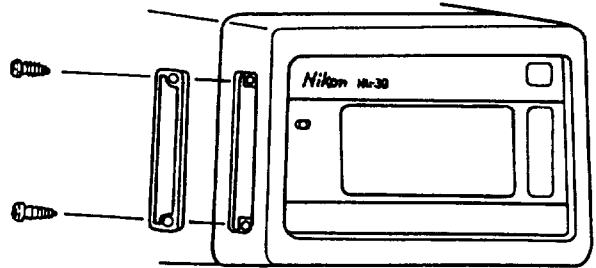
11-3. LCD Panel

The NL-30 uses an LCD panel with a back light. As the panel gets older it will become dim and blurred. Place a new order of "NL-30 LCD Panel" to your dealer.

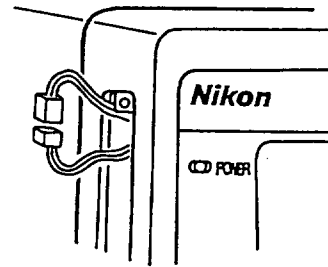
Replacement Procedure

Before replacing, turn OFF the power switch.

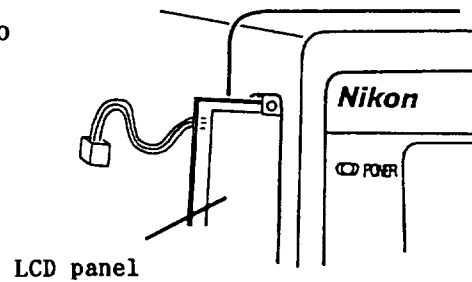
- (1) Remove the two screws from the left side of the display panel with a Phillips screwdriver. Slowly turn the screwdriver taking care not to damage the head of the screws. Remove the cover.



- (2) Draw out and disconnect the connectors.



- (3) Pull out the LCD panel to the left.



- (4) Check that the new LCD panel is clean and insert it into the slot until it comes to end.
- (5) Connect the connectors and put them into the slot.
- (6) Install the cover and carefully tighten the screws.

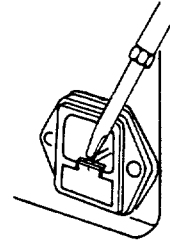
11-4. Fuse

Check for blown fuses if both of the following symptoms appears when the main switch on the main unit is set to ON (a fuse may have been blown off):

- The pilot lamp will not turn on.
- No measurement screen appears.

If the pilot lamp is lit but no measurement screen is seen, it indicates that no fuse is blown off. More likely, display contrast may be inadequate (-> P.13).

- (1) Unplug the power cord. Set the main switch to the OFF side (marked ○).
- (2) Insert the tip of a small screwdriver in the slot of upper edge of the fuse box located on the rear plate of the main unit, and take it out.



- (3) Remove the fuses from the fuse box.
- (4) Insert new fuses.
Ratings : T1A F250V x 2
- (5) Align the keys on the fuse box with the keyways in the main unit and insert the fuse box.

12. SPECIFICATIONS

Spherical (S) power:	$S \pm 30D$ (0.12D or 0.25D increments)
Cylindrical (C) power:	$C \pm 12D$ (S + C; less than 40D) (0.12 or 0.25D increments)
Axis (Ax):	0-180° (1° increment)
Prismatic (P) (Synthetic prism)	3-way indication: Up/down In/Out (Px-Py), R-θ, Distance mm Horizontal: 1-10 Δ (0.12 or 0.25 Δ increments) Vertical: 1-10 Δ Vector: 1-10 Δ Base: 1-360° (1° increment)
Decentering	160 mm (horizontal) 160 mm (vertical)
Addition	+0 to +10D (0.12 or 0.25 increments)
R/L indication	Automatic by touch sensor
Optical beam diameter	3 mm
Light source	Red LEDs (x4) (660 nm)
Transmission factor (lens to be measured)	10% or more (at 660 nm beam)
Measurement time	Within 0.2 sec.
Interface	RS-232C (x1)
Data memory	200 sets
Display	Non-glare-LCD display with back light
Alignment	[OK] position for alignment and [OK] position for marking appear on the display.
Contact lens	Hard lens mode/Soft lens mode
Progressive lens	Continuous reading
Lens diameter	4-100 mm

Printer	Thermal printing method
Paper width	60 mm
Printing speed	15 lines/sec.
Density	6 dots/mm
Interface	RS-232C (x1)
Power source	AC 110-240V, 50/60 Hz
Power consumption	50 VA
Dimensions (mm)	243 (W) x 268 (D) x 464 (H)
Weight	9 kg