Reichert
Ophthalmic Instruments

INSTRUCTION MANUAL

XPERT™ NCT™ *PLUS*

Advanced Logic Tonometer



A Division of Leica

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XCEL	XPERT	

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1. Carefully go through the packing materials to be sure nothing was inadvertently overlooked when the unit was unpacked.
2. Call the dealer you purchased the product from and report the shortage. The materials are packed at the factory and none should be missing if the box has never been opened.
3. Claims should be filed within 30 days.

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Our shipping responsibility ceases with the safe delivery in good condition to the transportation company. Claims for loss or damage in transit should be made promptly and directly to the transportation company.

If, upon delivery, the outside of the packing case shows evidence of rough handling or damage, the transportation company's agent should be requested to make a "Received in Bad Order" notation on the delivery receipt. If within 48 hours of delivery, concealed damage is noted upon unpacking the shipment and no exterior evidence of rough handling is apparent, the transportation company should be requested to make out a "Bad Order" report. This procedure is necessary in order for the dealer to maintain the right of recovery from the carrier.

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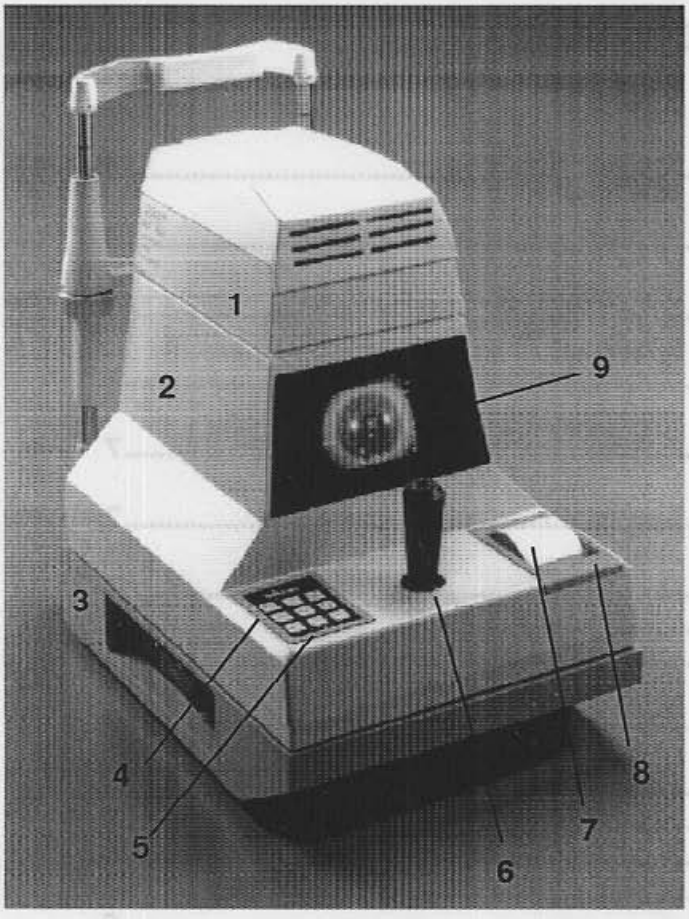

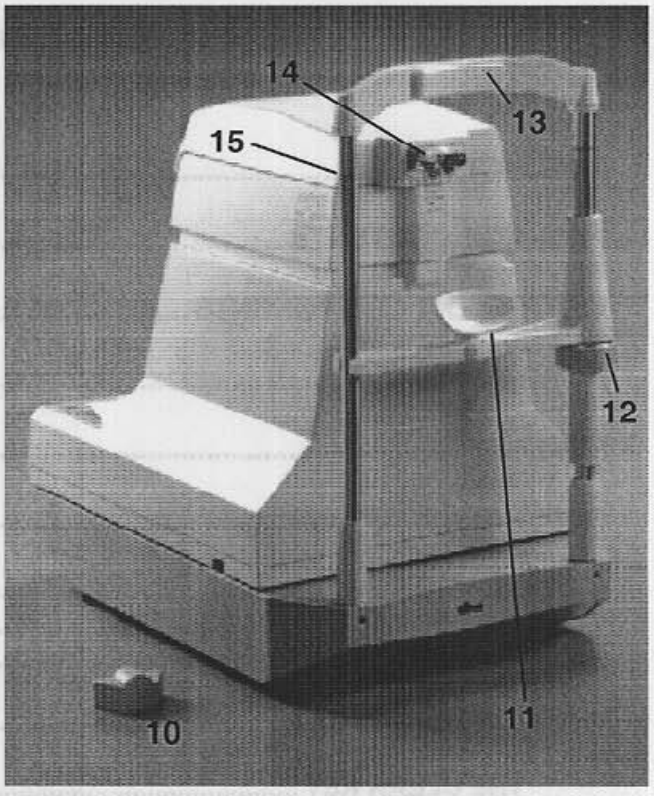

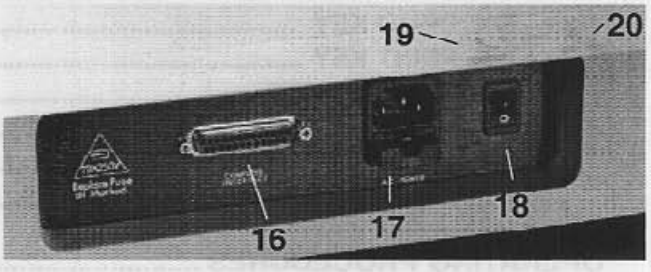

PRODUCT

This manual should be used in reference to the Reichert XPERT™ NCT™ *PLUS* Advanced Logic Tonometer Model 12450.

PACKAGE CONTENTS

Contents of the shipping container should include the following:

- 1 XPERT NCT *PLUS* Advanced Logic Tonometer
- 1 Power Cord
- 5 Rolls of Printer Paper (Boxed)
- 1 Dust Cover
- 1 Instruction Manual

INSTRUMENT COMPONENTS

1. Camera Section
2. Control Section
3. Base Section
4. Control Panel
5. Power Indicator Light
6. Joystick
7. Printer
8. Printer Cover
9. Video Monitor
10. Objective Cover
11. Chin Cup
12. Chin Rest Elevation Ring
13. Forehead Rest
14. Objective
15. Canthus Marker
16. Computer Interface
17. AC Power Inlet
18. Power Switch
19. Contrast Control
20. Brightness Control

INTRODUCTION

The XPERT NCT *PLUS* Advanced Logic Tonometer is designed to provide the control and flexibility required in clinical practice.

The XPERT NCT *PLUS*' video monitor and unique three dimensional XPERT Alignment System™ allow the objective measurement of intraocular pressure (IOP) quicker and easier than ever before.

For added convenience and flexibility, the XPERT NCT *PLUS* features help screens, automatic data averaging and analysis, as well as selective data deletion. Furthermore, the instrument is equipped with a computer interface and printer to accommodate various record-keeping methods.

SYSTEMS

The XPERT NCT *PLUS* utilizes two infrared (IR) optoelectronic systems (OES). The first OES monitors the instrument's position relative to the eye. The alignment status is then translated and displayed as cursors superimposed on a video image of the patient's eye.

The second OES monitors IR light reflected from the cornea to determine when applanation occurs.

These systems are integrated by a microprocessor. When proper alignment is achieved and the instrument is in the automatic mode, the microprocessor activates an electro/mechanical air pump which produces and directs an air pulse toward the patient's eye. In the manual mode, this process is initiated by pressing the black button on the joystick.

When applanation is detected, the system discontinues the air pulse. The force used to achieve applanation is measured and the correlating IOP (in mmHg) is displayed on the monitor.

CONTRAINDICATIONS

Use of the XPERT NCT *PLUS* is contraindicated in instances of:

A. Edematous/ulcerated cornea
B. Following keratoplasty
C. Following penetrating trauma

INSTALLATION

INSTRUMENT STAND

1. Check to see that the power switch (18) is in the "OFF" position and carefully lay the XPERT NCT *PLUS* on its side.
2. Attach the adapter (12418) to the tonometer base plate with the three screws provided (See Figure 1).
3. Insert the adapter post into the mounting hole in the arm of the stand.
4. Turn the knob on the instrument arm until post is stable. Instrument should swivel freely.
5. Plug the power cord into the base of the instrument and the arm receptacle.

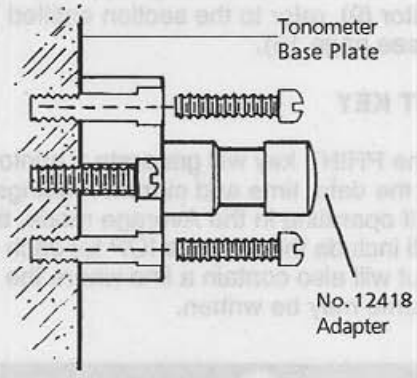

Figure 1

TONOMETER TABLE

1. Check to see that the power switch (18) is in the "OFF" position. Position the XPERT NCT *PLUS* on the middle of the table so the video screen is over the single leg.
2. Align the holes in the XPERT NCT *PLUS*' base plate with the two holes in the table.
3. Feed the screws supplied with the table from the underside of the table into the base plate of the instrument (See Figure 2).
4. Tighten screws so the instrument is secure, but do not over tighten.

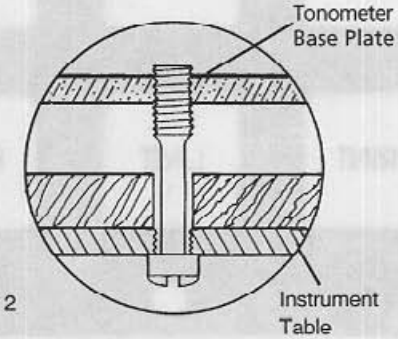

Figure 2

THE CONTROL PANEL

The XPERT NCT *PLUS* features a multi-function control panel (See Figure 3) which is described below.

THE CLEAR KEY

This key clears all readings.

THE DEMO KEY

When the DEMO key is pressed, a demonstration of the air puff is initiated.

Each time the instrument is demonstrated, an internal check is conducted. If a message appears on the video monitor (9), refer to the section entitled Trouble Shooting (see page 15).

THE PRINT KEY

Pressing the PRINT key will generate a printout containing the date, time and current readings for each eye. If operating in the Average mode, the printout will include the average IOP for each eye. The printout will also contain a line where the patient's name may be written.

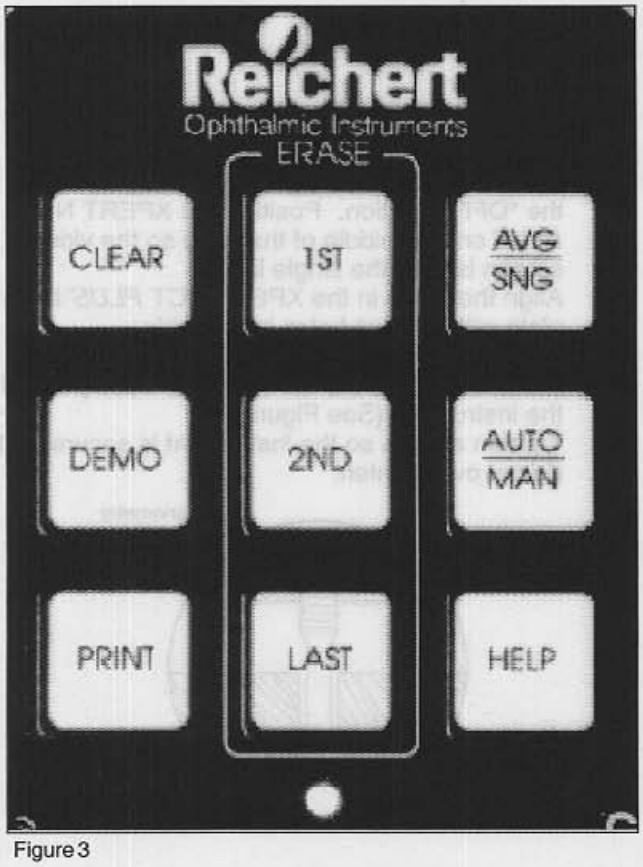

Figure 3

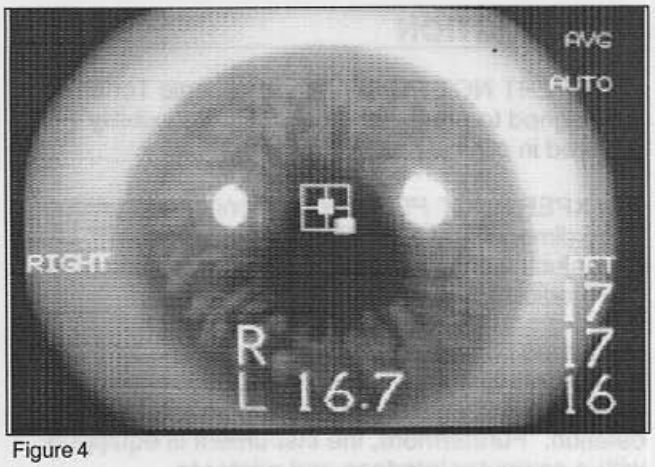

Figure 4

Note: Pressing the PRINT key clears all readings from both the monitor and the XPERT NCT *PLUS* memory.

For automated practices, measurement data is sent concurrently to the XPERT NCT *PLUS* computer interface in ASCII, a format compatible with most computer software packages.

THE AVG/SNG KEY

The XPERT NCT *PLUS* provides the option of taking single readings or an average of up to three readings. To select the desired mode, press the AVG/SNG key. The selected mode will appear on the video monitor (See Figure 4). When the power is turned on, the Average mode is automatically selected.

Note: Switching from one mode to the other erases all previous readings.

I. The Average Mode

The Average mode allows up to 3 readings for each eye to be collected and displayed on the video monitor. The average of the readings, displayed to one decimal place, will appear at the bottom center of the monitor (See Figure 4).

The XPERT NCT *PLUS* allows for one or more of the readings to be erased (See ERASE KEYS in this section and the section entitled FLYERS).

II. The Single Mode

In the Single mode, individual measurements are displayed and each successive measurement replaces the previous one. Therefore, readings are not accumulated and no average will appear.

THE AUTO/MAN KEY

The XPERT NCT *PLUS* can be operated in either the Automatic or Manual mode. To select the desired mode, press the AUTO/MAN key. The selected mode will appear on the video monitor (See Figure 4). When the power is turned on, the Automatic mode is initiated.

I. The Automatic Mode

In the Automatic mode, the XPERT NCT *PLUS* automatically takes a measurement when proper alignment is reached.

II. The Manual Mode

To collect a reading in the Manual mode, press the black button on the joystick (6) when the alignment target begins to blink, indicating proper alignment.

For patients whose corneal condition precludes measurement in the Automatic mode, measurement may be possible in the Manual mode.

In the Manual mode, a measurement can be taken even if the alignment criteria are not met. Since measurement errors may result from misalignment, operation in the Automatic mode is recommended whenever possible.

THE ERASE KEYS

The XPERT NCT *PLUS* makes it easy to delete and replace readings in both the average and the single reading modes. A reading can be deleted in two ways:

First, the XPERT NCT *PLUS* allows for automatic erasure of readings. If a fourth reading is taken, this will automatically replace (1), a low confidence reading marked by an asterisk, or (2), the first reading from the group being averaged. The average is automatically updated as readings are replaced.

Second, by pressing one of the three ERASE keys; 1ST, 2ND or LAST.

In the Average mode, the ERASE keys allow the convenient substitution of readings. An irrelevant reading (See section entitled FLYERS) can be erased, replaced with another measurement and incorporated into the average.

To delete a reading, press the appropriate ERASE key. 1ST will delete the first reading taken on the current eye. 2ND deletes the second reading and LAST will delete the last reading, regardless of the number of readings appearing on the monitor.

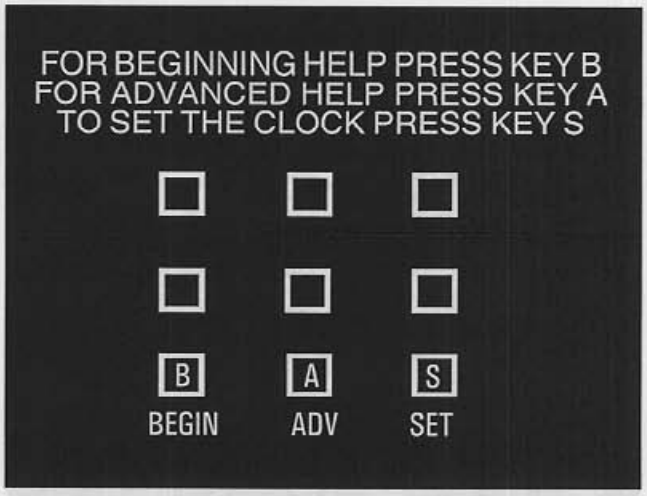

Figure 5

THE HELP KEY

The HELP key provides access to many user-friendly programs. These programs provide important information on the operation of the XPERT NCT *PLUS* and can be used to provide quick reference at any point during operation. These programs include Beginning Help, Advanced Help, and Setting Date and Time.

To select a program press the HELP key. Three choices will appear on the monitor: "BEGINNING HELP," "ADVANCED HELP" and "SET CLOCK" (See Figure 5). To enter a program, press the key on the control panel corresponding to the program desired.

I. Beginning Help

Press the key represented on the video monitor by "BEGIN" to view step-by-step operating instructions.

To page forward or backward through the help screens, press the key represented on the video monitor with the label "PRINT:Prev" or "LAST:Next." To exit Beginning Help, press the key represented on the video monitor by the label "HELP:Done."

II. Advanced Help

For descriptions of the control panel functions, instrument features and troubleshooting, press the key represented on the video monitor as "ADV."

To page forward or backward through the help screens, press the key represented on the video monitor by the label "PRINT:Prev" or "LAST:Next." To exit the Advanced Help mode, press the key represented on the video monitor by the label "HELP:Done."

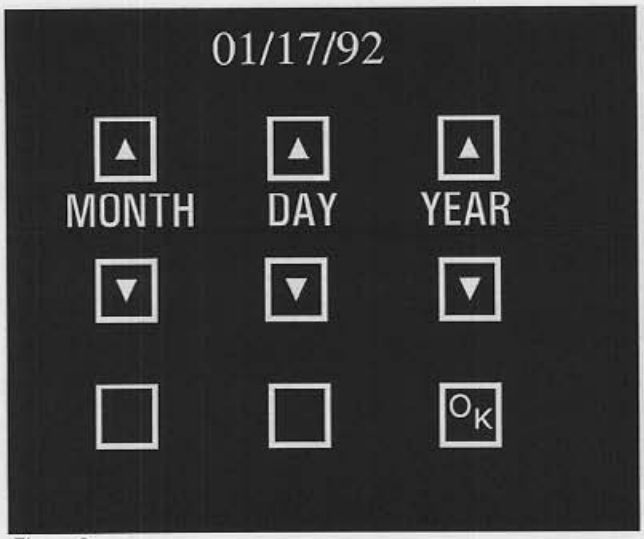

Figure 6

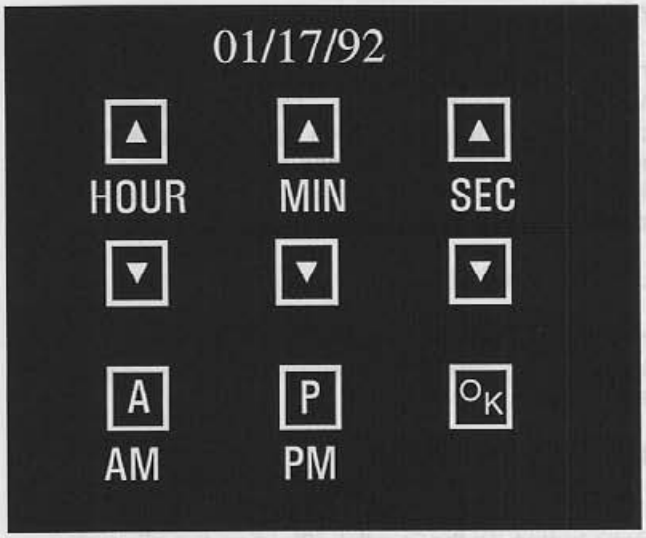

Figure 7

III. Set Date and Time

For user convenience, the XPERT NCT *PLUS* automatically adjusts the date for leap years. The time, however, must be reset to accommodate seasonal time changes and/or time zones.

To set the clock/calendar:

1. After pressing the HELP key, select the key represented on the video monitor by the label "SET."
2. The first screen to appear is the Set Calendar screen. Nine squares, representing the XPERT NCT *PLUS'* control panel, will appear on the video monitor (See Figure 6). Seven of the squares represent the functions needed to change the calendar.
3. Set the calendar by pressing the function key representing the setting to be changed.

For example, to advance the month, press the key represented on the monitor by an upward pointing arrow over the word "MONTH." Repeat the same procedure to set the day and year.

4. When the calendar is set properly, press the key represented on the video monitor by the label "OK."
5. A second screen with nine squares will appear indicating the function keys needed to set the clock (See Figure 7).
6. Press the key representing the function to be changed as described above.
7. When the time is set properly, press the key represented on the video monitor by "A" (for AM) or "P" (for PM) to set the time of day.
8. When the correct time is displayed, press the key represented on the video monitor by the label "OK" to return to normal operation.

Note: The calendar operates in the month/day/year format. The clock operates in the 12 hour AM/PM format.

OPERATING PROCEDURES

INSTRUMENT PREPARATION

The following steps should be taken prior to operation of the XPERT NCT *PLUS*.

1. Remove the objective cover (10).
2. Turn the instrument on by pressing the power switch (18). Note that the power indicator light (5) is lit.
3. Read the text which appears on the screen.
4. Press any key to begin normal operation.

Each time the XPERT NCT *PLUS* is turned on, an internal check is initiated. After a few seconds, the message "SYSTEM CHECK OK - PRESS ANY KEY TO CONTINUE" will appear on the video monitor (9). If any other message appears, refer to the Trouble Shooting section on page 15 of this manual. When the XPERT NCT *PLUS* is switched on, it will be set to operate in the Automatic and AVG mode. To select the Manual mode, press the AUTO/MAN key. The

message "MAN" will appear on the video monitor (See Figure 8). To select the Single mode, press the AVG/SNG key. The message "SNG" will appear on the monitor (See Figure 8).

To extend the video monitor's life , the screen will go blank if no measurements are taken within five minutes. To resume normal operation, press any key on the control panel or the black button on the joystick (6).

5. Familiarize yourself with the joystick's operation. Twisting the joystick left or right engages the electronic elevation system which moves the camera section up or down. Movement of the camera section left, right, forward or backward is accomplished by moving the joystick in the desired direction.

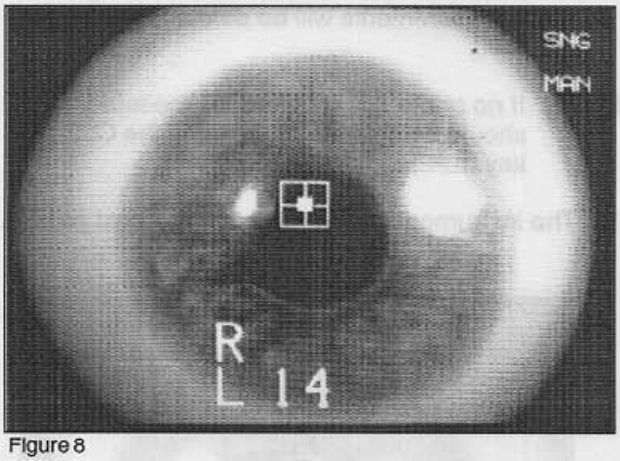

Figure 8

INSTRUMENT DEMONSTRATION

To allow an interested patient to experience the sound and sensation of an air "puff", have the patient place a finger approximately 1/4 inch in front of the objective (15). Press the DEMO key located on the control panel to demonstrate the air puff on the patient's finger (See DEMO KEY in the CONTROL PANEL section). Wait four (4) seconds between demo firings.

PATIENT ALIGNMENT

The collection of accurate/reliable IOP data requires that the patient be positioned comfortably.

1. Position the patient comfortably in front of the instrument. Check to see that the objective is at eye level with the patient, adjusting table height if necessary.
2. Check that the XPERT NCT *PLUS* is positioned as far back from the patient as possible.
3. Place the patient's chin in the chin cup (12). Check to ensure that the patient's forehead is centered and placed firmly against the forehead rest (14).
4. Using the chin rest elevation ring (13), raise or lower the chin cup so the patient's outer canthus is aligned with the canthus marker (16).

INSTRUMENT ALIGNMENT AND OPERATION

1. Ensure the XPERT NCT *PLUS* is in the desired mode for operation and collection of measurements.
2. Instruct the patient to fixate on the green light which is viewed through the objective.
3. Move the instrument forward until the image of the patient's eye appears on the monitor.

Note: If the image of the eye appears too dark or too light, adjust the brightness and contrast controls located under the left side of the instrument.

4. Center the alignment target (see Figure 9) on the pupil using the joystick. Twisting the joystick to the right electronically raises the instrument head, twisting to the left lowers the head

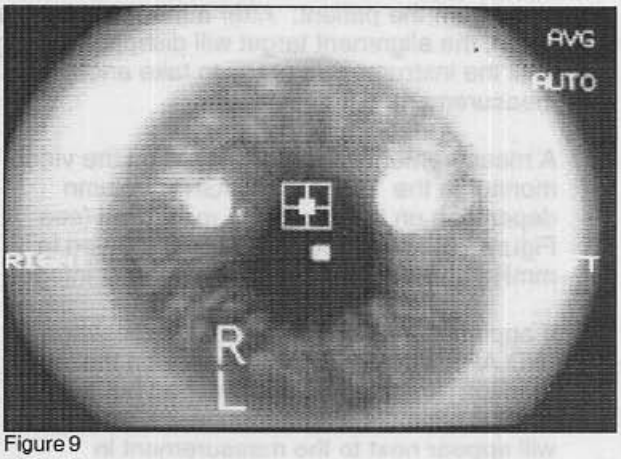

Figure 9

5. Slowly move the instrument toward the patient until the flashing alignment cursor appears. The cursor is a square box shape. At this point the automatic elevation control system in the instrument engages. (Twisting the joystick will not effect the elevation at this point).
6. To refine the alignment, move the cursor box until it is centered on the alignment target.

a. To move the cursor box horizontally, move joystick to the left or right.
b. To move the cursor vertically, move the joystick backwards or forwards.

NOTE: The instrument automatically adjusts the vertical position of the instrument head.

If the instrument is too close to the eye, the cursor box will be positioned above the alignment target. If the instrument continues to move toward the patient's eye, the warning message, "TOO CLOSE" will appear on the monitor (see Figure 11) and a beeping sound will be heard if the audible "TOO CLOSE" indicator has been activated. See Section on "TOO CLOSE" INDICATION. Pull the joystick back to move the instrument away from the patient.

7. The instrument is correctly aligned for measurement when the cursor is centered on the alignment target. The instrument will now collect a reading

   In manual mode, the alignment target will blink, indicating correct alignment. Press the black button on the joystick to initiate the measurement process.

8. Pull the joystick back to move the instrument away from the patient. After a measurement is taken, the alignment target will disappear briefly until the instrument is ready to take another measurement.

   A measurement will be displayed on the video monitor in the "LEFT" or "RIGHT" column depending on the eye being measured (see Figure 10). Measurements are displayed in mmHg and are rounded to the nearest integer.

   If applanation is not detected, the message "NO APPLANATION" will appear on the video monitor. If applanation is reached but the measurement is of low confidence, an asterisk will appear next to the measurement in question. (See Section entitled LOW CONFIDENCE READINGS.)

9. In the Average mode, repeat steps 3 through 8 until three readings are collected.

10. Position the XPERT NCT *PLUS* in front of the patient's other eye and repeat steps 1 through 9.

11. Press the PRINT key to obtain a copy of the measurements displayed on the video monitor,

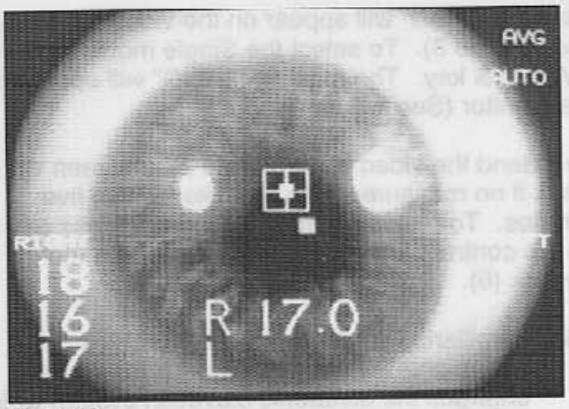

Figure 10

or to send data to the computer interface. The video monitor will go blank and display "PRINTING" while this function is being utilized. All measurements will be deleted after being printed.

NOTE: If no printout is required, all measurements should be deleted by pressing the CLEAR key.

12. The instrument is now ready for the next patient.

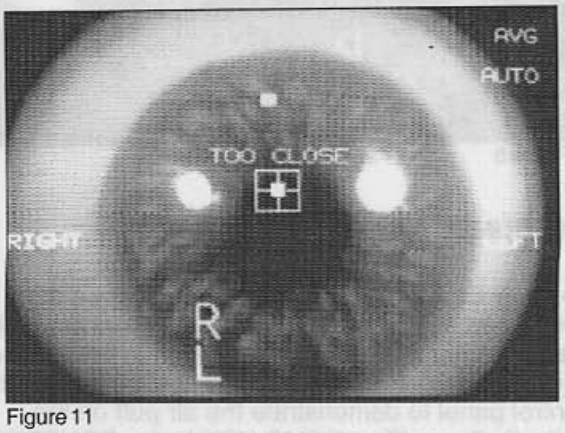

Figure 11

"TOO CLOSE" INDICATOR

XPERT NCT *PLUS* has a visual and audible "TOO CLOSE" indicator which allows the operator to know when they are too close to the patient's cornea. The visual indication is displayed as a message "TOO CLOSE" on the video monitor (see Figure 11).

The audible indicator is a beeping sound. This feature can be activated by holding the "LAST" key down while turning the instrument on. To deactivate the beeper, hold the "HELP" key down and turn the instrument on.

FLYERS

XPERT NCT *PLUS* measurements are made in a few milliseconds and occur at random, relative to the ocular pulse. Therefore, normal measurement fluctuations of 2 to 4mmHg should be anticipated due to the cardiac-related pulse amplitude. When a series of successive measurements are taken on a given eye, one or more readings may appear to be erroneously high due to involuntary reflexes such as blinking.

An example is illustrated below:

IOP Readings (mmHG):

16, 24, 14

The reading 24 in this example is a disparate reading. Although each reading may be an accurate IOP determination for the instant of measurement, a grand average computed for this sequence of readings would be erroneously high.

The disparate reading should be deleted and replaced (See ERASE KEYS in the CONTROL PANEL section).

LOW CONFIDENCE READINGS

An untimely blink of the eye can result in measurements which do not meet the XPERT NCT *PLUS'* criteria. These measurements are highlighted with an asterisk on the video monitor. If the reading is printed, the asterisk will appear on the printout as well. These "low confidence" measurements can be deleted and replaced (See ERASE KEYS in the CONTROL PANEL section).

ATMOSPHERIC PRESSURE

The XPERT NCT *PLUS* compensates for departures from standard sea level atmospheric pressure whether due to change in weather or altitude.

SAFETY

Design considerations and recommended dust protection measures virtually eliminate the possibility of a foreign particle being propelled by the air pulse (See section entitled MAINTENANCE). As a precaution, it is recommended that the instrument be discharged at least once (See DEMO KEY in the CONTROL PANEL section) following a long period of non-use.

MAINTENANCE

PRINTER PAPER

A colored stripe will appear when nearing the end of the roll. To replace the paper (See Figure 12):

1. Turn the XPERT NCT *PLUS* off. When the instrument is turned off, all measurements will be deleted. Therefore, it is recommended that the paper be replaced after completing the measurement process of one patient and before going on to the next patient.
2. Lift off the printer cover. Note the threading diagram on the underside of the cover.
3. Remove the old paper roll and keep the white plastic spindle.
4. Insert spindle into a new roll and cut or tear end of roll into a point.
5. Feed paper into slot and push through until paper exits at top slot.
6. Drop the roll into the printer and replace the top cover.

NOTE: Should the paper ever jam, you can remove the cutter bar and press the feed switch to unjam.

Use only Reichert thermal paper, available at your nearest Reichert Ophthalmic Instruments Dealer.

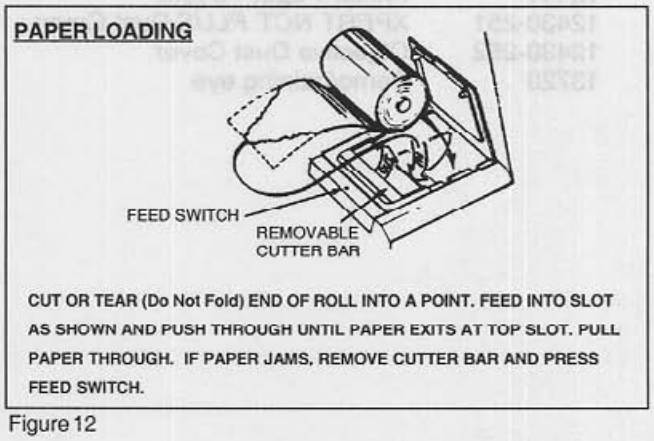

Figure 12

DUST COVER

When use of the instrument is not anticipated for a period of several hours, power should be turned off and the dust cover used.

CHIN CUP

May be wiped clean with water or alcohol.

FOREHEAD REST

May be wiped clean with water or alcohol.

OBJECTIVE

The exposed plastic front surface of the objective must be kept free of dust, fingerprints, tear stains, and mascara. At least once a week this surface should be cleaned using a dry cotton swab or soft, lint-free cloth.

To protect the objective against damage or dirt, be sure to cover the objective with the objective cover when transporting.

NOTE: Do not use any cleaning liquids or alcohol to clean objective as this can cause damage to the coatings on the surface of the objective.



ACCESSORY/PART NUMBERS

12440	Printer Paper - 100 rolls
12441	Printer Paper - 5 rolls
12430-251	XPERT NCT *PLUS* Dust Cover
12430-252	Objective Dust Cover
13720	Demo/training eye

OTHER REICHERT PRODUCTS

To complement your Reichert XPERT NCT *PLUS* Advanced Logic Tonometer, we invite you to take a look at the other products* made by Reichert Ophthalmic Instruments:

Keratometer
LensChek Advanced Logic Lensometer
LongLife Project-O-Chart
Monocular Indirect Ophthalmoscope
Non-Contact Tonometer (NCT) II
Prelude Applanation Tonometer
Premier Auto Recline Chair and Stand
Premier Custom Chair and Stand
Premier Manual Recline Chair and Stand
Premier Console
Selectra Project-O-Chart
Standard Project-O-Chart
Ultramatic RxMaster Phoroptor Refracting Instrument
Vertometer
XCEL Slit Lamps

* See Reichert Brand Names/Trademarks/ Tradenames for a list of trademarked names.

ISO 9001 CERTIFIED

Reichert products are designed and manufactured under quality processs meeting ISO 9001 requirements

TROUBLE SHOOTING

SYMPTOM	POSSIBLE CAUSE AND REMEDY
Power indicator not lit	Power switch is not turned on. Switch is located on left side of base. Should be in the up position, press indicator to turn on. Power cord not attached. Ensure power cord is firmly connected to the instrument and to a working power outlet. If the above remedies do not help, the internal fuse may have blown. It is NOT a user replaceable fuse. Contact your dealer for service. There are NO USER SERVICEABLE PARTS in the XPERT NCT *PLUS*.
No video image, power indicator lit	The brightness control is too low. Turn brightness control until image appears. Unit is in "SLEEP" mode. Press any key or the black button on the joystick to reactivate.
Text appears on video monitor but no eye image	Remove objective cover. The contrast control is too low. Turn CONTRAST control until image appears. No image will appear unless an object is in front of objective. Place hand in front of objective to reflect light.
No average is displayed	Unit is in Single Mode. Press AVG/SNG key on control panel to activate Average mode.
Instrument does not discharge when properly aligned	Unit is in Manual mode. Press AUTO/MAN key on control panel to activate Automatic mode.
No print out when "PRINT" key is pressed, video monitor reads "CHECK PRINTER"	Paper roll is depleted. Insert new paper roll as per instructions.
Video monitor reads "UNIT FAILS SYSTEM CHECK NEEDS SERVICE" when "DEMO" key is pressed	Unit is out of calibration. Readings can still be taken but accuracy is unknown. Have instrument serviced.
Time and/or Date is wrong on print out	Set the clock/calendar as per instructions.
"UNIT FAILS SYSTEM CHECK - NEEDS SERVICE" appears on screen when unit is turned on	The XPERT NCT *PLUS* performs several internal checks to insure that all of its systems are working. When this message appears, some component of the unit has failed. The instrument will still operate but accuracy is unknown. Have instrument serviced.
"DATE/TIME MAY BE INCORRECT" appears on the video monitor when unit is first turned on	Set the clock as per instructions. If message reappears the next time the instrument is turned on, the battery may need to be replaced. Have instrument serviced.
In the Automatic mode, the message "NO APPLANATION" or the asterisk appears repeatedly	Clean the objective. Have instrument serviced.
Retrace lines appear on video monitor (diagonal lines on screen)	Adjust brightness and contrast.

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12450-101 Rev. A 12/94 P P

Printed in U.S.A..