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Introduction

Dear User :

Welcome to use SW-2100 portable ophthalmic A/B scan & image workstation made by Suowei Company.

SW-2100 is a precise ultrasound instrument which could detect ophthalmic disease, display the focus location, configuration and the relation with the tissue around, detect axial length, depth of anterior chamber and thickness of lens, and calculate the IOL. It has image process software with abundant functions, which is very convenient for doctor to diagnose and archive the cases.

This User's Guide is designed as a training and reference manual. We recommend you carefully read and follow the steps in this guide to ensure that the instrument could work on optimum performance.

Classification

SW-2100 is classified as Class II, Type B, normal instrument.

This product has got ISO9001 and CE proval.

Symbol



Protective grounding



Type B

CE0197 CE approval



Power



Warning , it may cause hurt or damage



Attention! May do harm to machine and accessories. How to prevent such problems



Hint, how to use it better



Danger, high voltage



Refer to the instruction

Precautions

 Power supply requirement for the A/B scan main unit is 90~230V, 50HZ±2%. If the local power net could not fit the requirement, then the regulated power supply (UPS) is recommended. All parts of the system should be safely grounded.

 If an adapter is needed, please purchase the adapter that fits the CE standard.

 Before connecting the adapter to the power socket, please check the rated voltage of adapter to ensure that the supplied voltage and frequency meet the requirement.

 Improper power supply may cause instrument damage or personal injury.

 All the accessories including CD should be kept well. If anything is missing, the instrument could not be warranted.

 The probe is key, delicate and expensive component. Do not stress it, knock it or fall it from high place. Do not dip it into alcohol to perform the disinfection. Do not twist or pull the leading line violently.

 User is not permitted to disassemble the main unit or probes. If there is any problem in the machine, please send it to the warranty station.

 The instrument should be kept away from strong magnetic or electric field or other strong disturbance source.

 It is forbidden to install other software into the image workstation (PC) by users. Installing other software may cause unexpectable system problems, such as collision of different devices, speed slow-down, virus attack and so on.

 Don't change the system setting and parameters arbitrarily.

 There is no taboo in using the instrument to perform the A/B scan.

➡ The instrument should be placed at drafty place without directly irradiating by the sun.

➡ Don't store or use this instrument in moist environment.

➡ When the ambient temperature is under 10℃, the instrument should warm up for 5 minutes before it begins to work.

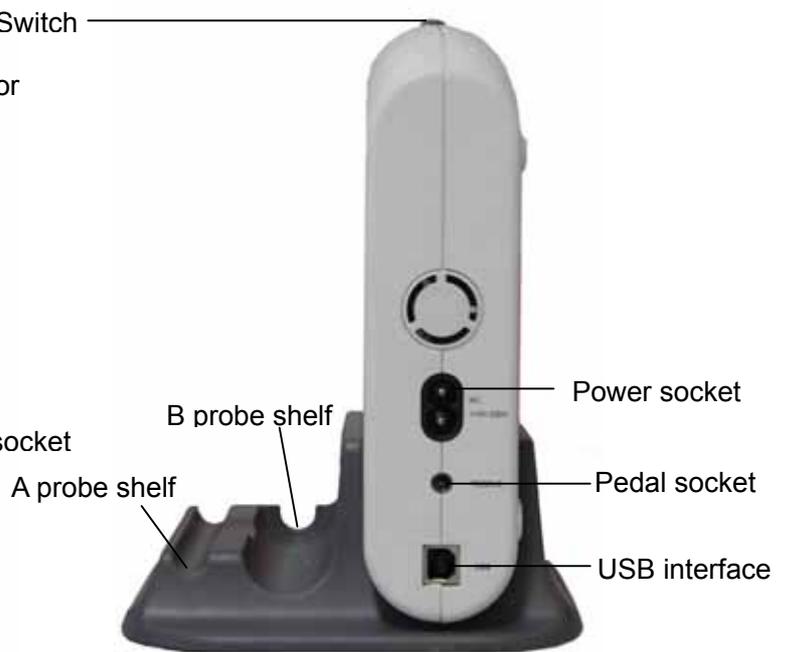
➡ It should be determined by doctor whether the instrument could apply to the patients with anaphylaxis to couplant or with eye disease that could not be touched.

➡ As to the damages caused by ignoring the declarations above, our company does not take the responsibility.

Instrument Components



Pic.1 Front View of SW-2100



Pic.2 Back View of SW-2100

Theory and Functions

USB interfaced ophthalmic A/B scan & image workstation is composed of main unit, A probe, B probe, image workstation and so on. The probe contacts the cornea and sends out ultrasound of 10MHz. In A scan mode, the echo wave from front surface and back surface of lens and retina is detected. The signal is processed and then we get the depth of chamber, thickness of lens and axial length. While in B scan mode, the B probe emits and receives the fan scanning waveform. After the signal procession, the transverse images of the eye are presented on the LCD. And the doctors could observe the eye disease as well as the location of the focus.

The ultrasound signal is pre-processed by main unit and then transported to image workstation through USB interface. The image workstation is composed of portable computer and professional ultrasound image procession software. The image process function is as powerful as to review images, measuring multiple groups of data, case output and archiving.

Characteristics

1. Basic Parameters

B scan

- Probe: 10MHz sealed, frequency-adjustable, magnetic driven noiseless novel probe.
- Scanning mode: Magnetic driven, mechanic sector scanning.
- Resolution: Lateral 0.3mm, Vertical 0.2mm
- Geometry location precision: Lateral 10%, Vertical 5%
- Detect depth: 50mm
- Gain : 20-105(dB)
- Blind area: 7 mm
- Scan angle : 53
- Image grey : 256 shades

- False color mode : 7 colors
- Measure mode : Distance1, distance 2, angle 1, angle 2, perimeter, area
- Case report : PDF format case report archiving
- Cinema loop : 100 frames of movie loop, AVI, ZIP, JPG format image output.

A scan

- Probe : 10MHz solid probe, with built-in fixation light
- Detect depth : AL 15-35mm
- Precision : $\pm 0.05\text{mm}$
- Eye Mode: Manual or auto mode, according to the inner lens mode , including lens eye, dense lens eye, no lens, PMMA , acrylic acid and silica gel.
- IOL formula: SRK-II、 SRK-T、 HOFFER-Q、 HOLLADAY、 BINKHORST-II、 HAIGIS-STD
- Stat. Calculation: average and standard deviation.
- Transmit speed: different speeds in different parts.
- Store: 10 scanning results could be stored for each eye.

2. Software and Others

- Workstation OS: Windows XP ,with USB2.0 interface ,CPU \geq PIV, memory \geq 512 MB;
- Image store ability: 80G for image store in hard disk, and CD burning could expand the store ability.
- Portable and dense packaged due to USB interface, whose plug-and-play function provides the infinite expansion.
- Dynamically adjust could be done to the frozen images. This ensures that the examiner could obtain the best images, which is of great value to disease diagnose.
- Auto-record 100 frames of images during 10 seconds before freezing.

Doctors could review the pictures one by one or continuously.

- Super high gain, with vitreous body intensifying function.
- Multi-windows displaying and all kinds of false colors.
- After-process archiving platforms with abundant functions provide various of eye-position signals and professional indication library.
- PDF format case report output
- Power: 10W;

3. Safety

- Accord with the requirement for 9706.1-1995 Class II Type B devices and GB9706.9.

Environment Requirement

1. Work Environment

- Ambient temperature : +5 ~ +40
- Relative moisture : 80%
- Power Supply : A/B scan main unit 90~230V
Image workstation AC110× (1±10%) V , 50× (1±2%) Hz
- Keep away from strong magnetic or electronic field.

2. Transport and Storage

- Ambient temperature : -40 ~ +40
- Relative moisture : 95% ;
- Atmosphere pressure : 500hPa~1060hPa。

3. Running

- Ambient temperature : +5 ~ +40
- Relative moisture : 80%
- Power Supply : A/B scan main unit 90~230V

Image workstation AC110× (1±10%) V , 50× (1±2%) Hz

- Atmosphere pressure : 860hPa~1060hPa
- Warm-up time : 3min

Install and Connection

1. Check the package to see if every part is in the package. (Please refer to Appendix I: Package list.)
2. Install the workstation software SUSBMATE in the computer, which fits the requirement. As to the requirement and steps to install the software, please refer to the software instruction. If the computer has installed the software, you can skip this step and go on the next one.
2. The plugs and sockets of A probe and B probe are waterproof ones made in Germany. Align the red mark on the probe to the one on the probe socket, and plug it in. When you hear a “click”, the probe is ready. When you are taking it off, hold the figured part and pull it out. Don't apply too much strength; otherwise the connector will be worn out easily.



Pic.3 How to plug and play the probe



The probe must be connected before power on. Don't plug or pull when power is on.

3. Connect the pedal and power line (the socket of power, USB2.0 and pedal are shown in Pic.2), then power on the computer.

-
4. Connect the computer and main unit with USB2.0 data line. When connecting, the yellow data transmission indicator will turn on for a second, then turn off. Now the computer will automatically install the driver for it.
 5. When computer is on, press the power switch on the top of the main unit of USB interfaced A/B scan. At the same time both the blue & yellow indicator will be on then in about one second the yellow indicator will be automatically go off and the computer will identify the device and start installing the “drive”. If the yellow indicator doesn’t go off for a long time, you have to re-start the instrument.
 6. Run SUSBmate software. When running the software, the yellow light will turn on flashing.

Operation of main parts

1. B probe

- B probe are used to emit and receive the B ultrasound wave. (See Pic.4)
- Smear the couplant on the probe or examined part before measure, then place the probe on the examining part, move or rotate the probe to acquire transverse images from different directions so that the best image for diagnose could be obtained.
- After each examination, wipe the couplant off the probe with soft tissue.



Pic.4 B scan probe

2. A probe

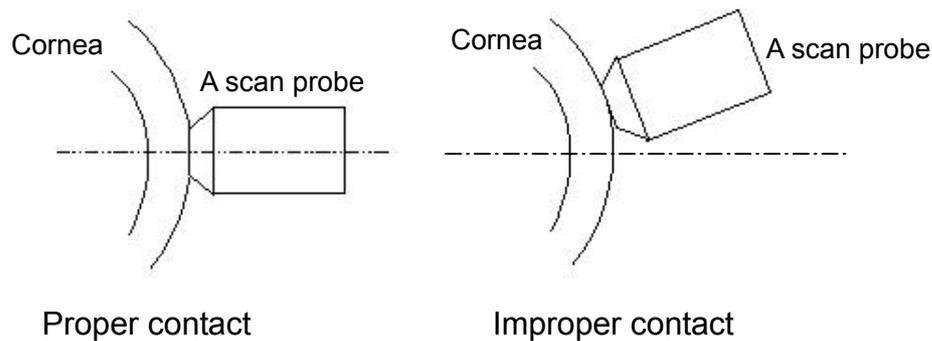
- A probe is to emit and receive A ultrasound wave. (See Pic.5)
- The surface of the probe that contacts the surface of the patient’s eye has to be sterilized with alcohol tampon before measurement. The



Pic5 A scan probe

probe can be used only after the alcohol on it has been completely evaporated.

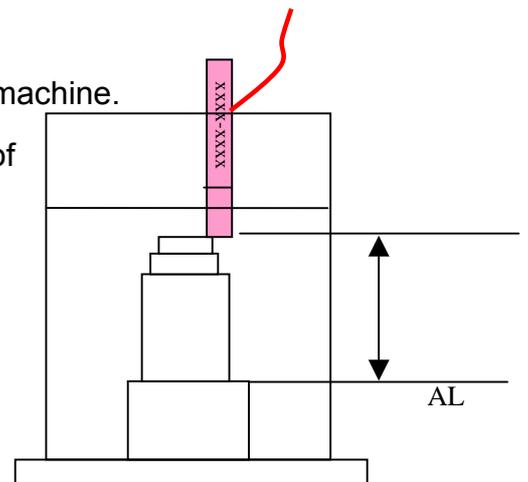
- The patient should lie in supine posture on the bed. And then make the anaesthesia of the eye's surface. Put the transducer perpendicular to the center of the cornea and make them contact properly.(See picture below)



How to calibrate the A scan :

A step model for calibration is attached to the machine. It could simulate the four acoustic reflection plane of human eye. You can check whether the A scan is operating normally by the model.

1. Temperature : 25
 Fill the test block with distilled water
 (No bubble in the water)
 Eye Type: Aphakic Eye
 Speed: 1520
2. Gain: adjust the gain to a lower lever, around 50
 Put the probe straight against first step, on the edge, move the probe slightly, make sure the ultrasound can get reflection from all the fourth steps. See the picture.
3. Choose Auto mode or Manual mode, observe the waves, when it has 4 waveforms, see the AL figure, if it is $24.5\text{mm} \pm 0.1\text{mm}$, then the A scan is working normal.
4. Set back the speed to 1532



3. Pedal

 The left pedal is to freeze and unfreeze the image, while the right pedal is to acquire images. Place the pedal at handy place. When need to freeze or acquire a picture, step the pedal once and it will freeze the image.



Pic6 Pedal/Footswitch

- ➔ Don't step with too much strength or not let it go.
- ➔ You can also use the manual freezing key (F4 on the computer keyboard) and acquisition key (F6 on the keyboard).

 This pedal could also be used in high voltage application. But in this system, the voltage on the pedal is low enough to sure the personal safety.

Run the Software

Please refer to the A/B scan image workstation software instruction.

Maintenance

- The power supply socket must be the three-pole socket with good connection to the ground.
- In moist season, if the machine hasn't been used for a long time, it should be powered on for 1 hour once a month to drive the moisture away.
- Pick up and put down the probe gently, avoid bumping or falling. Keep the probe clean.
- If the probe falls by accident, you should check it immediately. If any crack or loose connection is detected, stop using the probe and contact with the warranty station.
- Check the probe regularly. If you found any loose connection, stop using it and contact with the warranty station. Loose connection may cause dangers of electric leakage or make the image worse.

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- Don't use any causticize cleanser when cleaning the device. Avoid water or any other liquid running into the keyboard or shell. You can clean with mild cleaner and soft tissue.
 - The warranty station is responsible for the maintenance of the printer. It is recommended that you send the printer to warranty station for regular maintenance. This will make the machine last longer.

Package and Transportation

When transporting, all the parts should be taken off and packed into its package. So the package box of the accessories should be kept well for future transporting.

The packed instrument can be transported by transportation vehicles. It must not be transported together with goods that are easy to burn, explode or corrode. Also it should be protected from shock and moisture.

The instrument should be stored in the environment with ambient temperature within $-10 \sim 4$, with the relative humidity under 80%, without the corrosive gas, strong mechanical vibration, shock and magnetic field. The room in which the instrument stored should has good ventilation.

Trouble Shooting

Phenomena	Analyze	Solution
The main unit could not start up normally.	If the connection of power line is correct and reliable?	Insert the power line into the corresponding interface and power supply socket. Make sure that the connection is right and reliable.
	If the main unit is started at the temperature above 5 ° C?	Ensure that the main unit start up at the ambient temperature above 5 ° C, and has been placed under normal temperature for more than 10 minutes.
	Whether the fuse is burnt?	Contact the warranty station.
Display could not work properly.	If the connection between the main unit and power line is correct and reliable?	Insert the power line into the corresponding interface and power supply socket. Make sure that the connection is right and reliable.
	If the brightness and contrast is correct?	Adjust the brightness and contrast with adjusting buttons on the display.
The keyboard or mouse doesn't work	If the keyboard cable is connected correctly and reliable?	Turn off the main unit and re-insert the keyboard cable.
	If the inside of mouse is too dirty?	Clean the bottom of mouse and the rolling ball by dry tissue.
	The movement of mouse cursor is slow and with deviation.	Ensure that the plane under the mouse is clean and level.
No signal from the probe	Has the probe connected to the main unit?	Insert the probe cable into its socket, and ensure that it is connected reliably.
	If the gain of software is right?	Adjust the gain through toolbar on the software.
No image	The probe is freezing.	Press Freeze key to unfreeze the probe. (especially when you are going to take the first measure after running the software.)
	Instrument failure	Record detail phenomenon and contact with warranty station.

Failure of freezing the waveform under the status of measurement	The mode of the instrument is incorrect	Re-choose to make the instrument under the status of measurement.
	The amplitude of the signals is not enough	Reset the gain and threshold limit value
	The measurement signals are too weak or there are too many disturbing waves (A scan)	Tune the GAIN and the threshold value (in A scan)
No normal back wave but bright rings in the B mode	Bad connection of the B scan probe's plug	Shutdown the instrument and re-insert the plug to connect it well with the socket
No waveform under the status of measurement	The transducer does not contact the cornea properly	Adjust the probe to the correct position
	The surface of the patient's cornea is dry	Apply the physiological saline to the patient's eye
No display on the screen or no back wave with normal samples	Disturbance or problems of the instrument	Take down the details of the problem and contact our company
The displayed image is disordered	Problems of the instrument	Take down the details of the problem and contact our company

Appendix Warranty and Support

1. Warranty Announcement

- This device is warranted for 1 year free of charge from the purchase date.
- If the device gets some problem when all the operation instructions are strictly followed, please take the warranty card and contact with the warranty station. The repair is free of charge in the warranty period with the warranty card. If there is no warranty card or warranty station hasn't received it, then the warranty station can refuse to repair it.
- During the Warranty period, the items below are not free of charge:
 - Accident caused by man-made damage;
 - Accident caused by user's own repair on the machine, which is without permission.
 - The damage caused by wrong operation.
- After the warranty is expired, warranty station will continue to serve the users with some reasonable repair charge.