
CAS Ophthalmic A Scan

(CAS-2000A Touch screen)

Operation

Instruction

Prologue

Thanks

Thank you very much for choosing CAS-2000A Scan manufactured by our company.

For your security and benefit, please read the <Operation Instruction> as well as all the datum of the instrument carefully before using it.

Product Name: CAS Ophthalmic A Scan

Specification and model: CAS-2000A

Model: CAS-2000A

License NO.: CQ F&D Authority, Device No.20060030 Registration No.: CN F&D Authority, Device
(Approval) 2006; No. 3230383

Standard No.: YZB /CN 0507-2005 <<CAS Ophthalmic A Scan>>

EU Representative: SUNGO GROUP COMPANY LIMITED

Configuration and performance:

It consists of the main unit, one A-probe, one printer and one Foot-Switch; CAS-2000A has an internal printer; the main unit of CAS-2000A is separated from the printer. The frequency of A probe is 10MHz, the measuring accuracy is $\leq 0.08\text{mm}$.

Applicable scope: It is suitable to calculate the length of the eye axis, the anterior chamber, the crystal and the vitreous body length.

Caution:

1. Without the permission of our Company, anyone cannot arbitrarily open the equipment outer cover, otherwise our company shall not be responsible for consequence;
2. As A-probe is a high-precision instrument, the user should clean the A-probe, sterilize the probe cap and put it back to the bracing frame each time after using it. In order to avoid damage to the probe, connect the wire well. Our company will not take any responsibility for the damage caused by the incorrect using of the A-scan.

3. For good maintenance of this instrument, more than 5s should be left between turn off the power and turn on the power.

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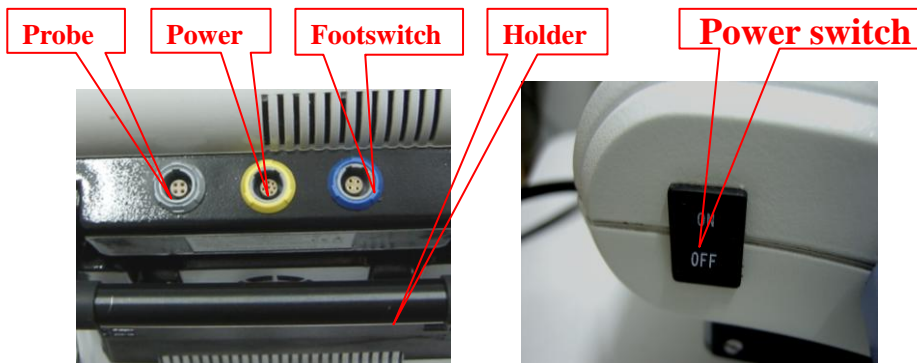
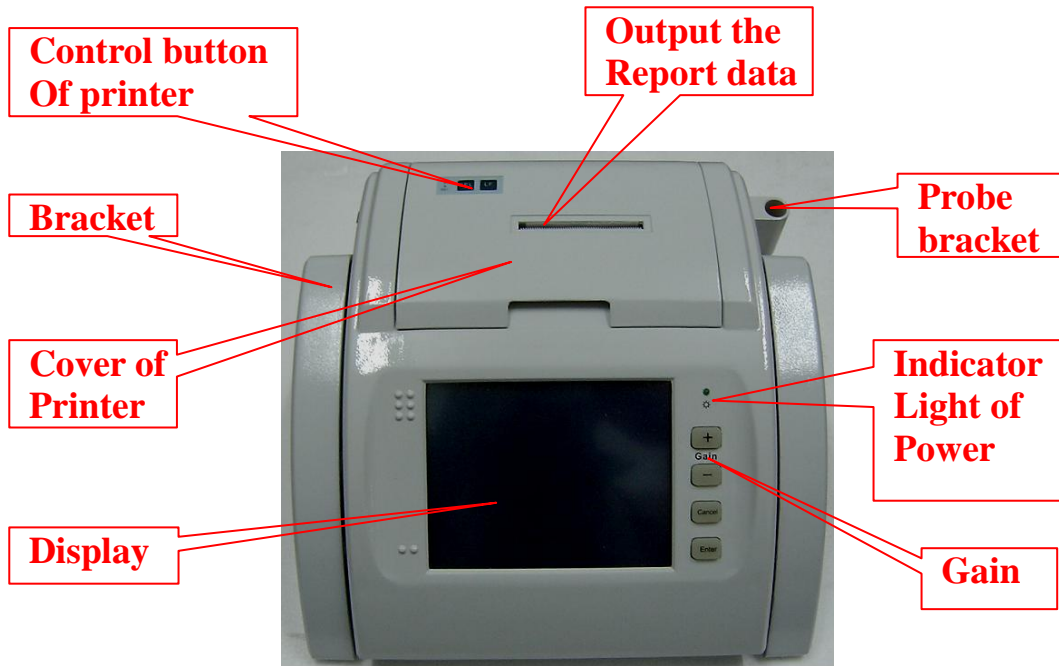
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1. Introduction

Please open the packing box carefully, check all accessories according to the packing list before throwing away the packing material.

1.1 Main Unit Of CAS Ophthalmic A Scan

Main Unit Picture



Back Picture of Main Unit Side Picture of Main Unit

1.2 Accessories



A Probe



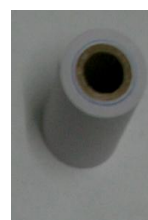
Power wire



Test pole



Foot-switch



Print paper



Power adaptor

1.3 Product Certification, Warranty Certificate, Acknowledgement of

Receipt, Receiving Report.

2. Installation

2.1 Installation Steps

- 2.1.1 Connect the Ultrasonic A-probe. There is a protruding mark on the A Scan while there is a concave part on the main body of A-scan. Connect them together;
- 2.1.2 Insert the probe into the Placed hole;
- 2.1.3 Connect the foot-switch;
- 2.1.4 Connect the power wire;

Notes: Connect the instrument with the ground well (connect the second wire on the board with the ground).

2.2 Explanation of the Keyboard

2.2.1 Gain Adjusting Button “+ -”: It is used to adjust the ultrasonic wave gain. You can adjust it before or during the testing process. It will change 5db each time when you press.

2.2.2 Delete Button “Cancel”: It is used to delete the unreasonable data. The function is the same as “Delete” key;

2.2.3 Confirm Button “Enter”: It is used to confirm the position of the marked point when carrying out manual mark testing. The function is the same as “Enter” key; it is also used to confirm calculating before calculating. The function is the same as “Calculate” key.

2.3 Explanation of Display Monitor

2.3.1 File Function Page

Input Data Area

Inquiry by Term Area

Data Display Area

Revise Key of Screen

Function Area

Date: Y 2010 M 04 D 28 No. 005		FUNCTION
Inquiry No.: D 28 No. 004		Print
Record date: 2010.04.28		Save
Inquiry result: SRK/T		Open
AXIAL	24.76 mm	Load
K1	43.00	Delete
K2	44.00	Clear
DR	1.00 D	
A	118.00	
ACD	mm	

adjust TEST IOL FILE

(1) **Input Date Area:** Input the date before testing(Y: year, M: month, D: day).

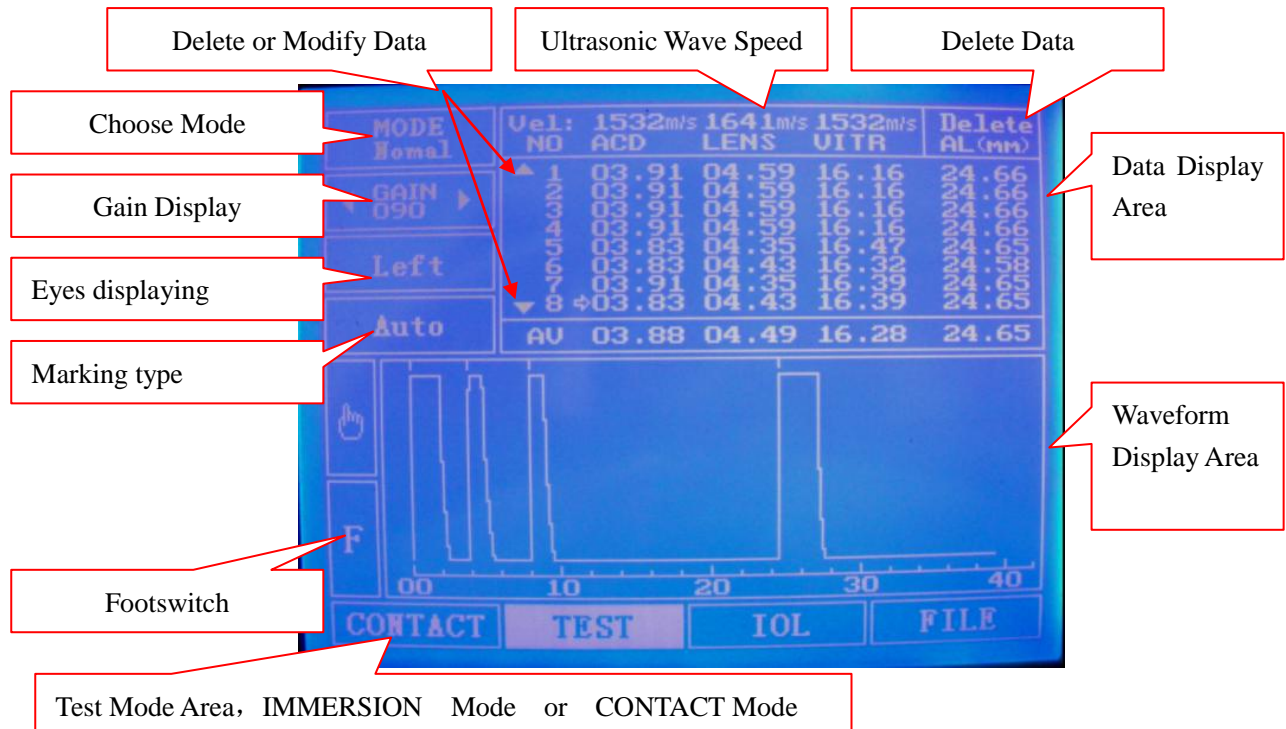
(2) **Inquiry by Term Area:** First input the “D (Date)” then input the “No.”. Then you can open the relevant data when you press “open” button in the “Functional Area”.

(3) **Revise Key of Screen:** Revise the focus of the screen.

(4) **Functional Area:**

1. “Print”: Print the report.
2. “Save”: Save the tested data. The register number will add 1 automatically after saved.
3. “Open”: see “(2)”
4. “Load”: First input the “D (Date)” then input the “No.”. Then you can open the relevant data when you press “open” button in the function area. If you press “Load, you can load the opened data up to “CALCULATE” page and re-calculate.
5. “Delete”: Delete all the saving data during the testing whole day
6. “Clear”: Clear all the data in the memory.

2.3.2 Testing Page



(1) Ultrasonic wave speed:

Under ACD, VITR, the speed of ultrasonic wave is 1532M/S; Under LEN, the speed is 1641M/S. Before testing, the speed of LEN can be revised. Default speed is the normal lens speed. We suggest to use the following setting: (1) Normal lens:1641 m/s (2) Slight cataract:

1650 m/s (3)Worse cataract: 1660 m/s (4)PMMA lens: 2760 m/s (5)Silicone lens: 1049 m/s
 (6)Acrylic lens: 2120 m/s.

(2) You can store eight groups of datum from # 1 to # 8. Four datum of each row are “ACD”, “LEN”, “VITR”, and “AL”. The ninth row is the average of each line.

(3) Eyes displaying: When touch “L” OR “R” mark, left or right eye is to be tested.

(4) Marking type: “AUTOMATIC” (Mark “A”) is auto-marking type, which means while playing, it will stop playing to mark the length of “ACD”, “LEN”, “VITR”, “AL” automatically. “MAUNAL” (Mark “Manual”) is manual mark, under this condition, you have to stamp the foot-switch to stop playing to mark datum.

(5) Waveform display area:

The waveform in “waveform display area” corresponds to the group of values which have been chosen, which means it will demonstrate the correspondence waveform which the arrow aims at.

(It will demonstrate the last group of waveform during the testing)

(6)Start or stop the wave: **F** means use footswitch to start or stop, **E** means use “Enter” button to start or stop.

2.3.3 Calculation Page

PARAMETER	IOL (D)	REER (D)
CRYSTAL	21.65mm	18.00
K1	42.00D	18.50
K2	42.00D	19.00
DR	-1.00D	19.50
A	118.00>>	19.67
D.EM	18.30D	20.00
D.AM	19.67D	20.50
ACDst	04.93mm	21.00
		21.50

Formulas Switch

Input the parameter

Press ">>>" to open A-const list

Confirm to calculate

Print result

Result display area after Calculating

A- Const list

The list shows a set of A-const, you can press “change” if you need to set A-const yourself.



PARAMETER		A-Const	REFR(D)
AXIAL	mm	112.00	
K1	D	120.00	
K2	D	114.00	
DR	D	115.00	
A	112.00>>	116.00	
D.EM	D	118.10	
D.AM	D	118.00	
ACDst	mm	119.00	
		Change	

Mode

The list shows a set of Test Mode, you can press it to choose anyone you need.

MODE	ACD (n/s)	LENS (n/s)	VITR (n/s)
Normal	1532	1641	1532
Cataract	1532	1650	1532
D_Cataract	1532	1660	1532
Amorphous		1532	
Silicone	1532	1049	1532
Acrylic	1532	2120	1532
PMMA	1532	2760	1532
User	1532	1532	1532

(1) Press “CALCULATE” key to enter into the page. The first line on the upper left of this page (AXIAL) is the measuring result. You should input datum below that. The left lower and the right frames are calculating results.

(2) Press  or  (“Formulas Switch”) to choose one of the six different calculation formulas which are “SRK II”, “SRK/T”, “HOFFER-Q”, “HOLLDAY”, “SCDK” and “Haigis”.

(3) Explanation of table parameters

For SRK II, SRK/T, CDK, There are the following parameters:

AXIAL: Eye axis length;

K1: Cornea diopter in horizontal direction;

K2: Cornea diopter in vertical direction;

DR: The anticipating diopter error after operating;

A: Artificial crystal constant;

IOL: Degrees of the artificial lens needed. (It is used in the formula of HOTTER-Q);

DEM: Maintenance emmetropic diopter;

DAM: Maintains degree is DR, degree of artificial lens needing planting after operating;

ACD: The length of anterior-chamber. It is used in the formula of Haigis;

Thereinto AXIAL is the measuring result, K1, K2, DR, A are inputting parameters, K1, K2 are being calculated by keratometer. IOL, DEM, DAM are outputting parameters.

Notice:

- 1. All parameters must be inputted correctly and completely, otherwise which result in the computing result wrong. For example, you must input the PACD value in Hoffer_Q formula, then ACDEST value of after computed is as PACD value and compute again. HOFFER-Q, HOLLADAY, SRK/T Is the forecast diopter third generation theoretical formula of artificial crystal. Has the condition oculist may choose the third generation artificial crystal formula to carry on the computation. At present believed, L (eye axis, similarly hereinafter) $\leq 22\text{mm}$, Surpasses using the Hoffer-Q formula computation other two; $24.5\text{mm} \leq L \leq 26\text{mm}$, using Holladay formula is the best; $L > 26\text{mm}$, but SRK/T formula is the superior; but for $22\text{mm} \leq L \leq 24.5\text{mm}$, there is not have the obvious difference among three formulas.**
- 2. You should input two decimal when you input the parameter. Such as 43 should be inputted as 43.00. If the parameter require positive or negative, you should input the symbol “+” or “-” front of the parameter. Such as 0.50 should be inputted as +0.50.**

3. Operation Steps

3.1 Edit information

- Turn on the power
- Input the patient's information:

Press down "FILE" key, input relevant number to edit the patient's information. Input "Day" "Month" and "Year".

3.2 Test Mode: Contact & Immersion (optional)

3.2.1 Contact Mode

3.2.1.1 Press down "TEST" key to choose "Contact" into the testing page.





3.2.1.2 Take off the probe cap; sterilize the ultrasonic A probe with disinfectant; let the patient lay on the sickbed. Surface anesthesia should be conducted in the testing eye well before the test.

3.2.1.3 Drop some physiological saline on ultrasonic A probes.

3.2.1.4 Press down eye mark key to choose "R: right" or "L: left" eye.

3.2.1.5 Press Auto or Manual mark key to choose "A: automatic" way or "Manual: manual" way.

The following is introduction of automatic marking way:

- (1) Open the patient's eyelid slightly with your left hand,
- (2) Ask the patient to stare at the red lamp inside the fixing probe or just glare above;
- (2) Stamp the foot-switch one time to start and then put the probe on the cornea of the patient slightly; the waveform will become still (Auto marking way) when you hear "DU" (it shows that you have finished measuring for one time),
- (3) After hearing the "Du", you should take the probe slightly from the cornea immediately and then use the probe to touch the patient's cornea again to do the next measurement (You should use the probe to touch the cornea vertically without pressing the cornea);
- (4) Stamp the footswitch to stop when finishing 8 groups of datum. If you choose the "Manual" manual to mark mode, you must stamp the footswitch each time you start or stop measuring.
- (5) If you want to delete the group the result of which is unreasonable, you can move up "", or down " to that group and then press  (OR press " key) to clear this

group of datum;

- (6) After deleting the useless group, you can test another group again according to the steps above.

3.2.2 Immersion (optional)

(1) Press down “TEST” key to choose “Immersion” into the testing page.

(2) smear the Ultrasonic liquid (methyl cellulose) on the top of the Probe as Figure 1.

(3) Put the accessory on the top of the Probe.

Don't touch the top of the accessory ,and it maybe cause unfaithful data if there is air bubble between them.

(4) Hold the Probe upwards, put the Ultrasonic liquid into the accessory and higher than it.

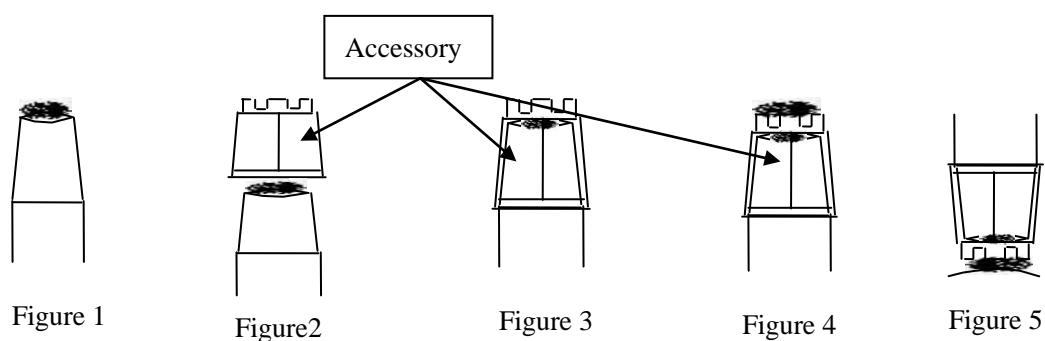
(5) let the patient lay on the sickbed.

(6) use the probe to touch the cornea vertically without pressing the cornea, and their axis leads must coincide with each other.

(7) Press the footswitch or “ENTER” button to test after setting the Eye displaying & Marking type.

(8) the process of reading the datum refer to “contact”. Better to finish 8 groups of datum for accuracy.

(9) The dealing with the datums refers to the “Contact” introduced above.



Notice for the Immersion Mode

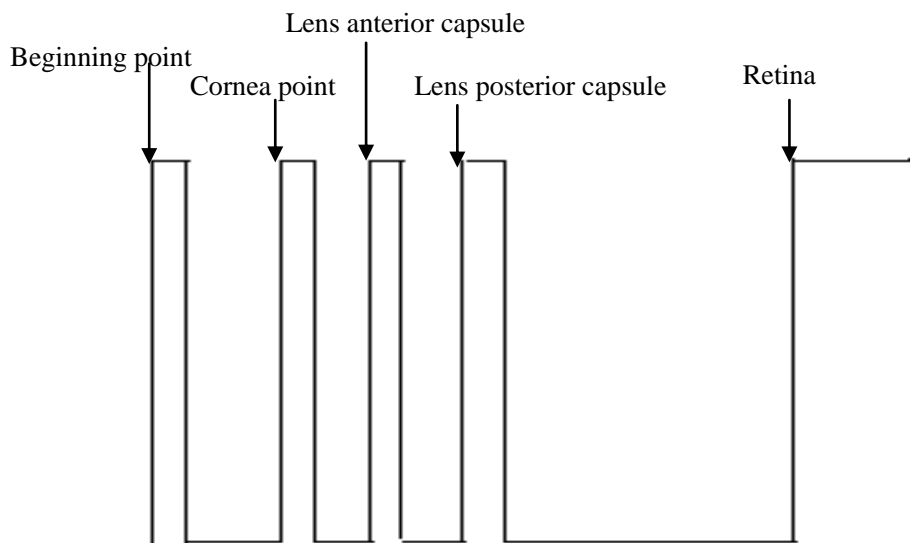
1. The accessory based on the Immersion Mode is disposable products , can't be used repeatedly.
2. Sterilize the ultrasonic A probe with disinfectant before use.
3. The accessory based on the Immersion Mode can be sterilized in high-pressure steam.

Notice for use

1. Please airproof the plastic bag after bring out the accessory.
2. Don't touch the top of the accessory while bring out it from plastic bag.

3. Choose the “Immersion” Mode before test, otherwise can’t use normally.

The ideal waveform based on the Immersion Mode:



3.3 IOL Form Calculation

3.3.1 After measuring all data, press down “CALCULATE” key to enter into the formula calculation page;

3.3.2 After entering into this page, you can continuously press “Formulas switch” key (By default, it is the “SRK/II” formulas) to choose any formula among “SRK/II”, “SRK/T”, “Hoffer_Q” “Hollday”, “SCDK” and “Haigis”.

3.3.3. After choosing, input parameters.

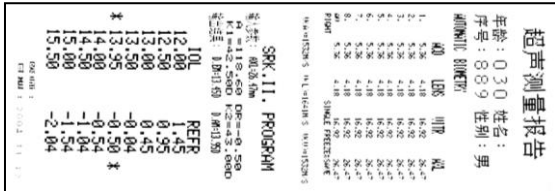
3.3.3 After inputting all the parameters, press  (“Calculate”) and it will get out results automatically;

Notice:

1. All parameters must be inputted correctly and completely, or the result will not be right. For example, you must input the PACD value in Hoffer_Q formula, and then input the ACDEST value into the PACD to recalculate.
2. You should input two decimal when you input the parameter, for example, 43 should be inputted as 43.00. If the parameter require positive or negative, you should input the symbol “+” or “-” before the parameter, for example 0.50 should be inputted as +0.50.

3.4 Saving and Printing

Press “FILE” to enter into this functional page after calculating. Press “Save” Icon to save the data. Press “Print” icon to print report data as picture.



If you want to measure another eye after measuring one eye, you need to change the page to the testing page, and then press “Test”. Choose the

differential eye mark (“R” or “L”); it will delete the front result;

- If we want to exam the next patient, press “Test”, do it again according to the above steps.

4. Notes

4.1 The Measuring Deviation

Even under ideal state, there is still 0.03mm deviation during the course of ultrasonic A measurement. While measuring, sometimes the deviation will reach 0.5mm. The reason for this may be the following:

- While measuring, the probe does not face directly to the center of the optic axis;
- Overexert. The probe presses the cornea when touching cornea
- The patient's anterior chamber or lens is muddy so that the instrument wrongly take those muddy as front vesicle or back vesicle of lens to demarcate. (You can use manual demarcating to change);

4.2 Some Notes about Marking

- Different people have different ultrasonic A plus. For the normal people, the instrument can mark promptly and normally even when the plus is smallest; while for some patients, you may have to adjust the plus to its maximum value.
- While using automatically marking way, the instrument can get result after ACD, LEN. VITR appear at the same time. For patients who have no lens, the instrument can only get a VITR waveform, the instrument can't demarcate automatically. So for amorphous (No lens) eye, you can only use manual (Manual) mode marking way.






4.3 The Manual Marking Measuring Way (for Amorphous Eye)




4.3.1 Input the patients' information in "FILE" functional page;

4.3.2 Switch to "MANUAL" mode to start measuring after choosing the testing eye.

4.3.3 Stamp the foot-switch one time to start, put the probe onto the patient's cornea until appearing the wave of retina, and then stamp the foot-stamp to stop one measuring group. Do another seven groups the same as the above steps, all together eight groups' data are recorded.


4.3.4 Wave marking

- Press  key (OR press "") one time, and then there is an  icon displaying on the wave. You can mark this group of datum by touching  or  mark.
- Use "touch mode" (Press one time slightly to the relevant position) to adjust coarsely and

use  or  on the screen to adjust slightly. After adjusting to the right place, press "" icon one time to mark and it will move to the next wave automatically. There are three waves (cephalic vesicle of lens, back vesicle of lens and retina) in total. After marking, it will get the result after the foot-switch is being stamped.

4.3.5 Mark the wave without lens

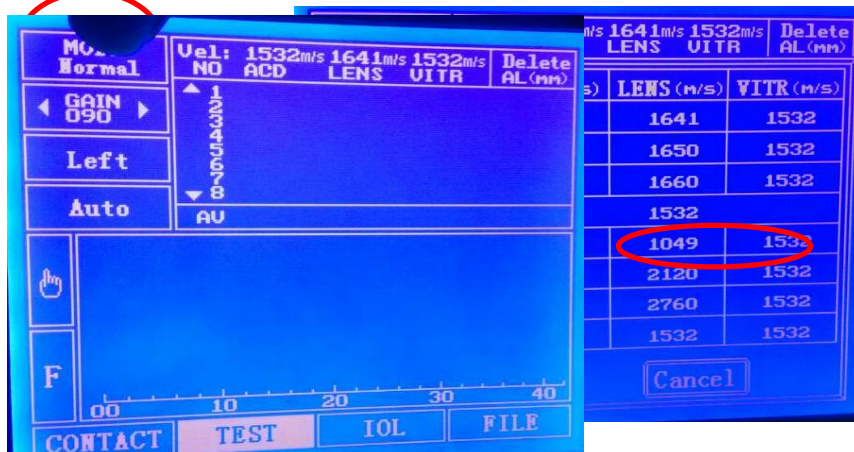
Please make the mark points symbol of lens front vesicle and lens back vesicle are put at the same position, make the symbol to mark retina wave position to avoid mistakes caused by no lens eye. The displaying data is zero or incorrect if the wave does not get up the mark request.

Notice: All buttons will not work except the "Left" and "Right" button when the mark point is under  state.

4.4 Using Methods of the Test Pole

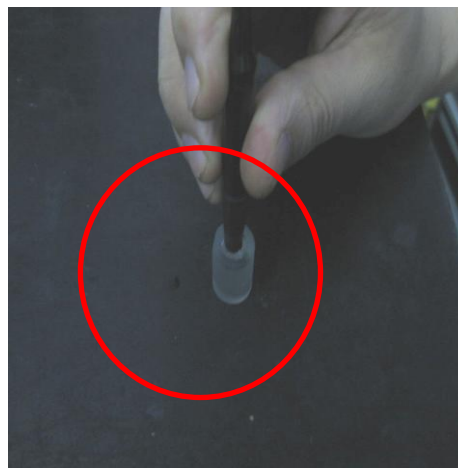
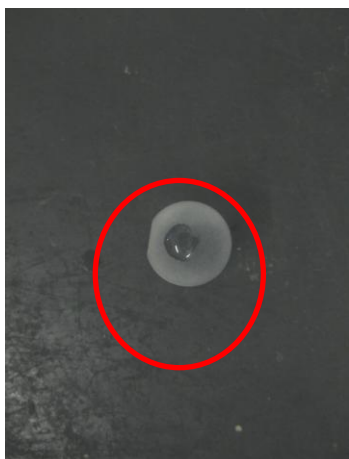
Notice: The test pole is to check the machine to see whether it can work normally.

4.4.1. Turn on the power; Touch the "TEST" menu; keep the model "Auto";. And change "normal" to "Amerphous" model.



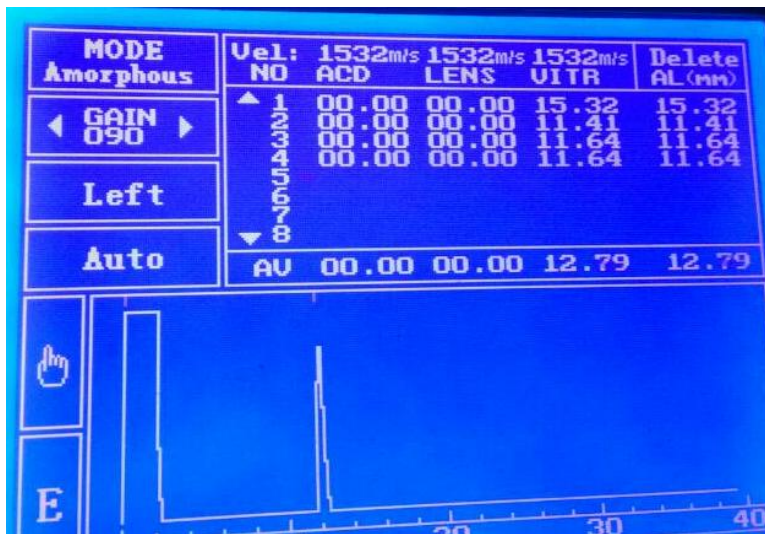
4.4.2. Put the test pole on the table; drop a littler drop-water on the test pole;

4.4.3 Let the probe touch the right surface of the test pole vertically;



4.4.4. Stamp the footswitch to start, some waves will display on the monitor.

4.4.5. it will automatic show eight group data, then you can get an average test result.



4.4.6. The measuring length should be consistent with the mark number on the testing pole.

5. Using and Maintenance

5.1 General Notes

- The instrument should be put in the dry place.
- Turn off the power when you do not use it.
- The operating time of this instrument should not be too long. (4 hours).

5.2 Probe A Protection

5.2.1 The probe is a very precise part of A scan, so it needs careful protection.

5.2.2 Keep the surface of the probe clean; avoid heavy collision; never drop know.

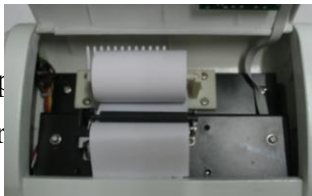
5.2.3 Wash the front of the probe with the distilled water, the physiological saline or the ethyl alcohol.

5.2.4 The probe can not be disaffected with high temperature disinfection; you cannot use the ethyl alcohol or soak the disinfection with the venom.

5.2.5 During transportation, take the probe from the main body and then enclose into the plastic bag.

5.3 Replace

Before replacing the paper, you must turn off the power. Then open the front cover of the printer



1. Nip one side of the paper from the printer, then pull another side of the paper roll
2. Press “SEL” (SEL key), then press “LF” key; make the black press pole rotate; put new print paper put under the black press pole. Press “LF” key to make the press pole stop rotating when the new print paper is roll out about 5CM. Then put the scroll back to printer properly.
3. Make the paper entry into the printer and come out from the output paper properly. Cover the front board of the printer, Press down SEL key.

5.4 LCD Protection

5.4.1 Do not let the heat source approach the instrument as well as the liquid crystal display monitor;

5.4.2 Do not place the hard sharp objects on the liquid crystal display monitor.

5.4.3 If there is dust on the display monitor, you can use the lint ball to clean.

6. Summary of Ultrasonic A

6.1 Ultrasonic A theory

Ultrasonic is the reflecting signal of the interface of inner body that display vertical wave crest and come into being unidimensional image. The propagation time of Ultrasonic represents the distance of reflecting interface. The farther the distance is, the more bake the sites of wave crest is. The height of wave crest represents intensity of echo, the more intensity echo the higher wave crest. Amplitude of vibration which we get is called echogram.

Ultrasonic wave has different propagation velocity in the different medium. Whether velocity of sound relates the density of medium or medium temperature, the propagation velocity is 1532m/s in the anterior-chamber and vitreous body, the propagation velocity in the crystal according to turbidity is 1590-1670m/s, general use is 1641m/s.

6.2 Analysis of Inspection Result

Ultrasonic A calculates three parts of the optic axis: anteroom, crystal (Lens) and vitreous body (the thickness of cornea including on the anteroom). From cornea to retina, the average of the visual axis from 22.5mm to 24mm, the depth of anteroom becomes thinner with the added age. The depth of crystal is general from 3.5mm –4.5mm. The depth of crystal and added age direct ratio, back of crystal is flat passage is from 16-18mm, but high myopia general is more than this range. The most attention of ultrasonic A probe is:

- 1: when putting the probe on the appearance of cornea, don't press forcefully;
- 2: the direction of velocity of sound must cross the eyeball axes or it will cause more measuring error.

Calculating formula

Calculating of degree of artificial lens, generally use SRKII to calculate, the formula is:

$$P=AL-2.5L-0.9(K_1+K_2)/2$$

Thereunto

P Degree of artificial lens A Constant of artificial lens

L Length of optic axis K_1 Dioptic cornea in horizontal

K_2 Dioptic cornea in vertical

When $22 \leq L \leq 24.5$ $AL=A$; When $21 \leq L < 22$ $AL=A+1$

When $20 \leq L < 21$ $AL=A+2$; When $19 \leq L \leq 20$ $AL=A+3$

When $L > 24.5$ $AL=A-0.5$

7. Main Technical Parameters

7.1 Working Environment:

- a. Temperature: $-5^{\circ}\text{C} \sim 40^{\circ}\text{C}$;
- b. Relative humidity: $\leq 80\%$
- c. Atmospheric pressure: $700\text{hPa} \sim 1060\text{hPa}$
- d. Relative humidity: $45\% \sim 85\%$

7.2 Replace the Protective Tube

Turn off the protecting fuse lid, exchange with a new good protective fuse, and again cover the protective fuse lid, the return to original state.

7.3 Transportation and Storage

During the period of transporting, prevent the instrument from damp, water, snow, and exposure under the sunlight. Keep A scan packed in the room in which the relative humidity is less than 80 percent, the environment humidity is between $-5^{\circ}\text{C} \sim 40^{\circ}\text{C}$, well ventilated without corrosion gases.

7.4 Characteristics:

Type: This product is type I kind B equipment

Working: Continuous running way

Working pressure: AC 220V $\pm 22\text{V}$ /50Hz $\pm 1\text{Hz}$

Power: 300W Protective fuse model: 250V 5A

A scan detecting:

Probe Frequency: 10MHZ Error $\pm 0.5\text{ MHz}$

Precision: 0.05mm

Measurement parameters: ACD depth, lens, Vitreous Axial length, and its average

IOL Calculation: SRK/ II , SRK/T, Holladay, SCDK, Hoffer-Q, Haigis

Data Processing: IOL table

Operation: Automatic, Manual

Output: $P \geq 1.70\text{ (Mpa)}$

$I_{\text{spta}} \geq 0.16\text{ (mw/cm}^2\text{)}$

$I_{\text{ob}} \geq 2.07\text{ (mw/cm}^2\text{)}$

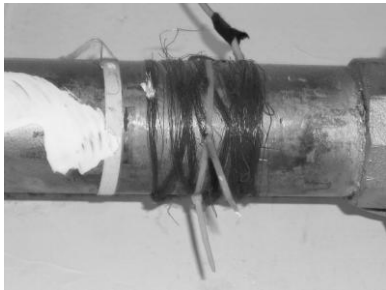
8. Sound Output Announcement

A scan ultrasonic sound outputting
Max Power (mW) ≥ 0.091
$P_{\text{(Mpa)}} \geq 2.08$
$I_{\text{ob}}(\text{mW}/\text{cm}^2) \geq 0.94$
$I_{\text{spta}}(\text{mW}/\text{cm}^2) \geq 1.12$
Configuration
$L_p(\text{mm}) \geq 5$
Wpb6(mm) (∥): .59 (⊥) : ≥ 3.05
$p_{\text{rr}}(\text{kHz}) \geq 0.032$
srr(Hz) Un-suitable
Size of outputting Wave beam (cm ²) ≥ 0.0962
$f_{\text{awf}}(\text{MHz}) \geq 7.82$
APF $\geq 0\%$
Opening mode Mode A frozen
AIF $\geq 100\%$
Initial mode mode A
Sound outputting frozen ok

9. Troubleshooting

- If the instrument has abnormal situation (dyeing machine), please turn off the power source for several seconds, then restart the machine again.
- While opening, if the displaying monitor is not lighten, please check the plug of power as well as the socket to see whether it has good connection with the ground, and pull off the socket to check the fuse to see whether it has been burned.
- In the course of printing, some slightly flash appear in screen is normal.
- The ways of connecting with ground as following:

Firstly dig the light of the water pipe surface and remove the oxide layer, then tightly entangle on the water pipe with yellow and green wires on the socket which have been dial part of plastic segment (picture 1), will entangle the adhesive tape (picture 2)



(Picture 1)



(Picture 2)

10. Maintenance Statement

Our company can provide you with the information of those parts need maintained.

1. Our company will provide maintenance and enquiry free for one life.

 2. Our company will maintain the machine for free for one year since the date of purchasing if the machine is operated according to the operation instruction.

 3. During the maintenance, Our companu will receive fee for the maintenance under the following conditions
 - Do not use, maintain, store the instruments according to operation instruction;
 - Take apart or amend the instruments without the permission of Our companu, which cause damage;
 - Damages is caused by accidents, use wrongly or caused by other major nature factors.
- ▲ Please forgive us for not informing you if the design or the assigned type changes.
- ▲ If you have any question about our products, please do not hesitate to contact us.