ZQ-9902
Service Manual

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This manual is a reference to maintain the ZQ-9902.

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● **Statement**

Manufacturer assumes the responsibility for device security, reliability and performance only under the preconditions that the disassembly, assembly and maintenance of the device are all performed by its assigned professional and the device is used strictly in compliance with the operation manual.

This Manual describes how to install and maintain the ultrasound diagnostic scanner correctly. Upon operating the instrument, please follow the operating instructions described in this Manual to ensure safety and correct functionality.

● **Suggestion**

The apparatus has to be operated under qualified operator or his/her instructing.

Please do not disassemble this instrument on your own. Even within the warranty period, the warranty will be expired in the following situations:

- Damage or loss resulting from disoperation or improper use (any application beyond the application scope of this instrument).
- Damage or loss due to the failure to follow regulations on power supply, installation and operating conditions.
- Damage or loss caused by the installation, modification and checkup or repair by an unauthorized

● **Warranty**

Manufacturer ensures a guarantee period within a year and a half since the

delivery day and promises there is no problem with the new device in material and technology. Within the warranty period, Manufacturer will maintain the device and replace the parts of non-man-made damages free of charge. But will not repair or replace the device surface if it is damaged.

This guarantee is only available for failures occurred when the device is operated in compliance with the operation manual. And the guaranteed device can only be used in the prescribed range given in manual.

This guarantee excludes losses or damages caused by external reasons such as thunder struck, earthquake, theft, unsuitable use or abuse and refitting the device.

Manufacturer shall not be responsible for damages caused by other devices or arbitrary connection to other devices.

Manufacturer shall not be responsible for losses, damages or injuries caused by delayed service request.
When there is problem with the products, please contact Manufacturer. And explain the device model, serial number, date of purchase and the problem.

To ensure safe and correct operations, please pay attention to the following warning symbols:

Danger! This kind of mis-operation may lead to personal injury or death. This warning indicates the situation with direct danger that, if not heeded, could result in serious personal injury or death and serious property loss.

Warning! This kind of mis-operation may potentially lead to serious personal injury or death. This warning indicates the situation with indirect danger that, if not heeded, could result in serious personal injury or death and serious property loss.

Caution! This kind of mis-operation may lead to personal injury. This warning indicates the dangerous situation that, if not heeded, could result in mild or moderate injury, partial property loss or data loss.

Note! This symbol indicates a specific warning or other information which may enhance the performance of this equipment.

Safety labels

Device labels explanation:

 Type B device

 Note! Refer to accompanying documents

 Turn-on (general supply)

 Disconnect (general supply)

 Signal output

 Equipotential

IPX7 Watertight-proof

 USB port

 VGA out

☆ The equipment implement the requirements of GB9706.1-2007 “Medical Electric Equipment Part One: General Safety Requirement”, GB10152-1997 “Ultrasonic B Diagnostic Equipment” and GB9706.9-1997 “Medical Electric Equipment: Special Safety Requirement of Medical Ultrasonic Diagnosis and Ward Equipment”.

☆Environment requirement should accord with the regulation of GB/T14710-1993’s section two Climatic test group Ⅱ and mechanical environment test group Ⅱ.

Chapter One Maintenance Introduction

1.1 General

This service manual describes the maintenance

In this system, we maintenance each PCBA board and each separate components, this manual uses of testing system to complete the troubleshooting steps.

1.2 Tools and Meter for maintenance

●Meter	1 pc
●Long screwdriver	1 pc
●Big flat-blade screwdriver	1 pc
●Small flat-blade screwdriver	1 pc
●Welding Gun	1 pc
●Side cutting pliers	1 pc
●Inner Hexagon Spanner	1 set
●Wireless Electrostatic Wristbands	1 pc
●Electrostatic Gloves	1 pc
●Small Cross Screwdriver	1 pc

1.3 Power requirement

AC Voltage: 110V～220V ± 22V；

·Frequency: 50Hz～60Hz ± 1Hz；

·Input Power: VA≦200VA；

·Please keep the voltage stable；

·The equipment may damage because of power failure interrupt or intermittent power off. .

1.4 Maintenance Safety

 **Warning !**
Don’t dismantle case or control panel by yourself. Installation and maintenance should by engineer of manufacturer or the authorized agent of the manufacturer.

 **Warning!**
The system must be grounded, don’t cut or move the ground line. Otherwise, it is risk of leakage or electric shock.

 **Warning!**
Only the specified auxiliary equipment by manufacturer can be connected to the system.

 **Warning!**
When using, avoid strenuous vibration, keep it away from devices with high field, intense magnetic field or high voltage.

 **Warning!**
Please remain this equipment under the dry conditions to avoid condensation droplets. If move the equipment from a cold environment to a warm environment, the water vapor may condense into water droplets inside of the machine, Please keep the equipment under worm environment at lest 4 hours before turn on, otherwise, it may occur a short circuit.

Chapter Two Summary of ultrasound scanner

Summary

The main board of ultrasound scanner is composed of several layers of printing board and SMT devices; it has high integration level and maintainability. This model can support several kinds of probes for high density electronically linear array scanning and convex scanning. 3.5MHz/R60mm convex probe used for normal checking 6.5MHz/R13mm vaginal probe used for gynecology checking,7.5MHz/L40mm used for small organ checking. This model use DFS,DSC, digital image dealing technology, the image showing on the screen will be very clear, having good, stability, high sensitivity and frequency conversion and strong resolution.

●Ultrasound scanner have B,B/B,4B,B/Mand M displaying mode, 4 levels of image multiplying factor, 256 gray levels, r correction, frame correlation, selectable focus; image can freeze, showing in real time, up/down/right /left revise, depth adjustment, cine-loop; full screen characters edition, real time clock, menu showing and 33 kinds of body mark, track ball as cursor, distance, perimeter, area, volume, M normal and OB checking, Video output : standard PAL-D .

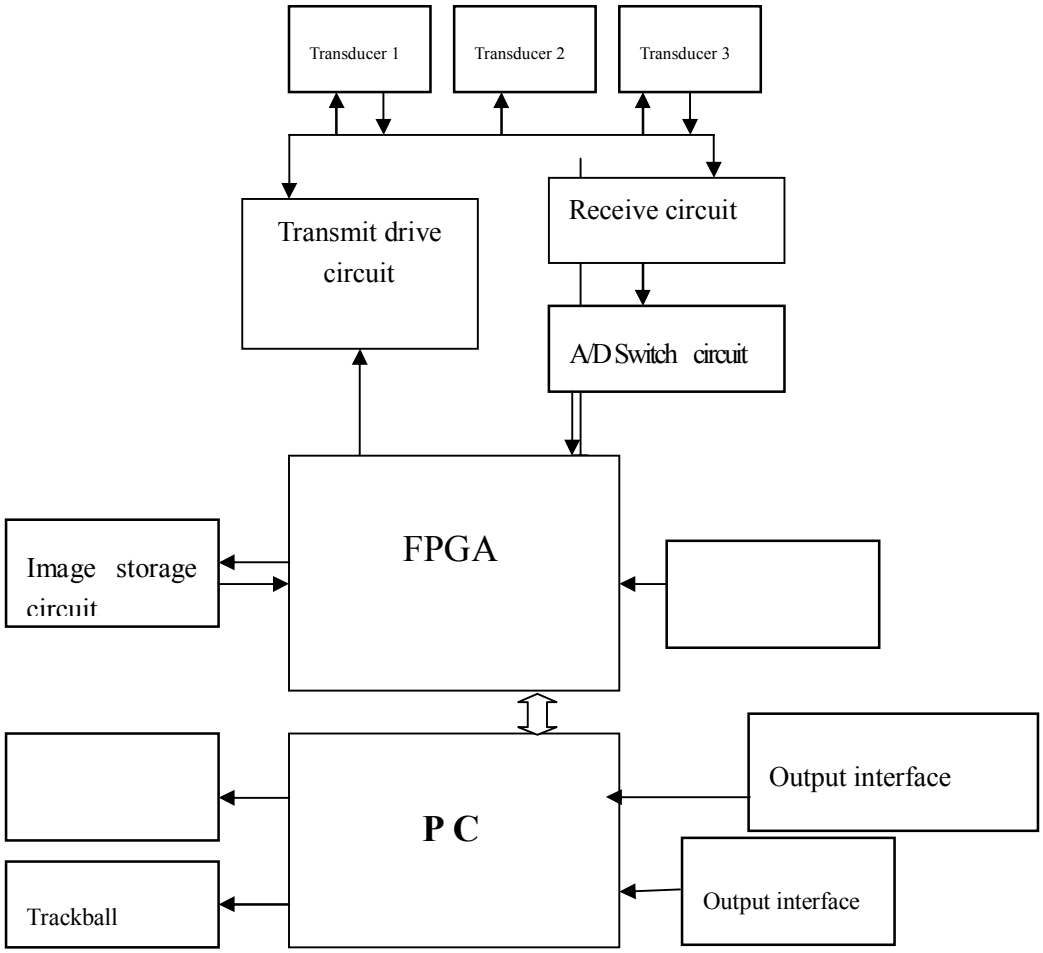
● Ultrasound scanner is trolley structure. Injection Molding main unit, soft touch keyboard with track ball, directive operation, convenient and comfortable, accuracy and stable, beautiful appearance;14 inch CRT screen or 15 inch LCD screen, Rsolution:800*600

● Product are main used in liver, gallbladder, kidney, spleen, heart, uterus, ladder and fetus diagnosis. Also used in abdomen, uterus, contraceptive ring and early pregnancy checking and diagnosis.

Chapter Three System overview and principle of operation

1. System principle picture

1.1 System frame picture

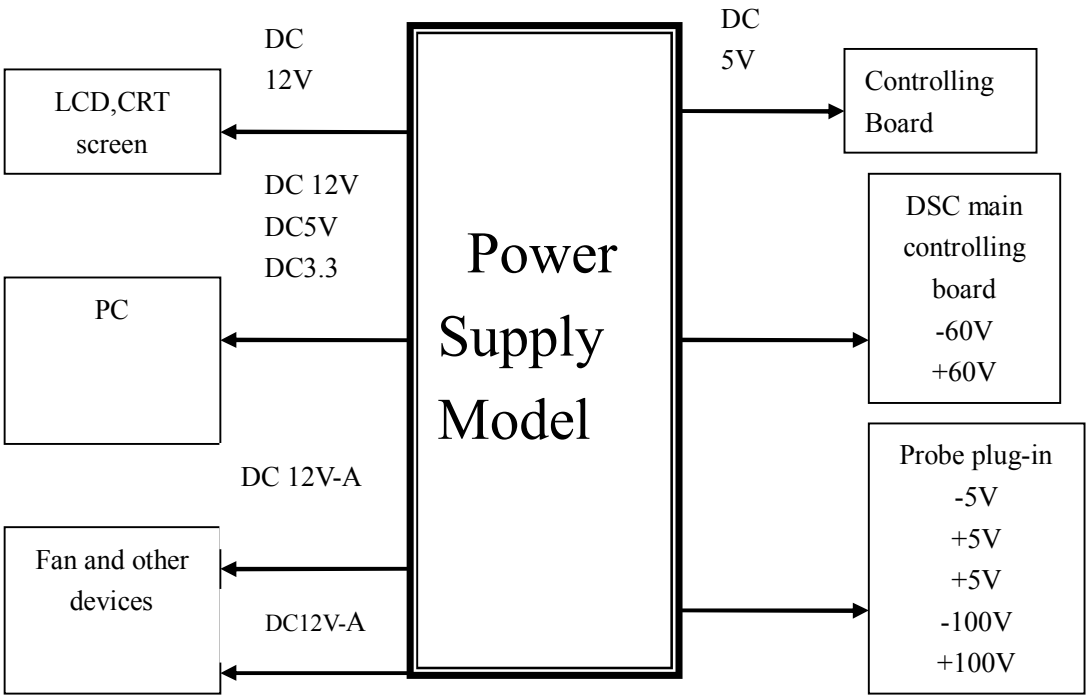


This system is developed as one type of all digital B/W ultrasound scanner under PC system, by using 32 channels for triggering 128 pcs of bimorph, then receive for DIFF, MT8816, plus as analog signal, then A/D high speed sampling, changing analog signals into digital signals. By using FPGA for DBF, RDA, DRA, DRF, DFS and DSC changing, ultrasound digital signals will be showing after PC calculation.

1.2 System power supply connecting picture

System power supply

System power supply OUT defining picture



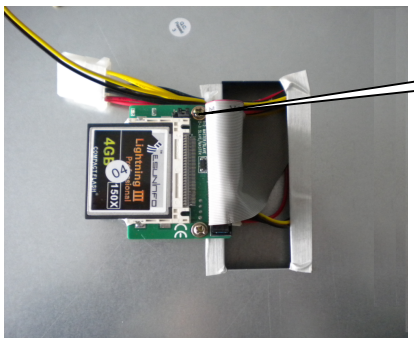
Power supply specification parameters

1	rated voltage	Nominal current	electric network stability	Load stability	Maximum ripples
2	3.3v	5A	±3%	±3%	≦50mA
3	5v	5A	±3%	±3%	≦50mA
4	s 5v	1A	±3%	±3%	≦50mA
5	12v	4A	±3%	±3%	≦50mA
6	-12v	0.5A	±3%	±3%	≦50mA
7	-5v	1A	±3%	±3%	≦50mA
8	+100v	60mA	±5%	±5%	≦100mA
9	-100v	60mA	±5%	±5%	≦100mA
10	+60v	60mA	±5%	±5%	≦100mA
11	-60v	60mA	±5%	±5%	≦100mA
Over current and short circuit protection： output terminal short circuit towards ground，power supply protection，after trouble shooting, restart machine for normal work					

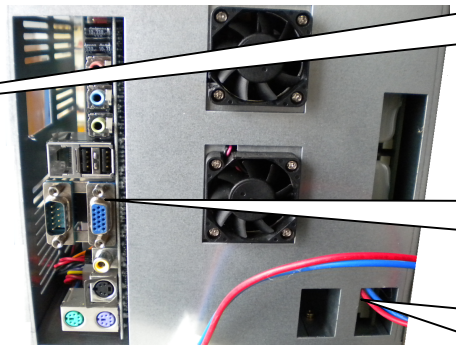
1.3 Main system structure external view

System picture

system vertical view



system left view

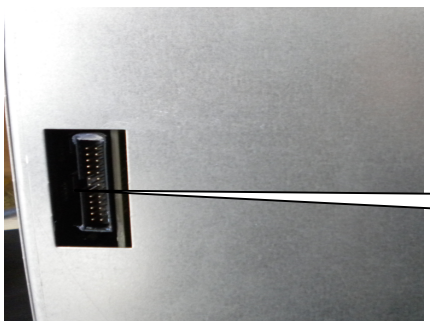


CF card

PC board

AC input interface

System right view

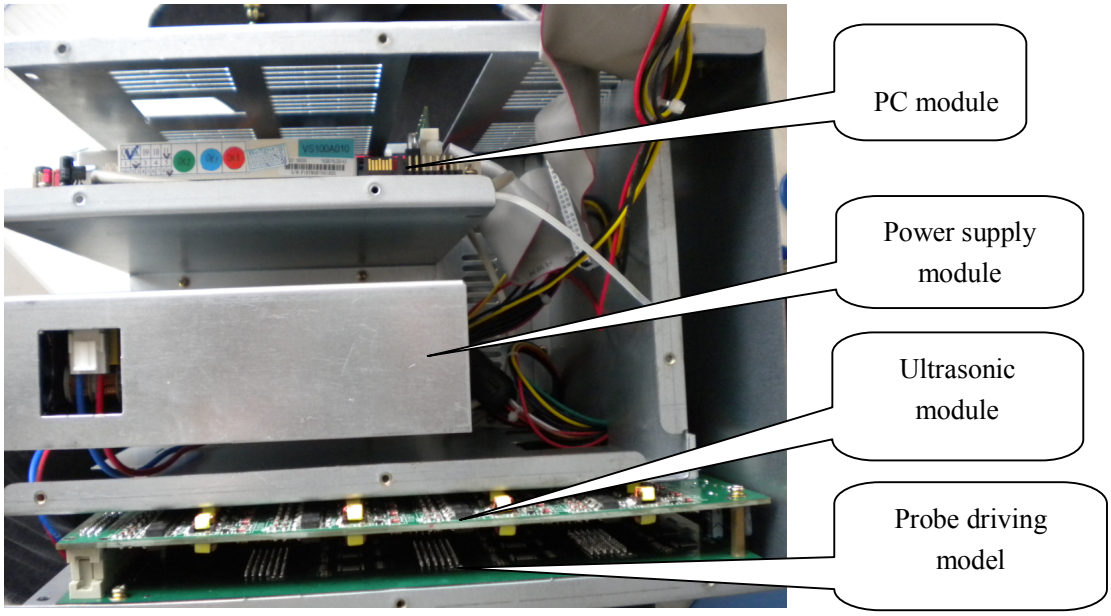


system back view

PC memory bar

Keybpard controlling interface

System inner picture



Main system description

a: Probe driving module：

Including three probe sockets, probe driving circuit, probe ID identifying circuit and receiving circuit. Transmitting probe supply high voltage pluses to ultrasound scanner, by using inverse piezoelectric effect of ultrasound scanner, it's forming the ultrasonic waves to the tissue of people. In order to owning high sound velocity directivity of the ultrasonic waves, improving the lateral resolution of the ultrasound scanner, should adapt electronically focusing method, make waveforms transmitted by each elements of the same sub matrix to the same destination, that's "electronically focusing". Transmitting pulse for making circuit, it will be occurred trigger delay pulse with different corresponding focusing, by receiving circuit module; add to the transmitting circuit, it will occur the corresponding elements of high voltage.

b: Ultrasonic Module：

Including the high voltage driving and motivating circuit which transferred from pluses transmitting circuit to ultrasonic probe elements. By zoom electronic

circuit dealing of ultrasonic analog signals, then come into the A/D digital changing circuit. Digital beamformer image after treatment, image signal cine-loop and microcomputer technology parts. Software set the keyboard controlling information which received from microcomputer system and deal with these commands.

c: Main system power supply module:

Voltage AC110v-220V（50/60Hz）will transmits to the power supply by fuses and switch. AC will be rectifier, sampled, over current protected, voltage regulated by switch, it will get the AC power from every parts, the total power supply transmit is around 200VA.

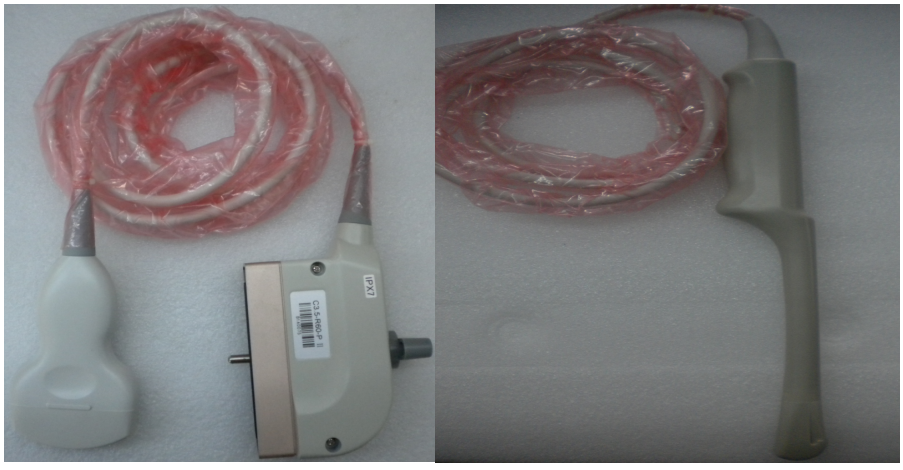
Power supply module have high voltage, do not operate when power supply connecting

d: PC Module:

Including PC system, PC communicating interface circuit, CF card ultrasonic system software

After current discharge：VGA.PS2.USB.RS232.PAL.RJ45.scokets.

1.4 Probe



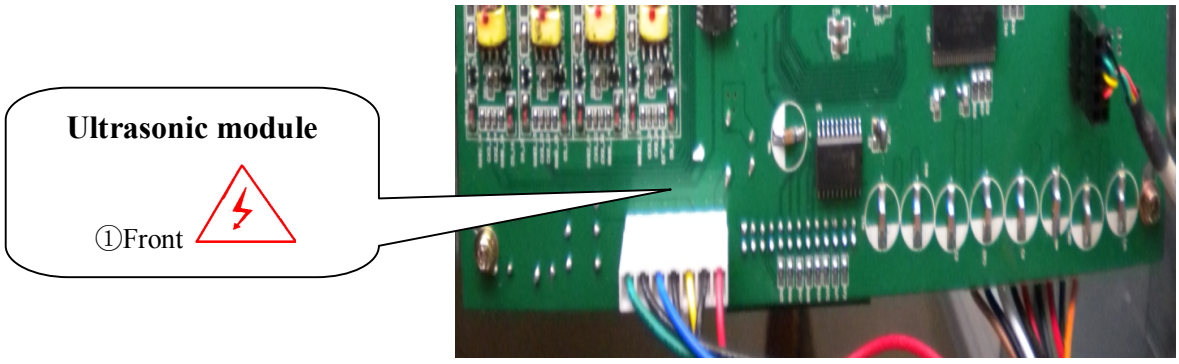
Probe Function Description:

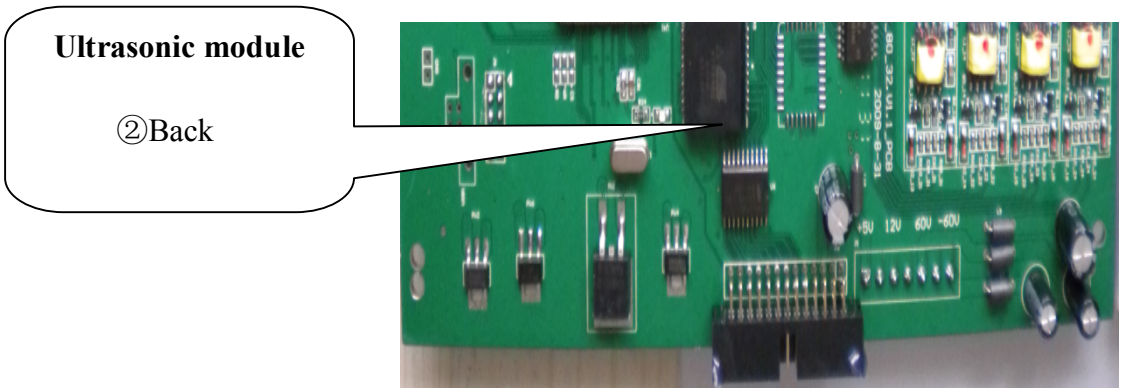
Getting medical ultrasonic image, need professional transducer for having signal detection of the detective part, transducer transmit the high energy ultrasonic to the detective part, detective part will have attenuation and back-reflection during transmitting, intensity of transmitting have relationship with the physical characteristics of detective part, the signal intensity of back-reflection is weaker comparing with energy of transmitting ultrasonic, currently, the ultrasonic probe become into the ultrasonic detecting device, sound and electronic changing by receiving waveforms, at the same time, transfer electronic signals to the zoom electronic circuit of the main system .

ZQ-9902 use m elements probe and n receiving channels, each scanning lines of image comes from corresponding location of corresponding element of probe. Each scanning line can use k pcs of elements as transmitting elements, n elements as receiving elements which take part in the picking up of echo signals.

1.5 Main controlling system board

Main controlling system—socket illustration of ultrasonic module

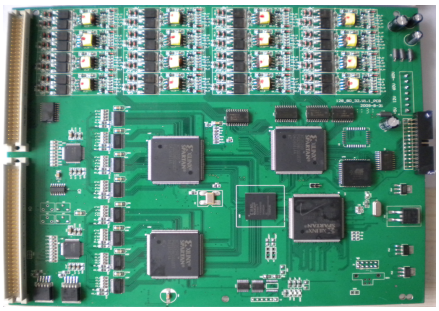




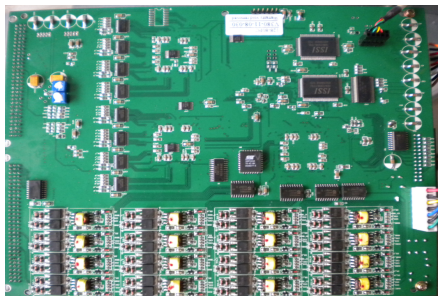
①Front
Power supply socket。1pin-60v，2pin GND　3pin 60V，4pin GND
　　5pin +12V，6pin　GND，　7pin+5V。
②Back
　34 chips DC2-2.54-34T　Controlling board connect with flat Sling

Main controlling board is the key point of the machine, dealing with all kind of signals, pictures are as follows

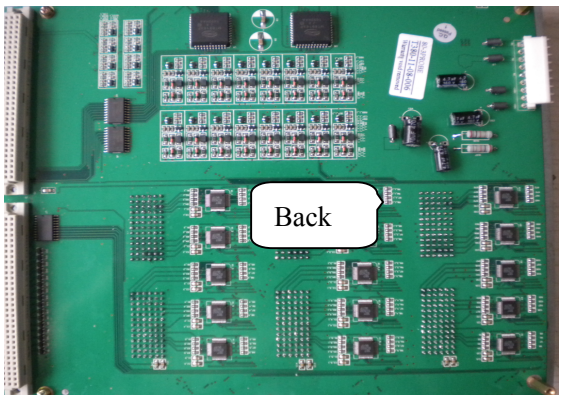
Back

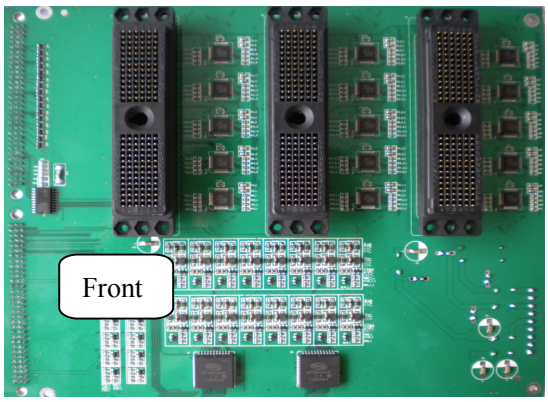


Front



1.6 Probe driving and shifting board





①Back
Power supply socket 1pin-5v，2pin GND 3pin +5V，4pin GND
　　5pin +5V，6pin　GND，　7pin-100V，8pin GND，9pin+100V。
②Front
　Three pcs of 156 chips of probe sockets

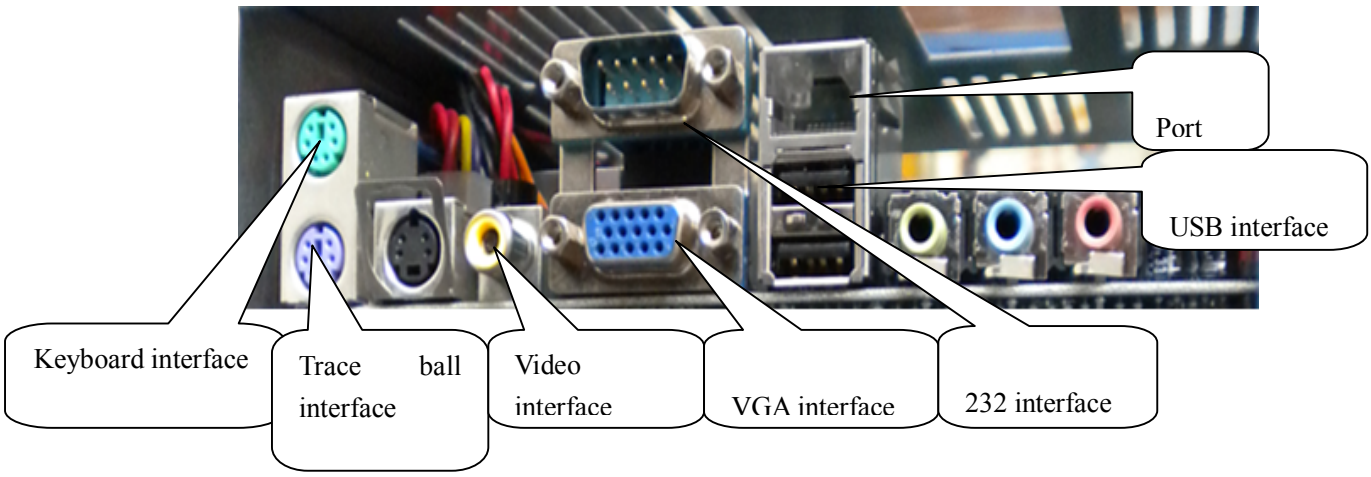
The main function of probe shifting board parts is that connecting main board

probe and finish changing of the probe.

Three probe sockets of ultrasound scanner can connect with each probes, automatic identifying. Different probes have different identifying code.

System can be connected with convex probe, linear probe, transvaginal probe, micro-convex probe and rectal probe.

1.7 PC Control board



The keyboard interface connects the panel control board through connecting wire.

The port of the trace ball connects the panel control board, the control of the trace ball

The video output connect the port of the video output in back board by connecting wire, while the VGA output connects the port of the VGA output in back board by connecting wire

232 interface--Serial interface definition port

USB interface connects the USB board in back by connecting wires in order to save the image

Port is the transfer interface of the DICOM picture

II. Whole machine drawing

main system components of ZQ-9902 series

Front view

Back output view

Chapter Four Machine dismounting of components

I. Regulation and disassembly of monitor

1、monitor parameter

◆size： 15 inch, medical LCD Display

◆Resolution：screen display：1024 Piexel * 768pixel.linebyline display without flashing

◆Constitution：the appearance display is composed by 1.display screen、2.back shell of display、3Front frame of display 4.Regulator、5.Sway back base of display

2、Display regulator

The location of display can be adjusted for easy in watching

◆ Rotating 60°right or left, tilting 15°up or down.

◆The display can tilt to the most appropriate angle for watching

◆The display can pitch before and after

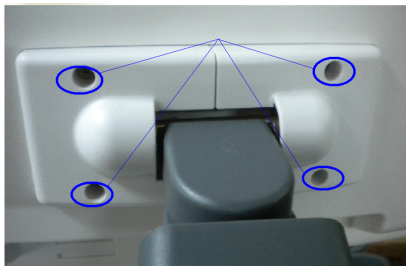
◆ Contrast and brightness adjustment

The adjustment of contrast and brightness is the most important factor of getting the appropriate image. If the settings of the adjustment is incorrect, then the gain, times compensation, dynamic range and even voice output need to be adjusted by frequent changes

◆the display adjuster is under the screen as the following picture:

3、Display dismounting

1).picture as shown： 2.1



Remove 4 screws and open the damping axis cover by cross screwdriver

2)． Picture as shown：2.2

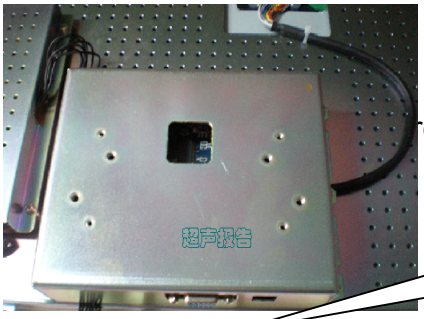
Remove 4 damping axis screws by cross

screwdriver

3). Picture as shown：2.3

After removing the 7 screws in display back cover by cross screwdriver and opening the trips around, the back cover will be opened

4). Picture as shown：2.4

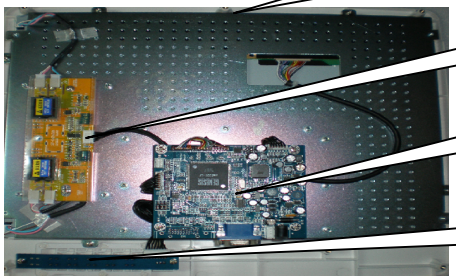


Remove the hardware screen can in

rd

by cross screwdriver

5).

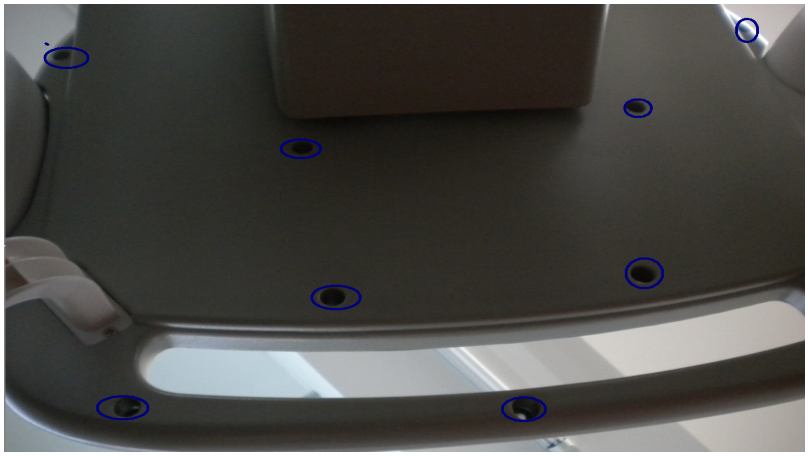


（ Monitor internal structure）

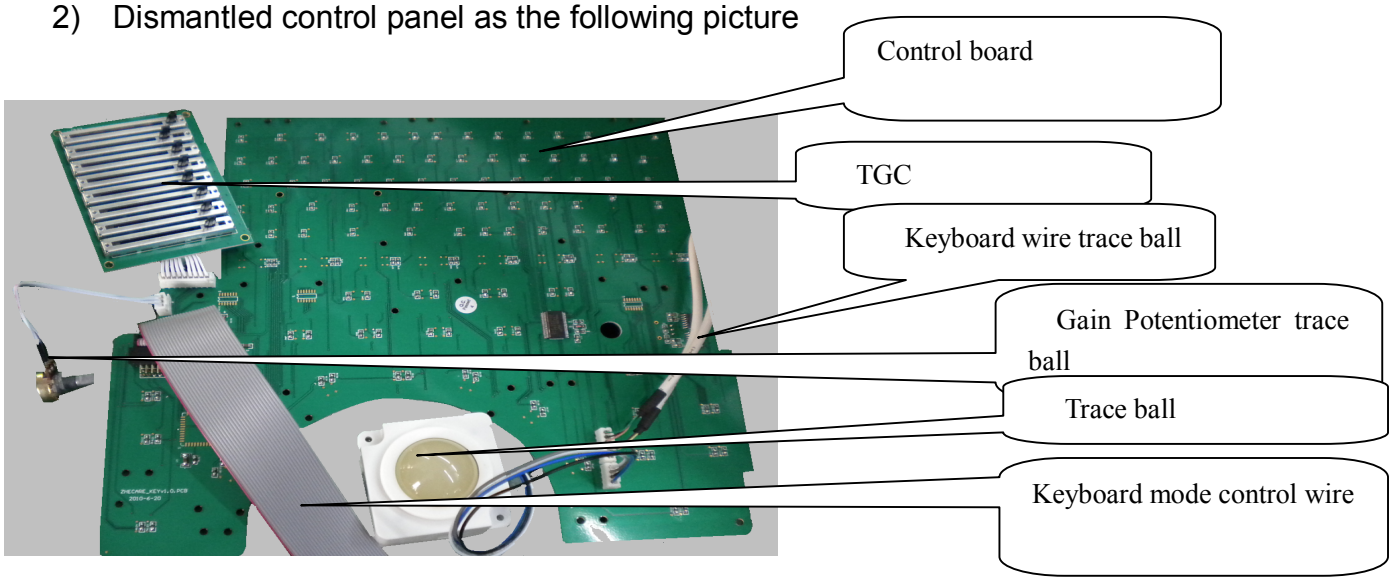
II. Control panel dismounting

1 Control panel dismounting as the following picture

1). Remove the screws at the bottom of the control panel by using cross screwdriver



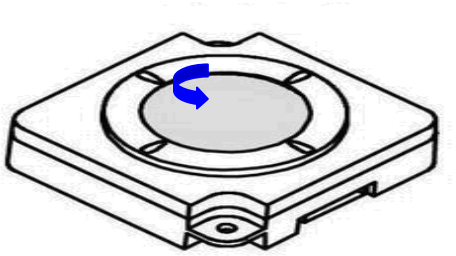
2) Dismantled control panel as the following picture



3). Probe hanger connector

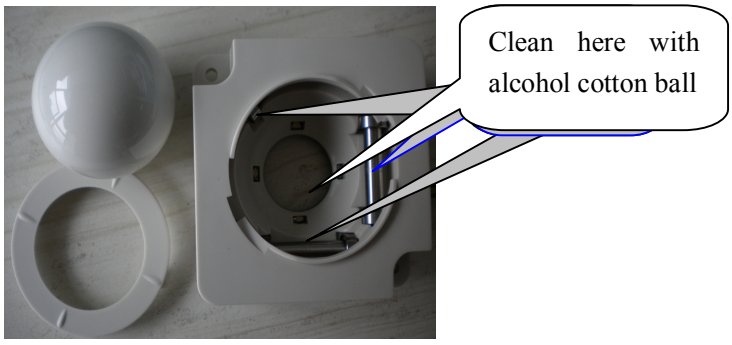
2，Dust removal of trace ball

1). Remove the shied of trace ball toward the rotation direction as the following picture shown



2).

3). Key cleaning place



III. Dismounting panel and functional module

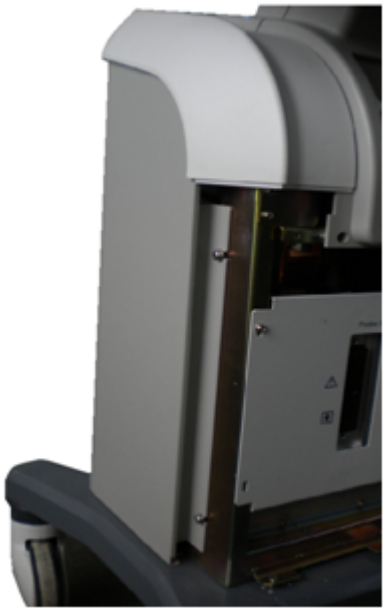
Lock the 2 front casters and fix B-ultrasound machine before dismounting

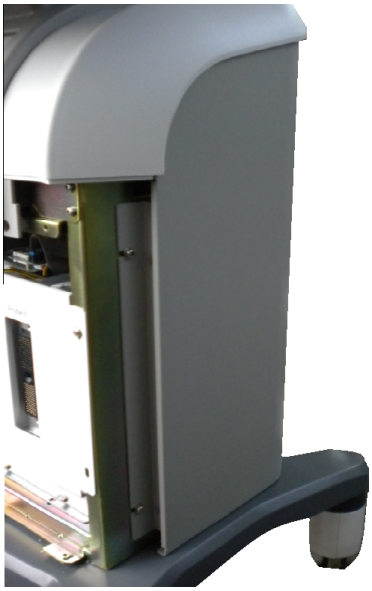
1，Take down the back panel

3-1　Back panel view

1). Take down the back cover by using hexagonal wrenches

figure3-2





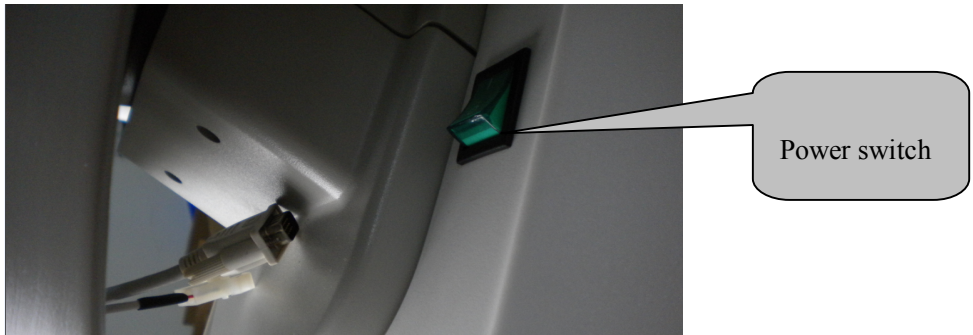
Location of damper as shown in figure 3-3

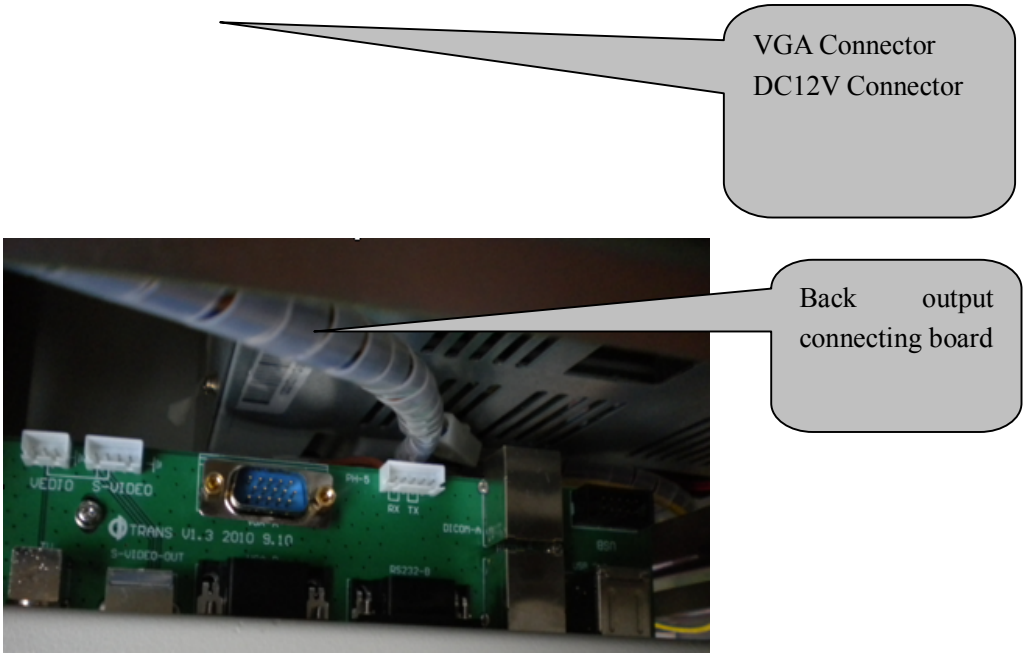
Location of front damper as shown in figure 3-4

Screw in bottom

- Three screws in bottom must be removed before the front frame being removed

Location of front damper as shown in figure 3-4





Chapter Five System detecting

Power on shelf detecting

When switched on power, it reacts as below:

- ◆the light of monitor and machine power is on
- ◆the system begins to initialize during this period
- ◆Buzzer blares
- ◆the key in control panel shows backlight
- ◆.system self-test: the test status will be shown in the monitor screen
- ◆the initialization of probe needs a few seconds
- ◆.The system can't detect the channel interface when system initialization being finished without connecting prober, then stay in the status of no image and echo in cavity
- ◆the system automatically in B mode after the initialization completes, please refer to "operation manual" for scanning

Caution: the error information will showed up under the screen if

something goes wrong. Please frozen the probe and take a picture of the error information for reference ask for technical service from Manufacturer if needed.

Chapter Six Trouble shooting

I. Essential requirements

Due to the ultrasound diagnostic instrument with complex circuit and compact structure which is High-grade black and white ultrasound diagnostic instrument researched and produced by our company ,the maintenance man should be professional engineering technician with following essential requirements

☆Understand the structure and operation principle of the instrument systematically

☆Be aware of the role of each control keys and knobs, the function of each command in menu and the status of normal working

☆Have the necessary testing tools and meters

☆Maintain the machine if necessary

II. Essential steps

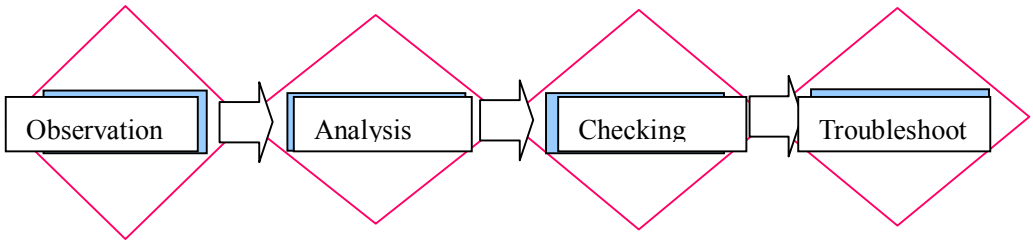
Although ultrasound diagnosis instrument is a sophisticated and complex electronic device, the fault is unavoidable sometime, and the fault reason summarized in three categories

I: Natural loss of the instrument. All kinds of components are used in certain period ,if used by exceeding the term of the use ,the phenomenon of aging ,metamorphism ,insulation lower and mechanical wear, even complete failure, leakage of electricity which will cause circuit trouble maybe appear,

II Wicked using environment and condition: the temperature of the environment, extreme humidity, corrosive gas and dust in the air, vibration of the instrument and excessive volatility and so on, when in severe cases, it can cause failure instantly

III Human failure: the delayed or unsuitably maintenance and violating the operation rules because of the lack of responsibility will lead to the trouble

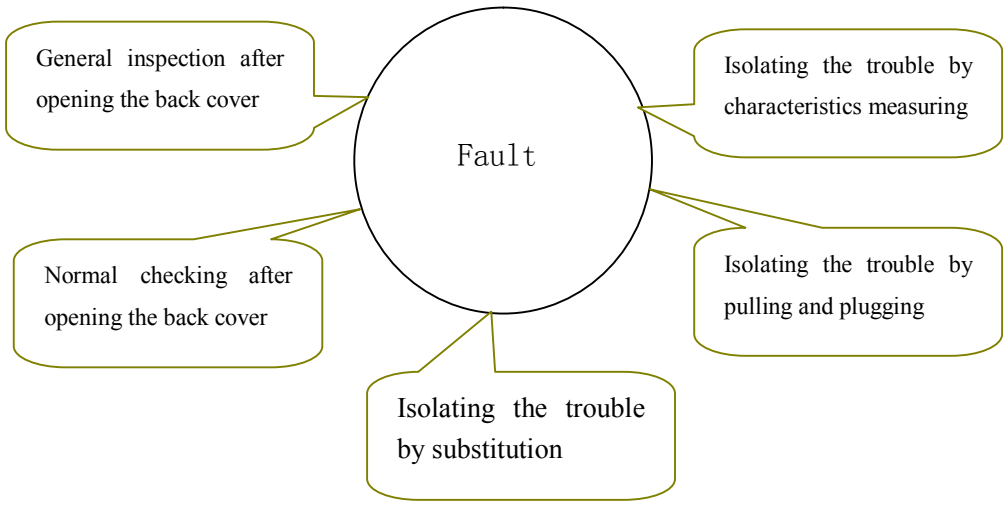
Four steps for maintaining the system trouble in order



Basic method of maintaining the system trouble

The key point of the troubleshooting is isolating the trouble, so the method to troubleshooting is actually the method to isolating the trouble, figure out the real location of the trouble and the finally find out the components with trouble, the commonly used method as the below:

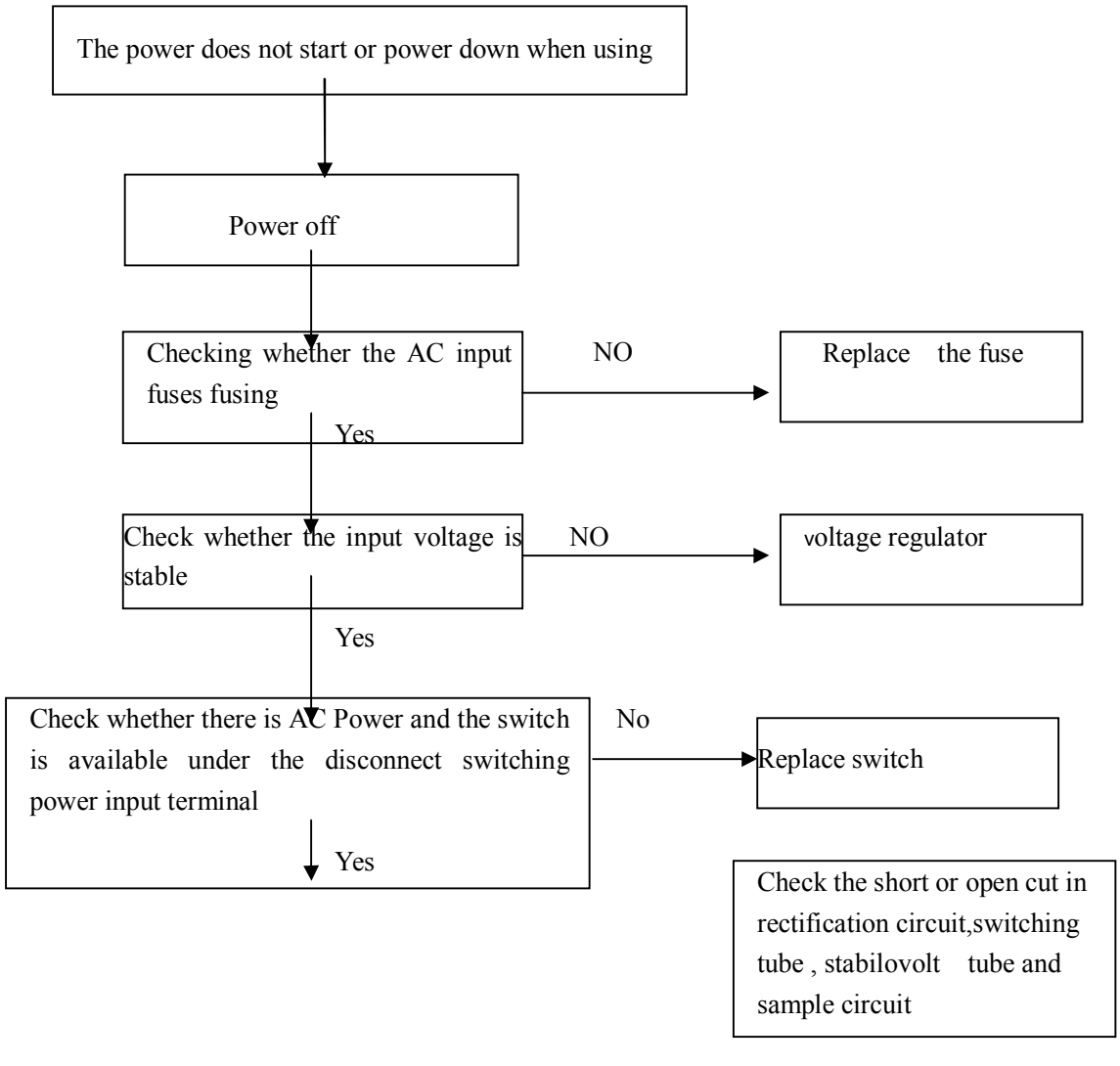
Basic method of troubleshooting

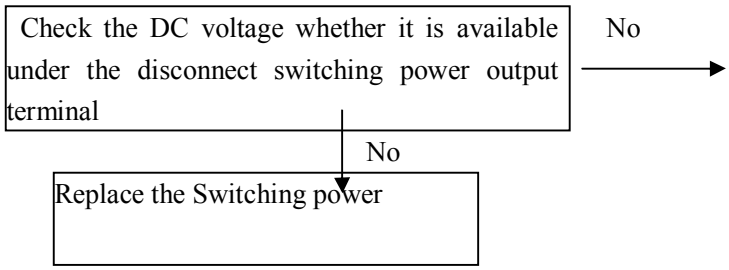


Chapter Seven The analysis of typical trouble

Common faults of ultrasonic diagnostic equipment are as follows: there is no output voltage, low output voltage, high output voltage, high output voltage fluctuation, high output ripple. The main reasons that lead to those faults are damage of integrated circuit, crystal triode and electrolytic capacitor. The amending method of PC faults is no differences of normal computer amending method. For PC faults, engineers can amend it according to some computer amending books. For main board fault, need to exclude some reasons according to the fault phenomenon, After getting rid of fault, the functions of machine need to check according to the user manual of machine. The normal faults and excluding method are introduced as follows:

1、 Power troubleshooting





2. LCD monitor troubleshooting

◆ After turn on the machine, if nothing displayed on the monitor, please adjust the contrast and brightness buttons to check whether there is change, then check VGA cable to connect or not, and check the input voltage is normal or not.

◆ After turn on the machine, the red light on the adjustment board will be shine. After10 seconds, the green light will be shine instead of the red light.

◆ After turn on the machine, if the red light don't shine, please check whether DC12V is normal or not.

◆ If the red light is lighting for a long time after turn on the machine, please check whether the input of VGA is normal or not. （ VGA type：R.G.B.H.V）

◆ If there is no display on the monitor after turn on the machine and the red light has changed to be green light, please check data interface and lamp is light or not.

If there is no change after adjust the contrast and brightness knobs, or replace the VGA cable, maybe it is because that the monitor broken or the computer monitor display settings of parameters on failure. Please change the monitor or the plug-ins of the main computer system.

*****Please make sure to connect VGA with DC cable before turn on the machine*****

3. Control panel troubleshooting

If the control panel doesn't work in normal, the abnormal conditions include: no power, key failure, tracking ball failure, encoder failure, TGC rod failure.

If it is just one failure, please check the solution as following:

1) No power: check the connection cable of the control panel is normal or not.

2) Key failure: the keys are depressed, or failure of silicone key.

3) Tracking ball failure: clear or replace the tracking ball.

4) Encoder, potentiometer failure: replace the corresponding encoders, and potentiometers;

If there are some items failures, please inspect or replace the connection. If the failures can't be solved, maybe it is because the control circuit on the control board works abnormal, please replace the control board group. If the failures still can't be solved, please replace the main system parts, computer main board or main control system—ultrasound module. The display mode of the system will be controlled by the main system-ultrasound modules, the rest parts will be controlled by the computer main board.

4. Main system troubleshooting

1）The images has flashing interference under the B mode

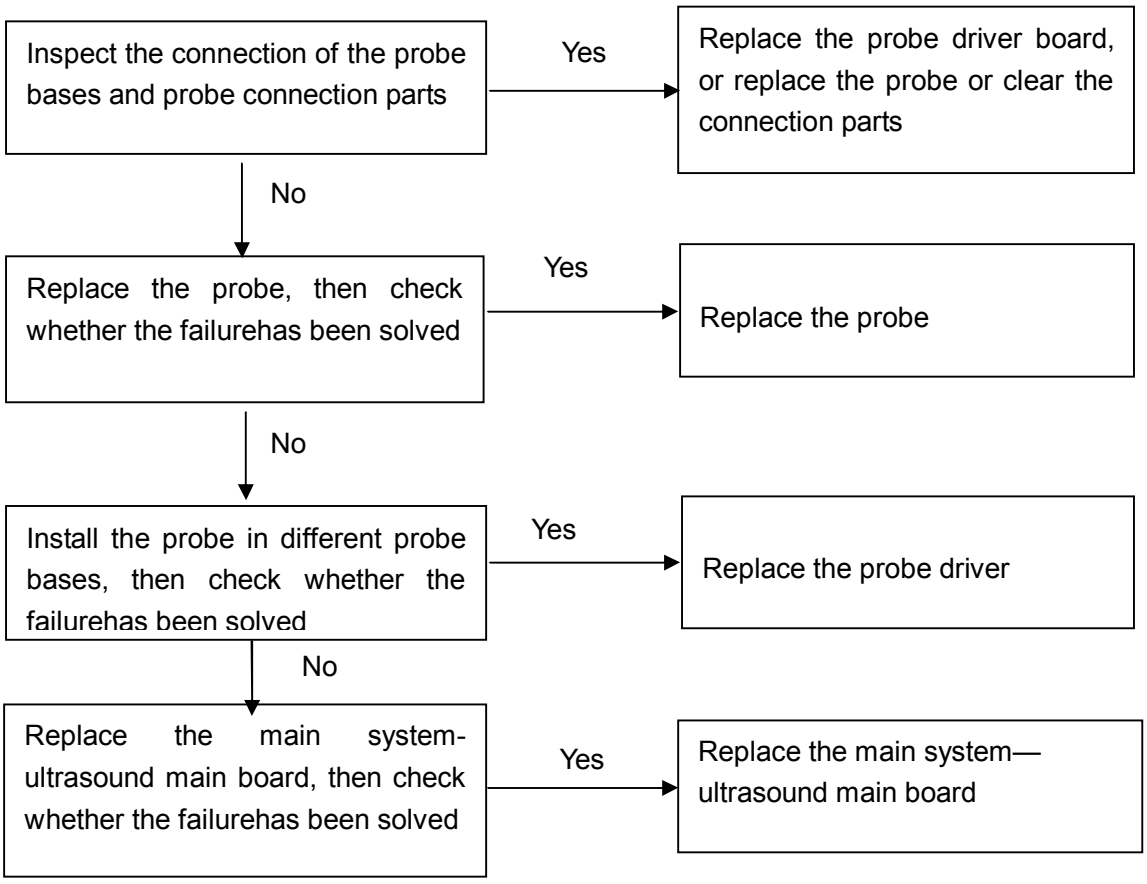
Ⅰ check whether there are nearby sources of interference;

Ⅱ check whether the power line network and take strong jamming equipment;

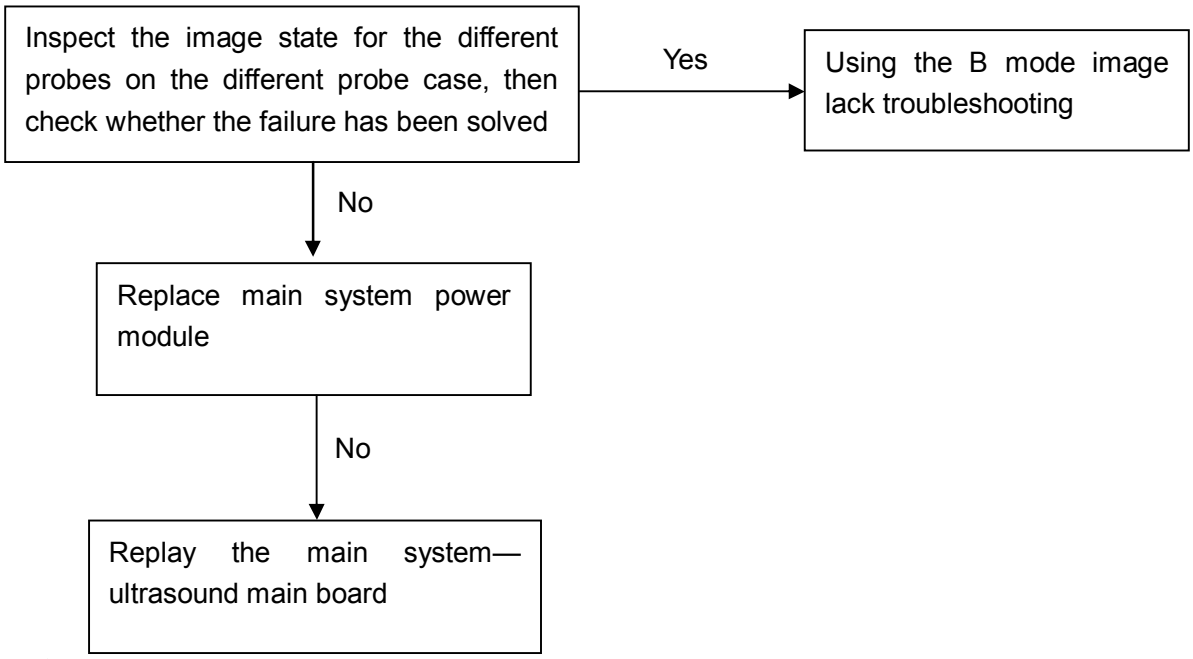
Ⅲ check whether the machine reliable ground;

Ⅳ Check the probe is then good

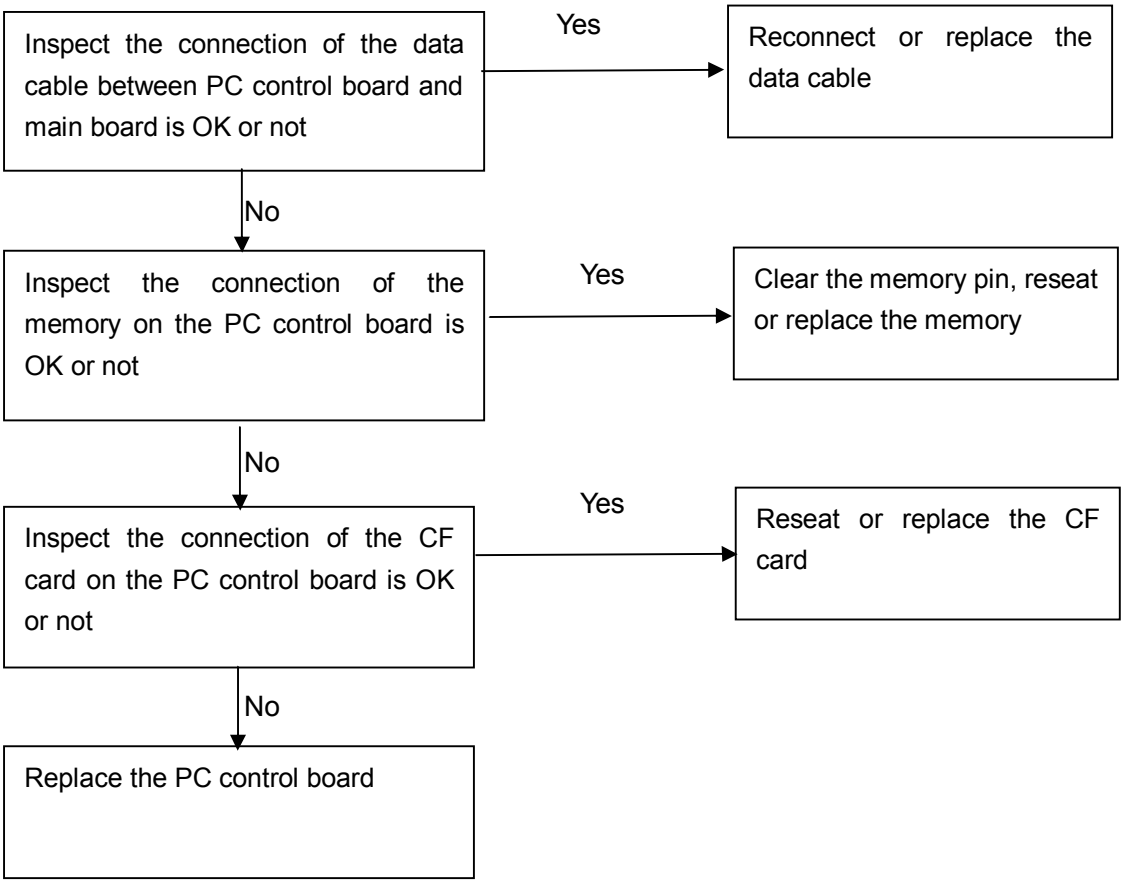
2) In the mode B, the images are missing. Or the images have fixed defects, such as bright spots, dark areas and so on.



3）Display mode works normal, echo image completely disappeared



4）The output of the DC power for every power modules work normal, display the blue screen, can't enter into the ultrasound system, and some noise from the machine.



5）I/O back board troubleshooting

I/O back board has failure，please refer to the following sheet:

ID	Failure	Possibility	Remark
1	Fan doesn't work	■ +12V power abnormal ■ Power cable failure ■ Fan failure	■ Inspect the +12V voltage on the power module
2	Serial ports failure	■ Power cable failure ■ PC control board failure	■ Replace the serial ports cable ■ Replace PC control board
3	USB interface problem	■ Power cable failure ■ PC control board abnormal	■ Replace USB cable ■ Replace PC control board

4	VGA\Video output failure	■Power cable failure ■Power cable connector failure ■ PC control board abnormal	■ Inspect the responding power cable ■ Inspect the responding connector ■ Replace PC control board

Chapter Eight System update

System update:

① Copy the update update files into the USB directory, then connectted into the output interface of the USB

② In the real-time display mode, move the tracking ball into the menu "system update" in the left of the display interface,press "SET", the system will pop-up menu box automatically.

Figure update menu:

Press “SET” to confirm it.

Chapter Nine Maintenance

I、The basic instruction of the cleaning o the main system

Cleaning：

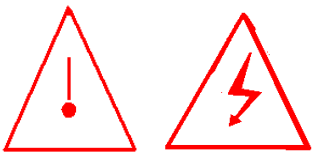
1. According the environmental states, clean the dust inside and outside the machine periodically. We suggest clean it per 6 months.

2. Inspect the circuit carefully, to check whether there are abnormal or broken items, then analysis and solve the abnormal failures.

3. Clean the connector and high voltage insulation by the ethanol, to protect the connection of every electrical part and prevent the high voltage insulation to be dirt or leakage.

4. Fasten every screws and connector, to make sure the connection of the system power is good and stable.

5. Inspection the performance of the control board, and adjust every control button, to make sure the machine works well.



Please don’t clean the machine when it is power on.

Cleaning method：

1. Cleaning the dust inside or outside the machine: Firstly, please clean the dust on the convex parts, then open the machine cover, clean the dust inside the machine. When cleaning, please open the vacuum cleaner, and then use the vacuum cleaner and small brush together. Because the circuit component inside the machine is complex and compact, so please remove the circuit parts off if necessary.

2. Plug parts cleaning: After clean the dust inside the machine, please use some detergent to clean the dirt and rust on the electrical connector. The detergent can be alcohol (ethanol or the concentrations higher than 95%

ethanol) or carbon tetrachloride. Both of these two types of detergent are colorless liquid with a pungent smell and easy to be evaporated.

3. Avoid wet: If the machine is wet inside or after you use alcohol clean the machine, please use the fans or blowing hot air fans to avoid wet.
4. Tight reinforcement: Check and tighten every screw.
5. Unified service: timely and necessary inspection.

2 System maintenance methods and cautions:

1. Maintenance should establish a scientific system. Exterior maintenance should be carried out every day, mainly outside of the instrument is clean, and inspect panel knobs and switches; Inside maintenance should be based on use of the environment on a regular basis, generally not less than twice a year, construction in late spring and Autumn two quarters, because the spring and more humid climate in summer and early autumn are hot, they are likely to cause adverse effects on the instrument.

2. The external maintenance is operated by the operator, machine maintenance should be chaired by the engineering staff, assisted by the operator, must not blindly open the cover for maintenance.

3. In the implementation of machine maintenance, make sure no power on, and unplug the system power cord, to make sure the personal safety.

4. After the maintenance, please inspect the machine cable and connectors, to prevent incorrect or in connection with machine tools and other forgotten the case of electricity, then test the machine after confirmation.

5. In the maintenance, don’t move the circuit parts or connect cable, and don’t

rotate every component.

6.

Washing the machine internal components is Prohibited, nor scrub motor windings, commutator, transformer, plexiglass, cables and other rubber products with gasoline, kerosene and banana oil. Alcohol and carbon tetrachloride on the rubber and other organic materials also have dissolution, and therefore can not be used to scrub the cable, rubber cable, gelatin plate and painting parts. For these organisms, can be scrubbed with the wet wrung cloth.

7.

On the Gold-plated (or silver) electrical contacts connector part, is strictly prohibited to be polished with gauze or other metal objects, and not touched with bare hands, so as to avoid corrosion caused by perspiration.

Properly use various tools, to prevent the fixing screw from damaged torque.

II、 System maintenance Probe

Probe function: It is used to transmit and receive ultrasound parts, called probe, ultrasonic probe is an electro-acoustic transducer. It transforms the high-frequency signals lunched by the instrument, via the vibration of the crystal by the probe, into the ultrasound into the body tissues ; then reflected ultrasound, on the ultrasound probe crystal, and then transform ultrasound into a high-frequency ultrasonic signals, displayed on the screen it is an indispensable part of the ultrasonic diagnostic apparatus .the instrument sensitivity, resolution and size of artifacts interfering is related with the performance of the probe.

2、Probe model

Probe model number is labeled in the probe handle and the top of the connector shell, so that when installed on the main unit is easy to see, select the probe, the probe model automatically displayed in the upper right corner of the monitor screen. ZQ-9902 configuration R60 abdomen convex array probe and R13 gynecological vaginal probe.

From the ergonomics point of view, probe design has the following characteristics:

- ●easy operation, easy to carry
- ● one end connected to the main unit
- ● lightweight, stable
- ● smooth edges, smooth surface
- ●suitable for the length of cable connected to the system

Label

Each probe has information as below

Operating frequency

Probe Series number

3、probe connected and disconnected

The probe can be connected and disconnected when system is in freeze mode, the probe starts, the system preset parameters, such as depth, focus number position and other parameters are also activated. Please see the details of operating instructions.

4、probe examination

After using every time, check the surface of the probe cable and shell if there is damage to the probe into the liquid, if there is damage, before site

engineers without inspection, repair or replacement, do not use this probe again, otherwise maybe cause some harm to the patient.

5、Probe cleaning

Clean the probe after daily use, the following is the method commonly used in cleaning the probe.

☆. Disconnect the probe and the ultrasound console, wipe with a soft cloth to all the gel and wash with water.

☆. Clean with mild soap and warm water.

With a soft cotton balls, gauze or other fabric wipe visible residue on the probe surface. If things dry stains on the surface of the probe can be extended soak time or with a soft brush (such as a toothbrush) to clean.

☆. With sufficient potable water to wash the probe surface residual soap.

☆. Air-dry or dry with a soft fabric.

☆. Clean the gel on the probe with a mild soap or water when the daily work is over, you can also wash the residual disinfectant on the probe, wipe with a soft cloth.

☆. After finishing use, press the freeze.

6、Probe maintenance

☆ Probe is a very sensitive device, improper operation, easily damaged, even in the non- use of state probe should be also gently, carefully protected.

☆ If improper operation or exposure to certain chemicals, ultrasonic probe can be easily damaged, do not follow these precautions can result in injury or equipment damage.

☆ Each probe has a specified level of immersion, immerse the probe in any liquid, not to exceed the range. Never in any liquid immerse probe connector or probes adapter.

The probe should avoid mechanical collision and extrusion ； the probe cable do not excessively bend or pull .

☆ Do not let the probe soak in the alcohol, bleach, chlorine and hydrogen peroxide solution.

☆ Probe model number is labeled in the probe handle and at the top shell of connector, do not eroded by using detergent.

☆ The different probe cables do not cross each other, not violent bent, the wheel should maintain a certain distance.

☆ The cable should minimize the use of general cleaning agent or disinfectant.

Complete scan and clean the probe after inspection, we should put probe on the probe holder or probe box, in order to ensure against damage. Probe storage environment refer to *Operating Instructions*.

☆ Avoid touching with liquid gel containing mineral oil or lanolin.

☆ Avoid temperatures above 60 degrees.

☆ Check whether the shell surface of the seal of probe damage or functional degradation. Do not use damaged or faulty probe.

7、special maintenance requirements

☆ We should maximize the spread of disease prevention, need to use protective isolation device .should use sterile sets.

☆ In clinic, there is any risk of infectious cases, can use the probe protective cover.

☆ If asked sterile clinical course, you should use sterile sets.

8、preventive measures

To prevent damage to the probe, gel shouldn’t contain the following ingredients:

☆ Methanol, acetaldehyde, isopropanol or other alcohol products.

☆ mineral oil

☆ iodine

☆ detergent

☆ lanolin

☆ aloe essence

☆ olive oil

☆ methyl or ethyl phenol

☆ dimethyl silicone grease

☆ para hydroxyl benzoic acid

☆ benzoate

☆ hydroxyl benzoic acid methyl ester

☆ hydroxyl benzoic acid ethyl ester

☆ glycerol

Chapter Ten Others

I. The fuse tube specifications

Fuse tube specifications: Delayed Φ5x20 rated
Voltage : 3.15A/250V

II. The use of Puncture guide

☆ puncture guide-line adjustment

Guide line and puncture needle image can not be coincided, this is completely normal, because the puncture guide is a mechanical device, long-term use will have wear and tear , it will inevitably lead that image and guide lines do not overlap. You can adjust needle angle of puncture guide, the image is coincident with or parallel to the guide line.

In actual use, generally not overlap, there is an error of about 1.5 mm, then please try to adjust, so that the image in parallel with the guide line .

☆ Direction of guide-line

The direction of guide-line can not be changed, so to match the habits. But on the screen can realize the function of turning up and down, left and right.

Statement

The company has reserved the right to change product design and specifications, if change without notice.

If there is a little difference that led in the printing process between manual picture and real product, please place real products.