Statement

SonoScape Co., Ltd (hereinafter called SonoScape) owns the intellectual property rights to this manual, and also maintains the contents of this manual as confidential information. This manual is a reference to operation, maintenance or cleaning for the product and does not convey any license under the patent rights of SonoScape, nor the rights of others.

This manual contains the information protected by copyrights or patents. Reproduction, amendment or translation of this manual in any manner whatsoever without the written permission of SonoScape is strictly forbidden.

All information contained in this manual is believed to be correct. SonoScape shall not be liable for errors contained herein or for incidental or consequential damages in connection with the furnishing, performance or use of this manual. SonoScape does not assume any liability arising out of any infringements of patents or other rights of third parties.

This manual is subject to change without prior notice and legal obligation.

Manufacturer's Responsibility

SonoScape is responsible for the effects on safety, reliability and performance of this product, only if:

● all installation operations, expansions, changes, modifications and repairs of this product are conducted by SonoScape authorized personnel;

● the use or application of the product or the use of parts or accessories is approved by Sonoscape.

● the electrical installation of the relevant room complies with the applicable national and local requirements; and

● the product is used in accordance with the instructions for use.

About This Manual

Signal words in this manual are defined as follows. Please understand their meanings clearly before reading this manual.

Signal Word	Meaning
⚠ WARNING	Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.
△ CAUTION	Indicates a potentially hazardous situation which, if not avoided, may result in malfunction or damage of the system.

NOTE	Indicates precautions or recommendations that should be used in operating the system.
☣	Indicates a potentially biological hazardous situation which, if not avoided, may result in disease transmission.
Boldfaced Word	Indicates keys and controls located on the control panel, or on-screen objects such as menu items or keys.

Contact Information

Manufacturer: SonoScape Co., Ltd.

Address: Yizhe Building, Yuquan Road, Nanshan, Shenzhen, P.R. China

Zip Code: 518051

Tel: +86-400-678-8019

Fax: +86-0755-26722850

Website: http://www.sonoscape.com

E-mail: service@sonoscape.net

EU Representative: SONOMED

Address: Via Luigino Tandura, 74-00128 Rome, Italy

Tel: +39-06-5082160

Fax: +39-06-5084752

http://www.sonomed.com

Contents

Chapter 1 Warranty & Service

This chapter describes the important information for servicing information.

1.1 Customer Service

Only the service personnel of or authorized by the manufacturer can service the ultrasound system. Any feedbacks or inquires concerning our product or service should be directed to the following address.

Address: Yizhe Building, Yuquan Road, Nanshan, Shenzhen, P.R. China

Zip Code: 518051

Tel: +86-400-678-8019

Fax: +86-0755-26722850

E-mail: service@sonoscape.net

1.2 Warranty

The warranty extends to,

- all installation operations, expansions, changes, modifications and repairs of this product are conducted by SonoScape authorized personnel;
- the use or application of the product or the use of parts or accessories is approved by Sonoscape.
- the electrical installation of the relevant room complies with the applicable national and local requirements; and

The warranty service shall not extend to:

- any SonoScape product which has been subjected to misuse, negligence or accident;
- any SonoScape product from which SonoScape's original serial number tag or product identification markings have been altered or removed;
- any product of any other manufacturer.

1.3 Return Policy

In the event that it becomes necessary to return this product or part of this product to SonoScape, the following procedure should be followed.

1. Return Authorization
   Contact the Customer Service to obtain an authorization number, the number must appear on the outside of the shipping container. Returned shipments will not be accepted if the number is not clearly visible. Please provide the model number, serial number, and a brief description of the reason for return.

2. Freight Policy
   The customer is responsible for freight charges when this product is shipped to SonoScape for service (this includes customs charges).

3. Return Address
   Please send the part(s) or equipment to the address offered by Customer Service.

Chapter 2 Safety

This chapter describes the important information for operating this ultrasound system. To ensure the safety of both operator and patient, please read the relevant details in this chapter carefully before using this system.

You should be thoroughly familiar with the precautions provided in this manual. Otherwise, the manufacturer is not responsible for the effects on safety, reliability and performance of the ultrasound system.

2.1 Intended Use

The ultrasound system is intended for the following applications: Fetal, Abdominal, Pediatric, Small Parts (including breast, testes, thyroid), Cardiac (pediatric and adult), OB/GYN, Urology, Musculoskeletal, Superficial Musculoskeletal, Peripheral Vascular, Trans-rectal, Trans-vaginal, Trans-esophageal (Cardiac) and Laparoscopic applications.

The ultrasound system also provides the measurement and calculation packages used for clinical diagnosis purposes. For details, please refer to Advanced User Manual.

Contraindication: The ultrasound system is not intended for ophthalmic use or any use causing the acoustic beam to pass through the eye.

⚠ WARNING Precautions must be considered in the use of any application. Otherwise, it may result in system damage or serious injury.

2.2 Safety Precautions

Read and understand all precautions in this manual before attempting to use the ultrasound system. Keep this manual with the ultrasound system at all times. Periodically review the procedures for operation and safety precautions.

2.2.1 Electrical Safety

⚠ WARNING
- Only qualified physicians or sonographers can perform ultrasound scanning on human subjects for medical diagnostic reasons.

- Any unauthorized personnel should not tamper with the main unit of this system.

- Do not operate this system in an atmosphere containing flammable gases or liquids such as anesthetic gases, hydrogen, and ethanol, because there is danger of explosion.

- If this system is transported to the operating environment with a great temperature change, leave it for about 4 hours before powering on it. Ensure temperature and humidity inside and around this system are equivalent before the operation.

- Do not use this system around the strong electric field, the strong electromagnetic field and the devices which generate radio waves, such as the radio, cellular telephones, transceivers. Using the system in the improper environment may result in malfunction or damage.

- Do not use this system at the same time with other equipment such as electric knife, high-frequency therapy equipment and defibrillator. Otherwise, there is a danger of electric shock.

- Connect the earth conductor only before powering on the system. Disconnect the grounding cable only after powering off the system. Otherwise, there is a danger of electric shock.

- Ensure the potential-equalization lead wire is connected before inserting the equipment power plug.

- The AC power connector plug for the ultrasound system is a three-prong grounded plug and should never be adapted to any two-prong outlet or by using an adapter. The AC power connector plug should be plugged into a hospital-grade power outlet.

- Select the qualified multi-socket outlet with protective grounding, and ensure its maximum output power not exceed the required one of this system.

- The multi-socket outlet can only be used to provide power to the recommended peripheral devices of this system.

- Do not place the multi-socket outlet on the floor.

- Do not connect other devices to the multi-socket outlet; otherwise, the rated output power may be exceeded and failure may be resulted.

- The video printer should be connected to the specific interface using the cable provided by the manufacturer; Otherwise, there is a danger of electric shock.

- Accessory equipment connected to the analog and digital interfaces must be certified according to the respective EN/IEC standards (for example, EN/IEC 60950 for data processing equipment and EN/IEC 60601-1 for medical equipment). Furthermore, all configurations shall comply with the system standards EN/IEC 60601-1-1.

- In the environment that patient is 1.8 meters (6 feet) around, connect peripherals to the auxiliary power outlet which is capable of isolation protection, or power the peripherals by auxiliary output cable or isolation transformer complied with IEC 60601-1-1 or the power input of the same safety level.

- Parts of non-medical electrical equipment in the patient environment that, after removal of covers, connectors, etc., without the use of a tool, may be contacted during the routine maintenance, calibration, etc. You should not touch the referred parts and the patient simultaneously.

- Do not use the probe other than those provided by the manufacturer. Otherwise, the ultrasound system cannot be performed, and an accident such as a fire may result in the worst case.

- Only the peripherals and accessories provided or recommended by the manufacturer can be used. Using other devices or accessories may degrade the system performance and even cause an electrical shock.

- Do not pour any fluid onto the ultrasound system surfaces, as fluid seepage into the electrical circuitry may cause excessive leakage current or system failure. If carelessly pour any water onto the system, immediately stop using the ultrasound system and contact Service Representative immediately.

- To avoid electrical shock and damage to the ultrasound system, power off and unplug the system from the AC power outlet before cleaning.

- To maintain the safety and functionality of the ultrasound system, maintenance must be performed at least every 6 months. Electrical safety tests must also be performed at regular intervals as specified by local safety regulations.

2.2.2 Mechanical Safety

WARNING

- Ensure that the casters are intact and can rotate well before moving the system.
- Always use the handle to move the ultrasound system. Ensure the foot brakes are released and all cables are away from the casters when moving the system.
- Ensure the footswitch is disconnected and the system is powered off before moving the system.
- Casters of the system could cause injury if they rolls over feet or into shins. Take cautions when moving the ultrasound system going up or down ramps.
- To avoid possible personnel injury and system damage, move the system slowly and carefully, and lock foot brakes after arrival.

2.2.3 Accessories Caring

WARNING

- Do not use the footswitch in the operating room.
- Disconnect the probe from the system after freezing an image or powering off the system. Otherwise, the system or the probe could be damaged.
- Use the probe carefully. If any part of the transducer surface is scratched, immediately stop using the probe. Otherwise, there is a danger of electric shock.
- After disinfecting the accessories, chemicals must be washed out or gases must be discharged thoroughly from the accessories. Remaining residual chemicals or gases could not only result in damage to the accessories but also can be harmful to human bodies.
- Only the trained physicians or sonographers under ultrasound guidance can handle the biopsy needle guides. During the operation, the operator must observe proper needle insertion sequencing with the needle guide in order to avoid undue discomforts, unnecessary risks or injuries to the patient.
- Contact with natural rubber latex may cause a severe anaphylactic reaction in persons sensitive to the natural latex protein. The operator and patients must avoid contact with these items. Refer to package labeling to determine latex content and FDA's March 29, 1991 Medical Alert on latex products.
- Use the legally marketed coupling gel in accordance with the relevant local regulations. Read and understand all precautions in the relevant manual of the coupling gel before using it.

2.2.4 Biohazard Considerations

- To minimize the risk of cross-contamination or infectious diseases when performing the biopsy, the operator should wear disposable gloves, protective clothing or protective goggle if it is needed. Follow the working regulations strictly in case the skin contacts the samples.

- Some disinfectants are acid or alkaline, the operator should take cautions in preventing hands or clothing from being directly contact with them. Wash hands or eyes immediately if they are contaminated by the disinfectants.

- Dispose of the cleaners, disinfectants or discard solutions in accordance with the local standards or regulations.

2.3 Acoustic Power Principle

WARNING
- Perform ultrasound procedures prudently under the guidance of the ALARA (as low as reasonably achievable) principle. Expose the patient to only the lowest practical transmit power levels in the shortest possible period to achieve a satisfactory diagnosis.

- Although the output power is automatically controlled for the selected applications, high TI values should be kept to a minimum or avoided in obstetric applications.

- You should be familiar with the performances and operations of the system, observe the ultrasound output parameters on the screen all the time.

2.3.1 Biological Safety

Diagnostic ultrasound is recognized as being safe, but the possibility of biological effects exists when using it in high exposure levels and long exposure times. Thus ultrasound should be used in a prudent manner to provide medical benefit to the patient.

2.3.2 ALARA

It is required to practice ALARA when using ultrasound energy. Practicing ALARA ensures that the total energy level is controlled below a low enough level at which bioeffects are not generated while diagnostic information is being accumulated. The total energy is controlled by output intensity and total radiation time. The output intensity necessary for examinations differs depending on the patient and the clinical case.

Not all examinations can be performed with an extremely low level of acoustic energy. Controlling the acoustic level at an extremely low level leads to low-quality images or insufficient Doppler signals, adversely affecting the reliability of the diagnosis. However, increasing the acoustic power more than necessary does not always contribute to an increase in quality of information required for diagnosis, rather increasing the risk of generating bioeffects.

The operator must take responsibility for the safety of patients and utilize ultrasound deliberately. Deliberate use of ultrasound means that output power of ultrasound must be selected based on ALARA. Additional information regarding the concept of ALARA and the possible bioeffects of Ultrasound is available in a document from the AIUM (American Institute of Ultrasound Medicine) title "Medical Ultrasound Safety".

2.3.3 Mechanical and Thermal Indices

The display of the ultrasound system consists of two parts: Thermal Index (TI) and Mechanical Index (MI).

■ MI/TI Explanation

In October 1987, the American Institute of Ultrasound in Medicine (AIUM) ratified a report prepared by its Bioeffects Committee (Bioeffects Considerations for the Safety of Diagnostic Ultrasound, J Ultrasound Med.,Sept. 1988: Vol. 7, No. 9 Supplement), sometimes referred to as the StoweReport, which reviewed available data on possible effects of ultrasound exposure. Another report "Bioeffects and Safety of Diagnostic Ultrasound" dated January28, 1993, provides more current information.

Mechanical Index (MI)

Mechanical bioeffects are threshold phenomena that occur when a certain level of output is exceeded. The threshold level varies, however, with the type of tissue. The potential mechanical bioeffects varies with peak pressure and ultrasound frequency. The MI accounts for these two factors. The higher the MI value, the greater the likelihood of mechanical bioeffects occurring. There is no specific MI value that means that a mechanical effect is actually occurring. The MI should be used as a guide for implementing the ALARA principle.

Thermal Index (TI)

The TI value informs the operator about the conditions that might lead to an increase in temperature at the surface of the body, within the body tissue, or at the point of focus of the ultrasound beam on bone. That is, the TI value informs the operator about the potential temperature rise in body tissue. It is an estimate of temperature increase in body tissue with specific properties. The actual amount of any temperature rise is influenced by factors such as tissue type, vascularity, mode of operation and others. The TI value should be used as a guide for implementing the ALARA principle.

Depending on the examination and type of tissue involved, TI could be one of three types:

● Soft Tissue Thermal Index (TIS) is used when imaging soft tissue only, it provides an estimate of potential temperature rise in soft tissue.

● Bone Thermal Index (TIB) is used when bone is near the focus of the image as in the third cropester OB examination, it provides an estimate of potential temperature rise in the bone or adjacent soft tissue.

● Cranial Bone Thermal Index (TIC) is used when bone is near the skin surface as in transcranial examination, it provides an estimate of potential temperature rise in the bone or adjacent soft tissue.

■ MI/TI Display

TI and MI values are displayed in real time on the screen. The operator should observe these index values during examinations and ensure that exposure time and output values are maintained at the minimum amounts needed for effective diagnosis.

The MI and TI precision is 0.1.

2.3.4 Transducer Surface Temperature Limits

For probes intended for internal applications, e.g. the intracavitary or transesophageal probes, the surface temperature of the probe may be changed by adjusting the system parameters.

The maximum surface temperature of the intracavitary probe is 43°C. To protect the patient against the harm of excessive temperature, the probe stops working automatically when its temperature reaches the limit. The surface temperature of the probe displays on the lower left side of the screen.

PAT: 37°C TIP: <28°C	PAT: Patient Threshold Temperature TIP: Transducer Tip Temperature

2.3.5 Imaging Functions that Change Acoustic Output

The qualified operator may use the system controls to limit the ultrasound output and to adjust the quality of the images. The operator should observe the acoustic output display for possible effects.
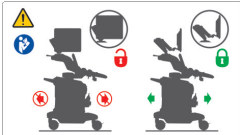
There are three categories of system controls relative to output. They are controls that have direct effect on the output, controls that indirectly control output and controls that are receiver controls.
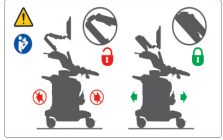
2.4 Safety Symbols

The following table is provided for your identification of important symbols located in labels on the ultrasound system.

Symbol	Meaning
⚠	General warning sign
⚡	Dangerous voltage
✋	Pinch hazard
🚫AH	Risk of explosion if used in the presence of flammable anesthetics
CE 0434	This product is provided with a CE marking in accordance with the regulations stated in Council Directive 93/42/EEC

Symbol	Meaning
EC REP	Authorized representative in the European community
	Type BF Applied Part
	Main switch OFF
	Main switch ON
	On/Standby switch
	Footswitch Connector
	Protective earth (ground)
	Equipotentiality
	Alternating current
IPN₁N₂	Degree of IP protection
	Non-ionizing electromagnetic radiation.
	Manufacturer
	Date of manufacture
	Consult operating instructions.
	Network Port
	Control port of color video printer

Symbol	Meaning
	USB Port
	Video Input
	Video Output
	AUDIO
	Fragile
	Keep dry
	No stacking for the main unit
	Maximum stacking limit of packages Maximum of two layers allowed for the monitor
	Keep this way upward
	This symbol indicates that waste electrical and electronic equipment must not be disposed of as unsorted municipal waste and must be collected separately. Please contact an authorized representative of the manufacturer for information concerning the decommissioning of your equipment.
SN	Serial Number
	Control Panel Adjustment
	Monitor Upper Arm Lock DO NOT push the system when the monitor upper arm is unlocked.

Symbol	Meaning
	Monitor Lower Arm Lock DO NOT push the system when the monitor lower arm is unlocked.
	1. General warning, caution, risk of danger. 2. DO NOT push the system when the casters are locked. 3. Beware of excessive stress exerted to the system. 4. Do not sit on the system.

Chapter 3 Principle Descriptions

This chapter provides hardware and software descriptions, you should read these descriptions thoroughly before attempting to service the ultrasound system.

3.1 System Block Diagram

The ultrasound system consists of probe board, VBF board, high-voltage board, QM67 industrial main board, keyboard, main board of the touch screen, KEAA board, internal IO board, LED indicator board and external IO board. They are described as follows:

- Core unit (including probe board, VBF board and high-voltage board) accomplishes the transmit and acquisition of ultrasound beams, the compound of AD sampling beams and the process of Doppler signals.

- QM67 industrial board provides the hardware control for the ultrasound system.

- Keyboard and touch screen are in ergonomic design.

- KEAA board and internal IO board provide the signal transition.

- LED indicator board illuminates the pull-out keyboard.

- External IO board outputs the signals, and provides interfaces for print workstation.

Connections between boards are shown in Figure 3-1.
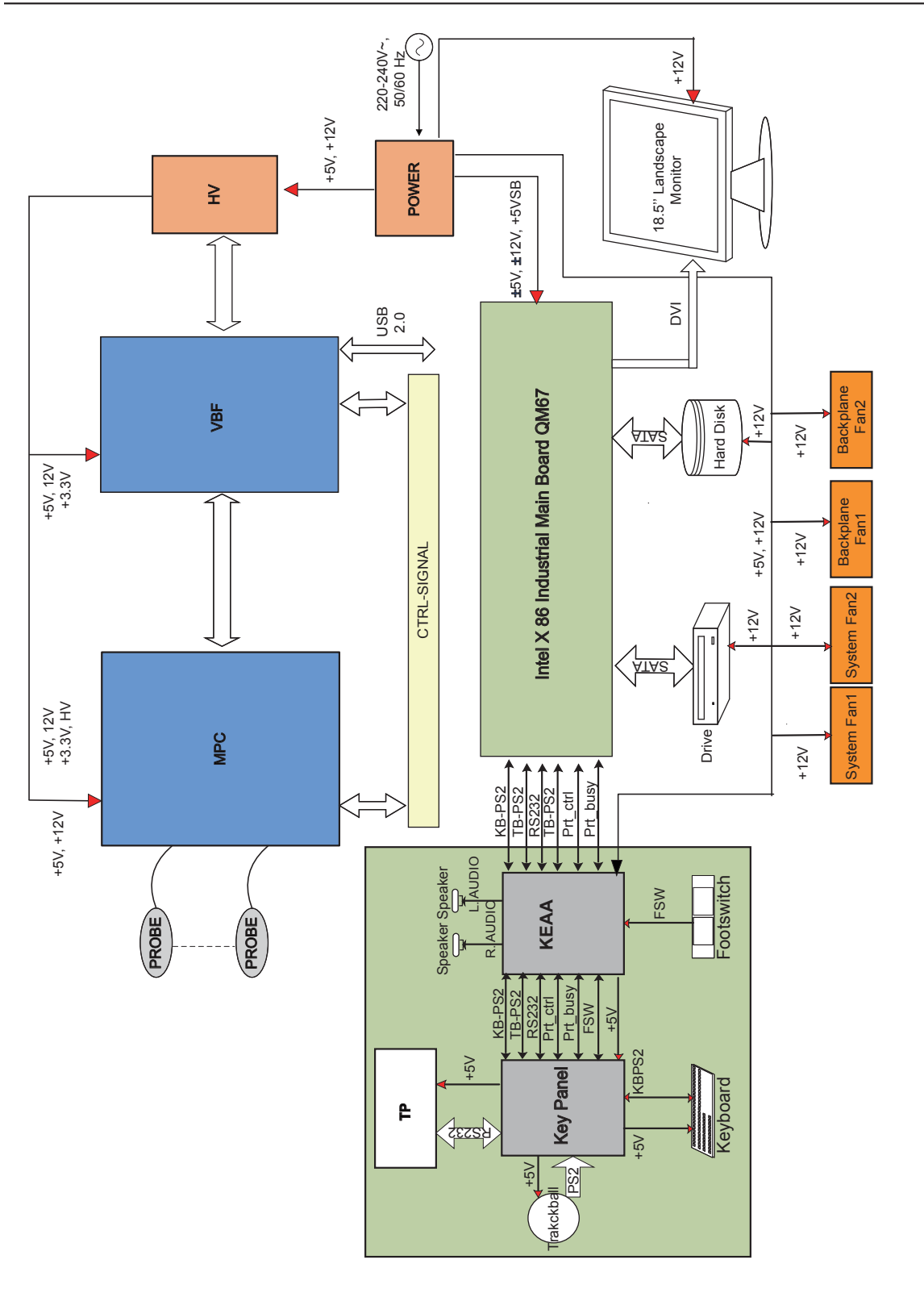
Figure 3-1 System Block Diagram

3.2 Hardware Description

3.2.1 Probe Board

The probe board provides 4-idental probe ports.
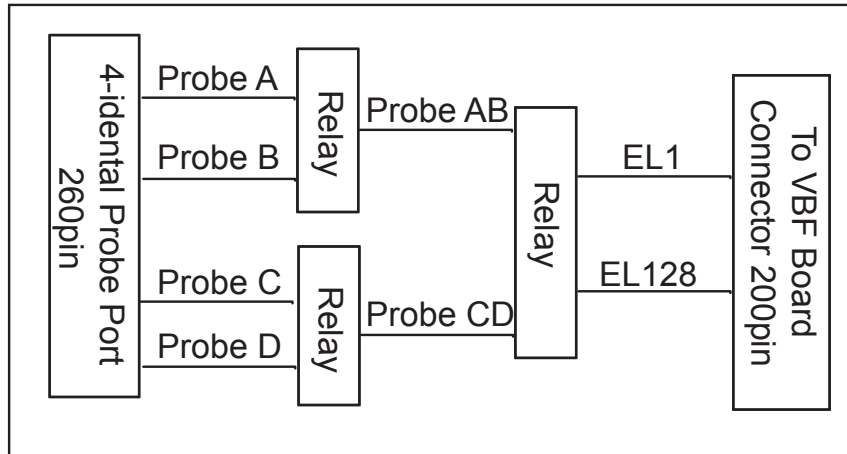
Figure 3-2 Probe Board Diagram

The ultrasound system adopts 192 secondary relays (G6KU-2F-Y(DC12V))to transmit signals. Moreover, the probe board also consist probe identification, relay drive circuit and high-quality probe drive circuit.
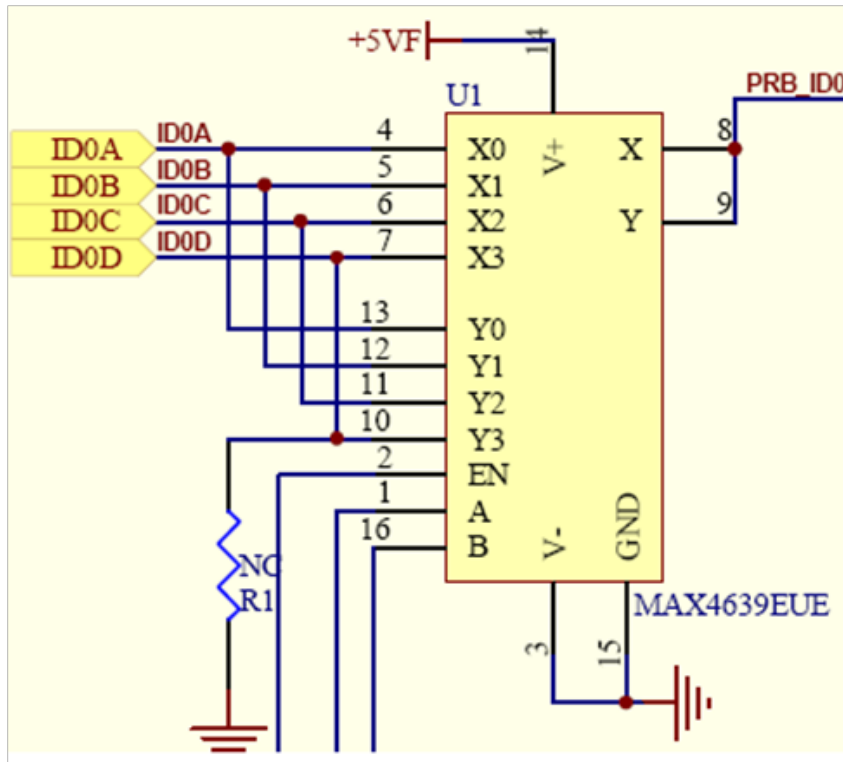
Figure 3-3 Probe Identification

When a probe is connected to probe port A, MAX4639 transmits ID information of this probe to the ultrasound system, and icons for corresponding application modes of this probe appear on the screen. Meanwhile, VBF board detects the probe to drive the relay.
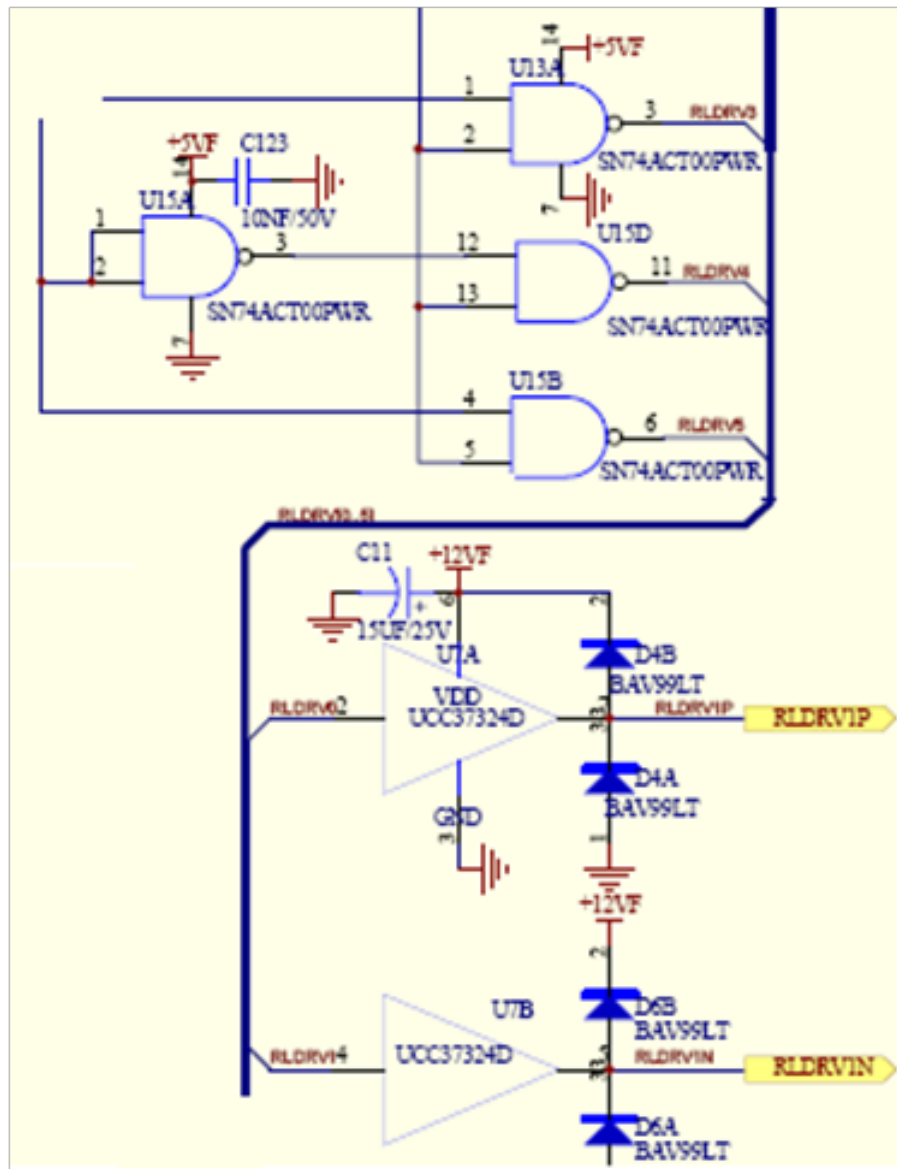
Figure 3-4 Relay Drive Circuit

3.2.2 VBF Board

VBF board is an ultrasound signal processing board, used to control the transmit and acquisition of ultrasound beam, perform the relevant post processing.
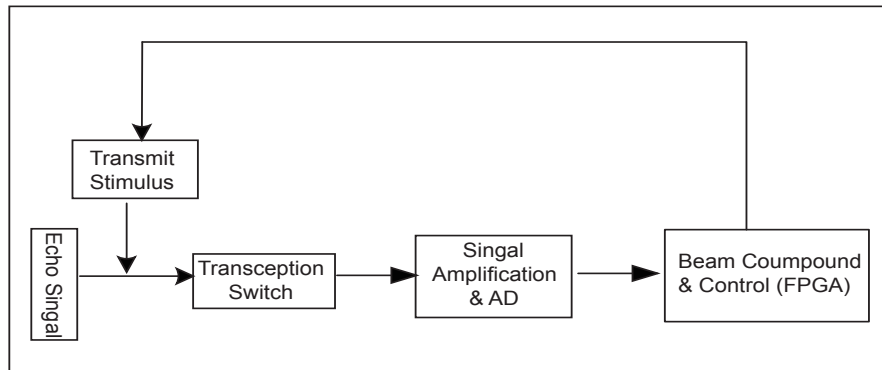
Figure 3-5 VBF Board Diagram

The echo signal acquired by AD (AFE5808) is transmitted to FPGA, accomplishes beam compound and dynamic focusing in FPGA, the processed echo signal is finally transmitted to the ultrasound system, thereafter, the signal becomes one received ultrasound beam. The transmit stimulus is provided and controlled by FPGA. The transception switch (MAX4936) is used to isolate transmit stimulus from echo signal, i.e. identifying transmit stimulus to be high-voltage signal and echo signal to be small signal. The recurring signal processing produces a ultrasound image, and displays it on the monitor.

3.2.3 High-Voltage Board

High-voltage board provides various of power supplies for the ultrasound system. The mains supply (including +5V and +12V) is transformed by voltage booster, DC-DC conversion and LDO conversed circuit to the desired voltage, such as -12V, +3.3V, +2.5V, +90V, -90V.
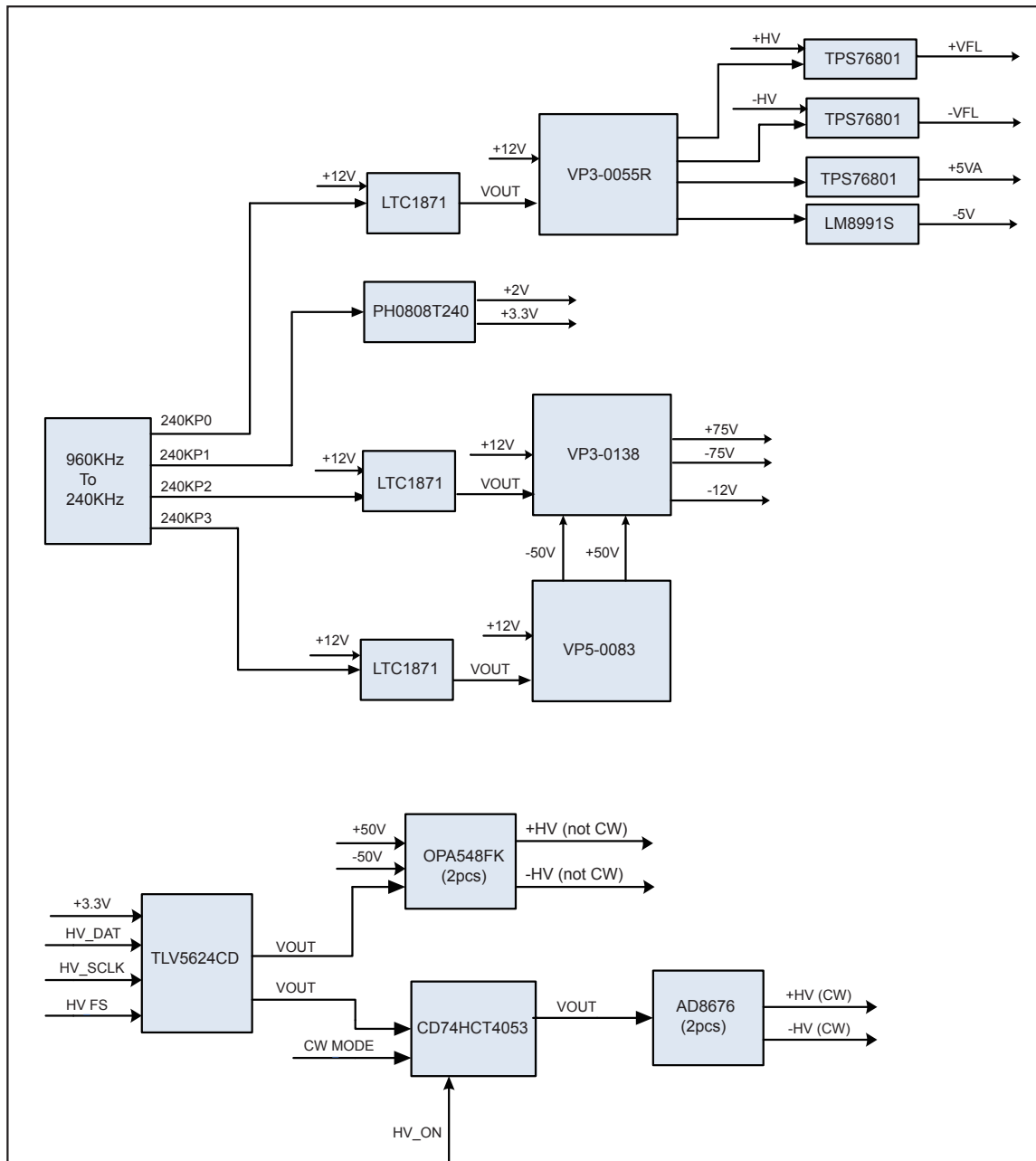
Figure 3-6 High-Voltage Board Diagram

3.2.4 Touch-Screen Board

Touch-screen board is the core of the touch screen operations, it is based on ARM9 hardware architecture and Linux operating system. You can implement some features by tapping buttons on the touch screen.
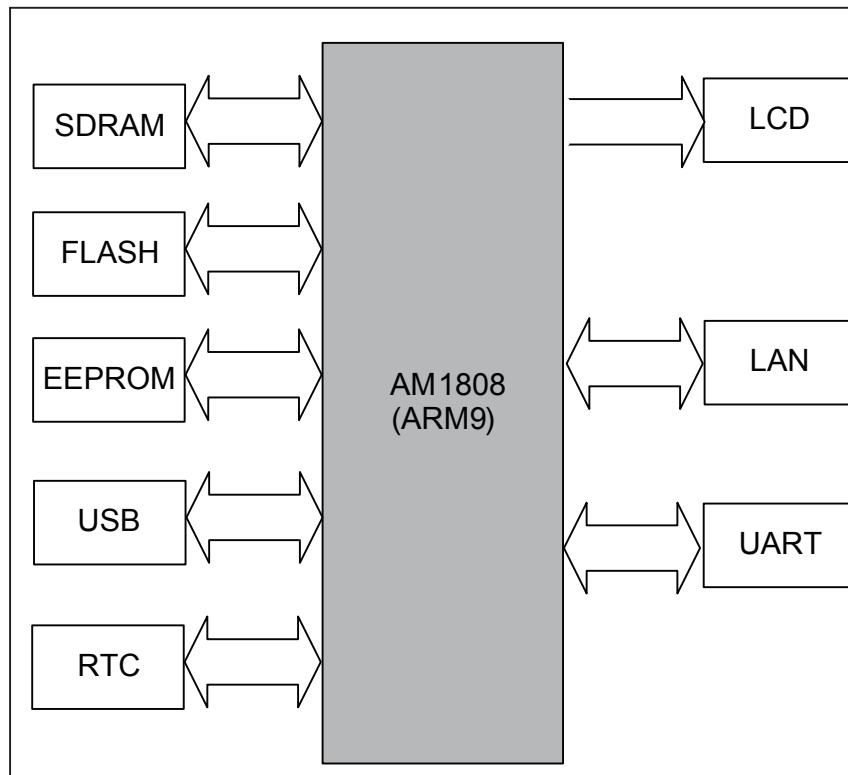
Figure 3-7 Touch-Screen Board Diagram

Parts in the above figure are described as follows,

- UART is used for communication among touch screen, keyboard and ultrasound system.

- USB interface is used for data communication of the USB device (USB flash drive) , through which you can update the touch-screen software.

- RTC oscillator provides a working clock for RTC circuit on the chip.

- DDR/SDRAM storage provides the running space for the system applications, system and user data are stored in DDR/SDRAM.

- Flash storage (NOR FLASH, EEPROM)

- LCD provides the user interfaces for operating instructions.

- LAN is a network interface for engineer debugging.

3.2.5 LED Indicator Board

LED indicator illuminates the keyboard. When the keyboard is pulled out, LED indicator is on. When the keyboard is pushed in, LED indicator is off.

3.2.6 Internal IO Board

Internal IO board contains two connection components, which are used to connect switch power and main board for system startup. After ⏻ is pressed, PSON signal is transmitted to power supply by internal IO board, and power supply works for the system after it receives PSON signal.
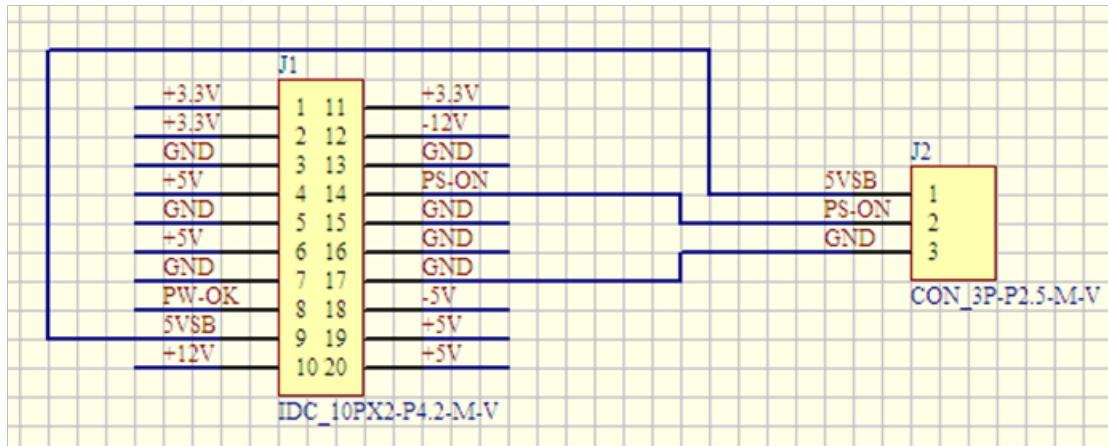
Figure 3-8 Internal IO Board Diagram

3.2.7 External Board

External IO board provides standard ports which are extended from PC main board. The ports contains VGA, compound video, LAN, DICOM, printer control, audio output and USB ports.

3.2.8 DVI Board

The ultrasound system adopts DVI monitor. HDMI signal passes through PC main board and are transmitted to DVI monitor interface by DVI signal conversion board.
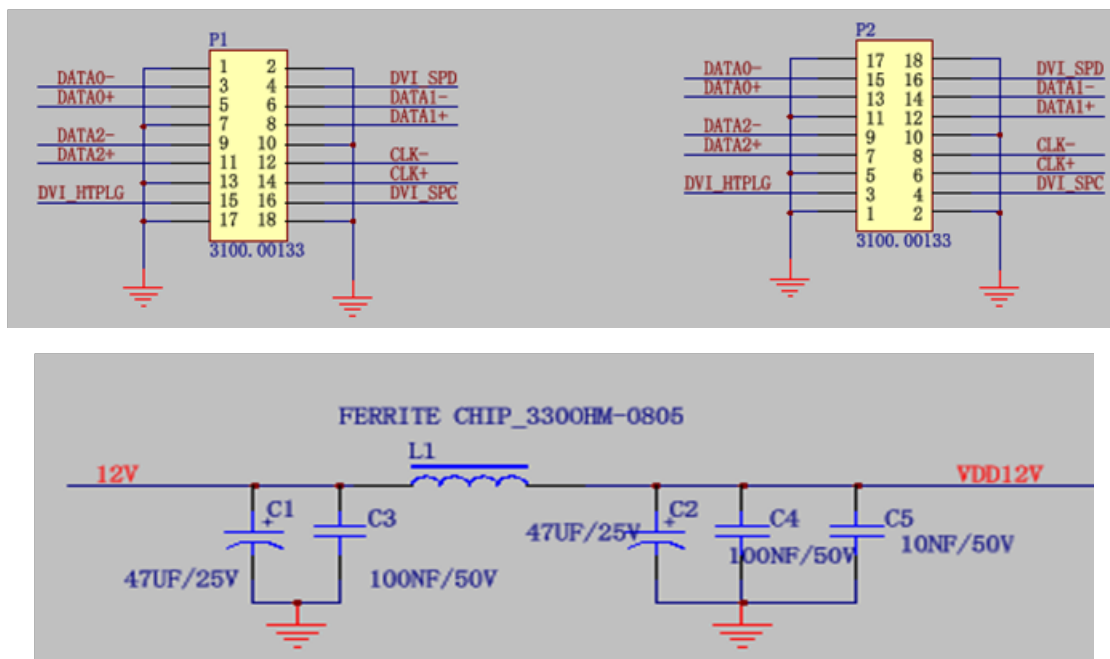
Figure 3-9 DVI Board Diagram

3.2.9 KEAA Board

KEAA board is a conversion board for internal signal and a drive circuit for speaker.
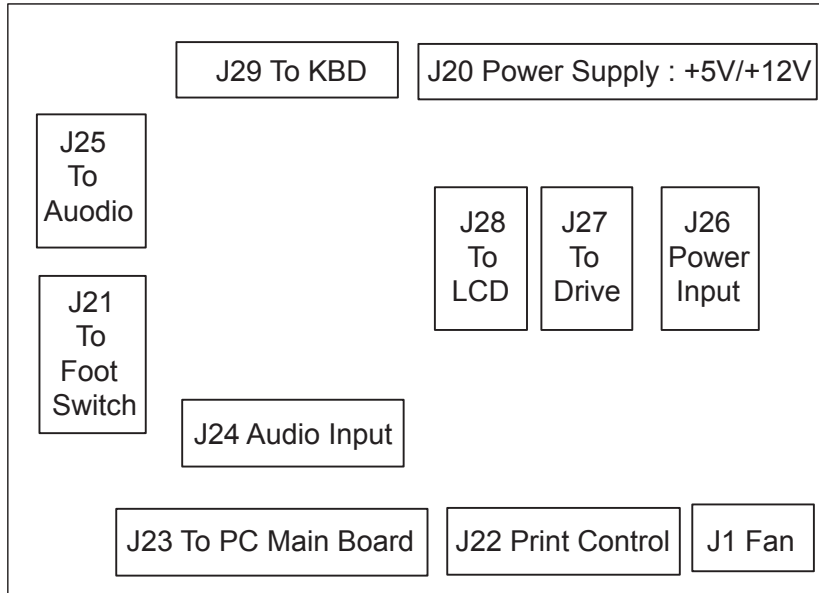
Figure 3-10 KEAA Board Diagram

3.2.10 Key Panel

Key panel is a ergonomic platform, used to scan keys, control indicators, control speaker, converse and receive coder data, TGC data and PS/2 data, communicate with the main unit through serial port.
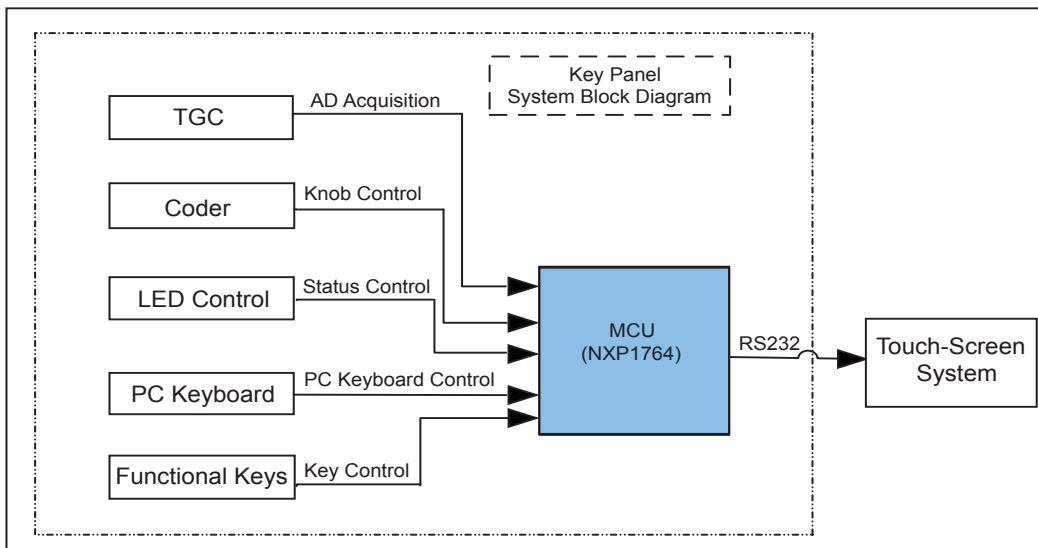
Figure 3-11 Key Panel Diagram

Key panel is an important part for external data transmission. Key panel can be divided by features into partial CPU circuit, DC/DC conversion circuit, key control circuit, coder control circuit, LED drive circuit and A/D acquisition circuit.

- CPU is the core of key panel, used to process various information. It contains one MCU (NXP1764) chip and external circuits.

- DC/DC provides different levels for key panel.

- Key control circuit is hardware of key processing.

- Coder control circuit converses mechanical actions to recognizable signals for MCU.

- LED control circuit indicates LED status.

- A/D acquisition circuit converses analogue signals provided by slide pots to recognizable signals for MCU.

3.3 Software Description

3.3.1 Structure

Software system consists of hardware layer, operating system layer, intermediate layer and application layer.
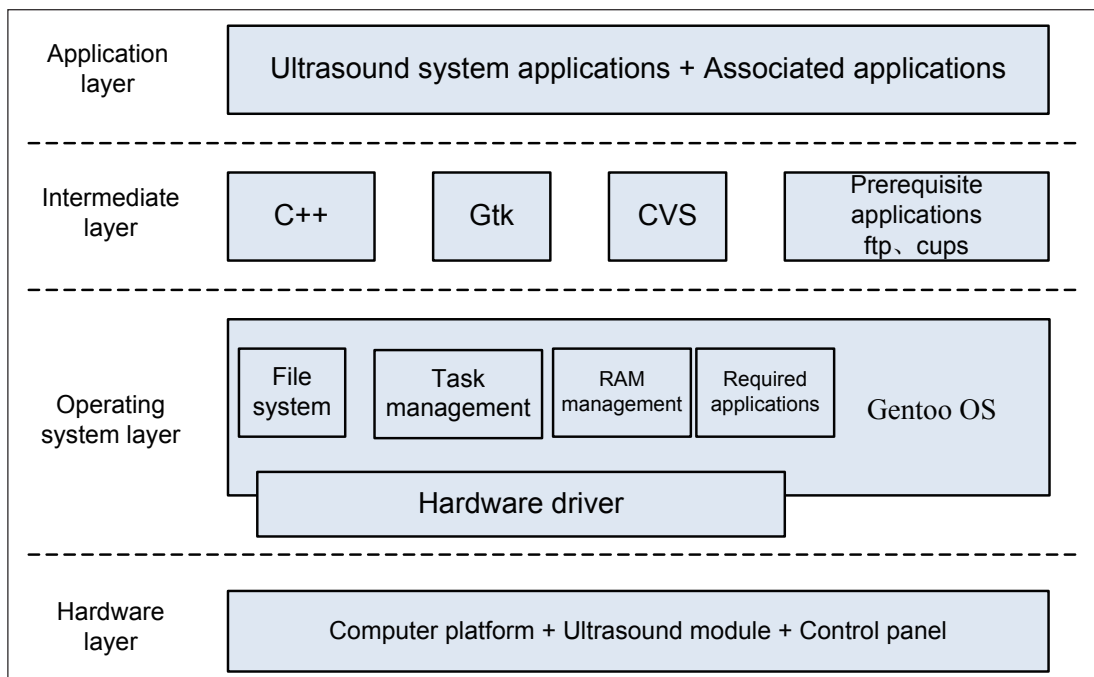
Figure 3-12 Software System Structure

System module can be divided by applications into imaging mode, system setting and system function.
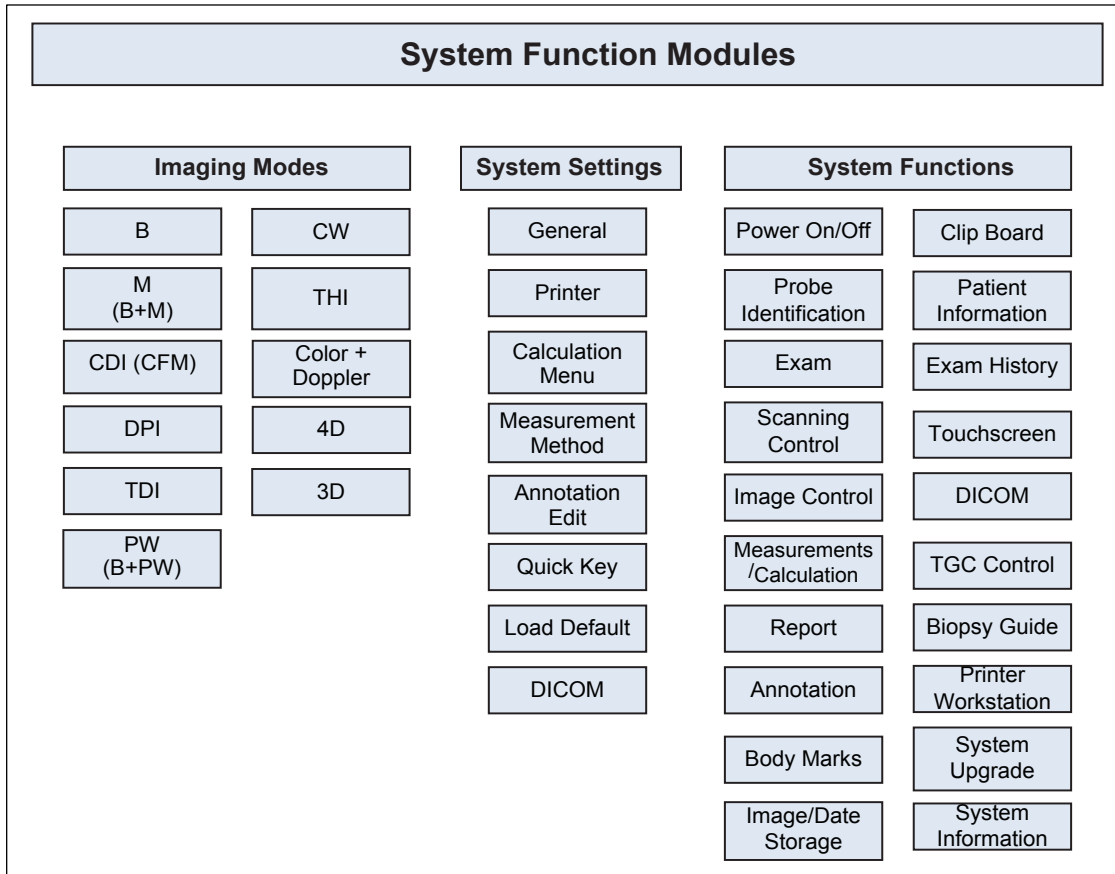
Figure 3-13 System Module

3.3.2 Workflow

Software system is an ultrasound system program on basis of linux operating system. Its workflow is shown as below.


```
┌─────────────────────────────────┐
│          ┌──────────────┐        │
│          │   PowerOn    │        │
│          └──────┬───────┘        │
│                 │                │
│          ┌──────▼───────┐        │
│          │  Start BIOS  │        │
│          └──────┬───────┘        │
│                 │                │
│          ┌──────▼───────┐        │
│          │  Start Grub  │        │
│          └──────┬───────┘        │
│                 │                │
│          ┌──────▼───────┐        │
│          │ Start Kernel │        │
│          └──────┬───────┘        │
│                 │                │
│       ┌─────────▼──────────┐     │
│       │ Start File system  │     │
│       └─────────┬──────────┘     │
│                 │                │
│  ┌──────────────▼─────────────┐  │
│  │ Start all kinds of servers │  │
│  │ （init0, cups, usb, etc）  │  │
│  └──────────────┬─────────────┘  │
│                 │                │
│       ┌─────────▼──────────┐     │
│       │ Start Application  │     │
│       └────────────────────┘     │
└─────────────────────────────────┘
```
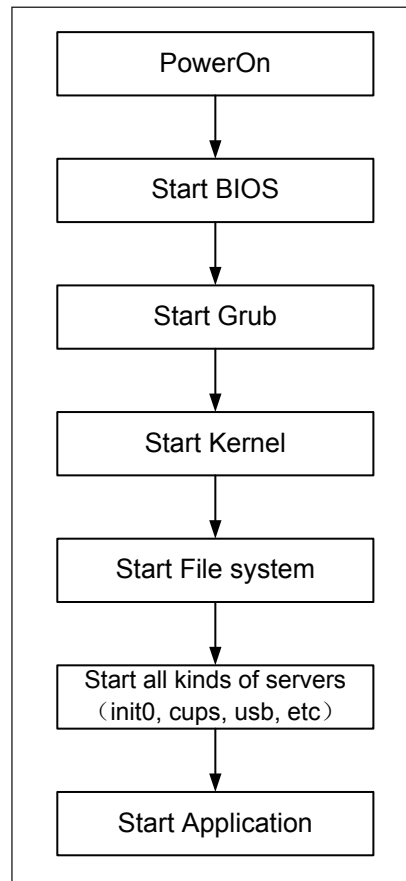
Figure 3-14 Workflow

To start up the ultrasound system,

1. Power on the system.
2. Start up BIOS to check whether the hardware works normally.
3. If the hardware works normally, start up Grub bootstrap program of the operating system.
4. Start up the kernel of Linux operating system by using Grub.
5. Start up file system and various service processes, such as init0, cpus, usb.
6. Start up the software.
   You can also control the ultrasound system by operating and checking interfaces.

This page is intentionally left blank.

Chapter 4 Parts Disassembly

This chapter contains information for disassembling the ultrasound system. You can assembly the ultrasound system by performing disassembly procedures on the contrary. During the disassembly, cabling and wiring should be paid great attention, disassembled parts should be taken care. If you are not familiar to the replacement procedures, you are recommended to take photos during the disassembly and take them for assembly reference.

The ultrasound system consists of the LCD display, monitor arm, touch screen assembly, key panel, pneumatic spring, main board, hard disk, ultrasound unit, power supply and DVD drive.

Tools includes,

- one cross screwdriver (M3-M5)

- one short-handled screwdriver (shorter than 100mm)

- one set of hex key wrench (including 3mm, 4mm, 5mm, 6mm, 10mm)

- one snap ring pliers

4.1 LCD Monitor Disassembly

One cross screwdriver is needed during the monitor disassembly.

Perform the following steps,

1. Use the cross screwdriver to remove three screws and take out the hinge cover.

2. Cut off the binding strap and pull out the display connection cables.

3. Use the cross screwdriver to remove six screws and take out the LCD display.
    Hold the LCD monitor to avoid falling during the disassembly.

The disassembled LCD monitor is as shown in the following figure.

4.2 Monitor Arm Disassembly

One cross screwdriver, one short-handled screwdriver and two hex key wrenches (4mm and 5mm each) are needed during the monitor arm disassembly.

Perform the following steps,

1. Disassemble the LCD monitor. For details, refer to Section 4.1 LCD Monitor Disassembly.

2. Use the hex key wrench (4mm) to remove the screws and take out the display linkage assembly.

3. Use the short-handled screwdriver to remove four screws and take out the back cover of support platform.

4. Use the short-handled screwdriver to remove four screws, pull out the connection cable, and then take out the sheet metal part.
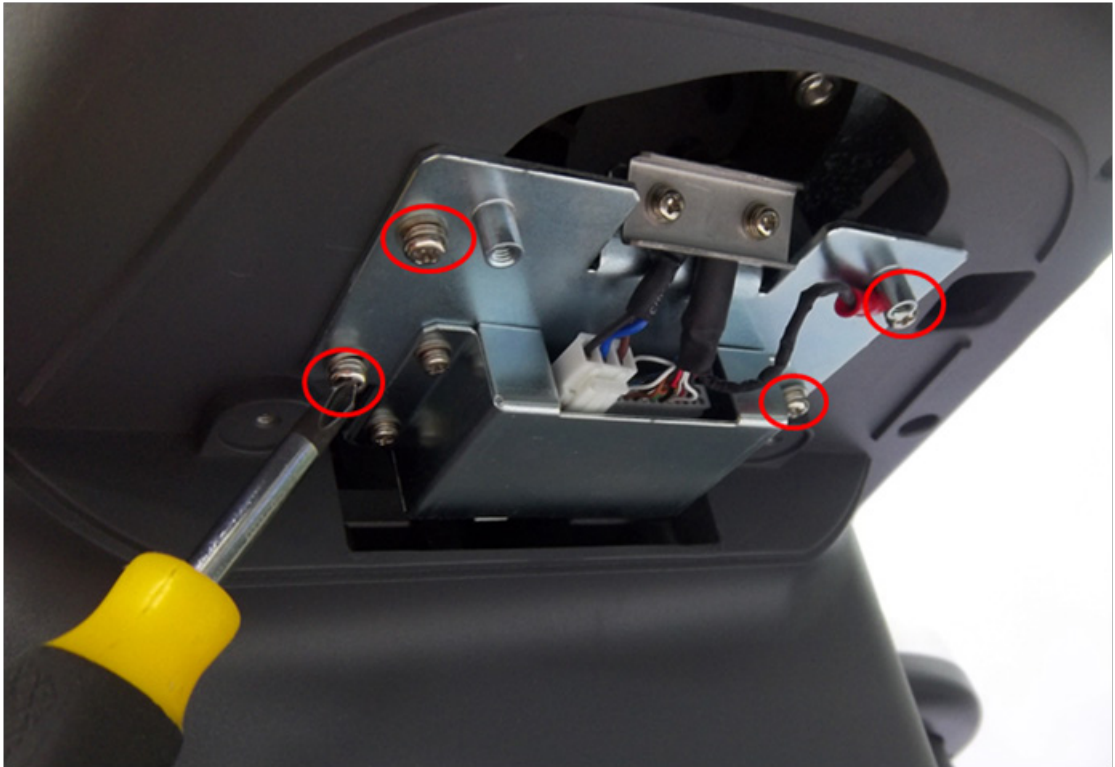
5. Use the hex key wrench (5mm) to remove four screws.

6. Take out the monitor arm assembly.

The disassembled monitor arm is as shown in the following figure.

4.3 Touch Screen Disassembly

One cross screwdriver and one short-handled screwdriver are needed during the touch screen disassembly.

Perform the following steps,

1. Use the cross screwdriver to remove two screws from the back cover of the touch screen.

2. Take out all probe holders.

3. Use the screwdriver to remove 19 screws from the back key panel.

Not these two screws
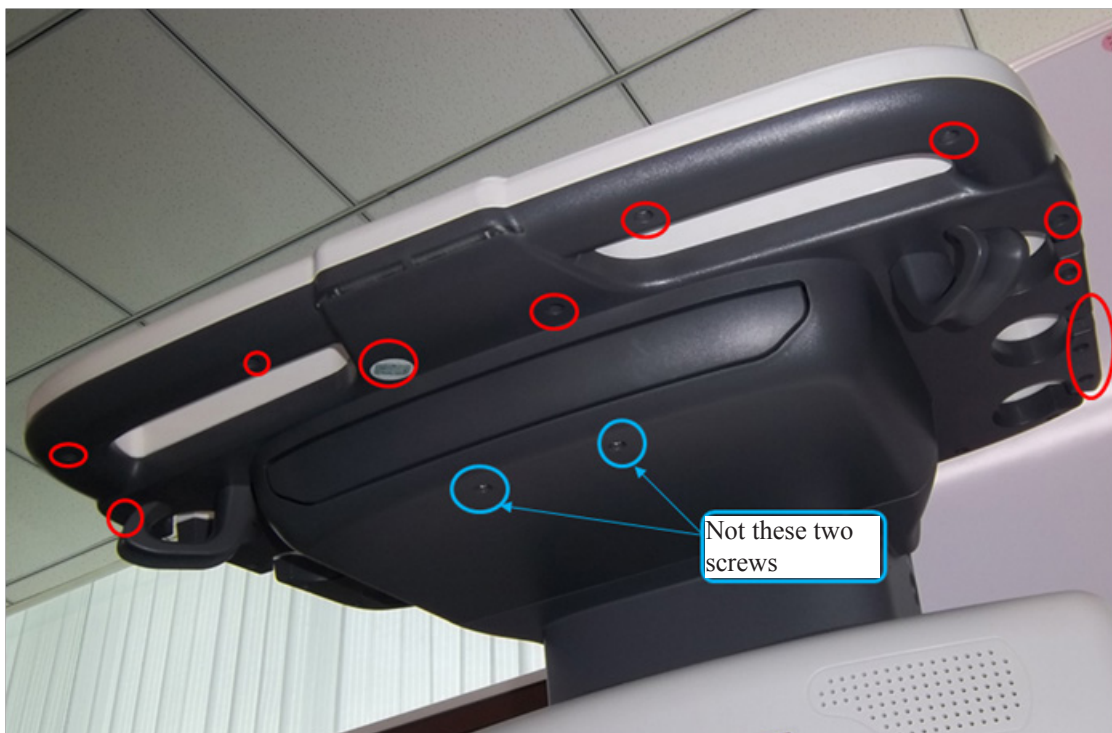
4. Pull out all connection cables from the touch screen and take out the touch screen assembly.
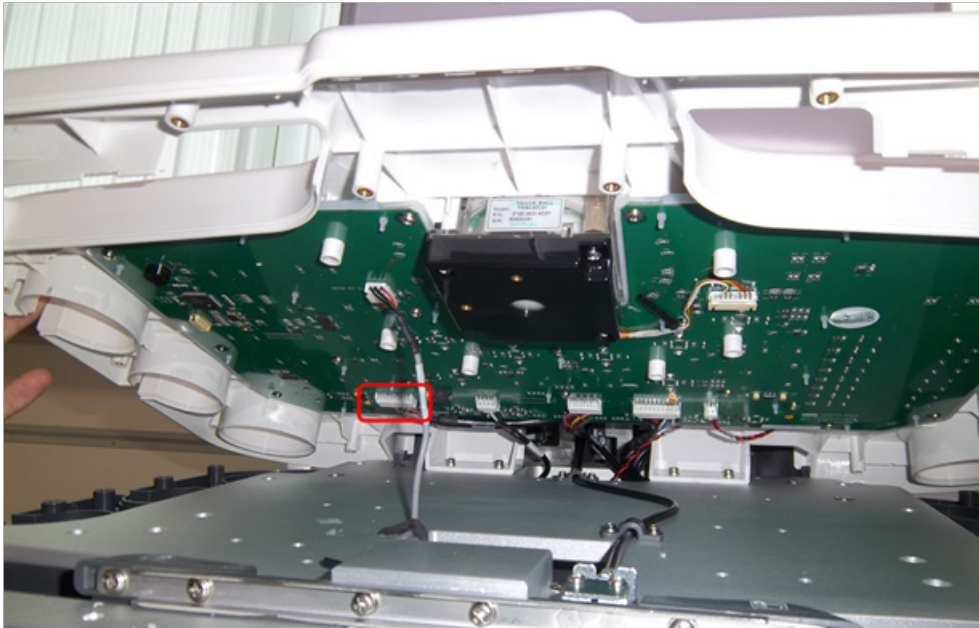
The disassembled touch screen is as shown in the following figures.
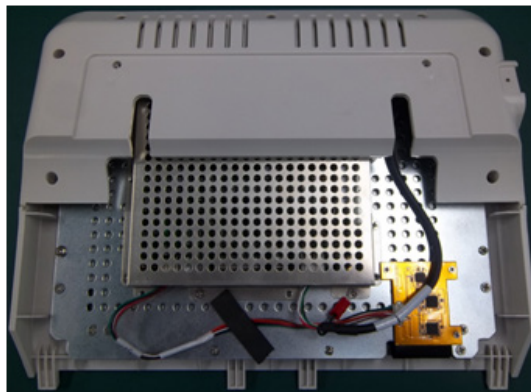
4.4 Key Panel Disassembly

One cross screwdriver and one short-handled screwdriver are needed during the key panel disassembly.

Perform the following steps,

1. Disassemble the touch screen assembly. For details, refer to Section 4.3 Touch Screen Disassembly.

2. Pull out all connection cables and take out the top cover assembly.

3. Pull out all keys from the control panel.
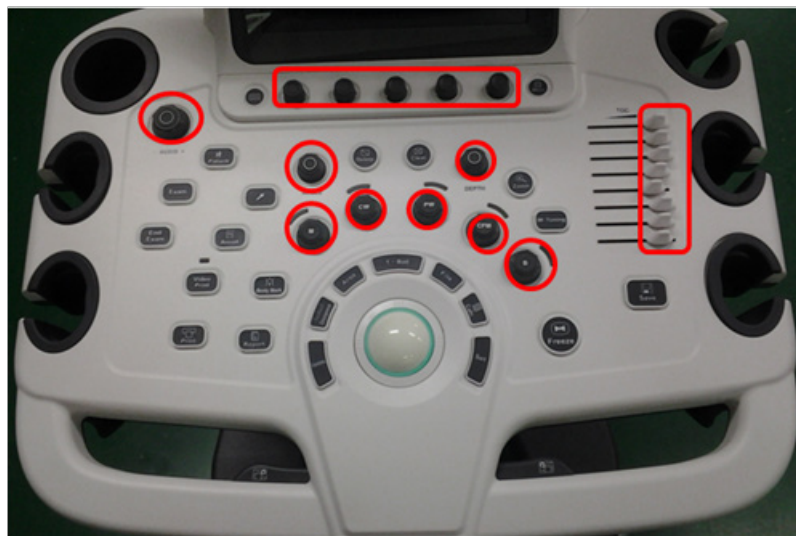
4. Use the screwdriver to remove all screws and take out the key panel.
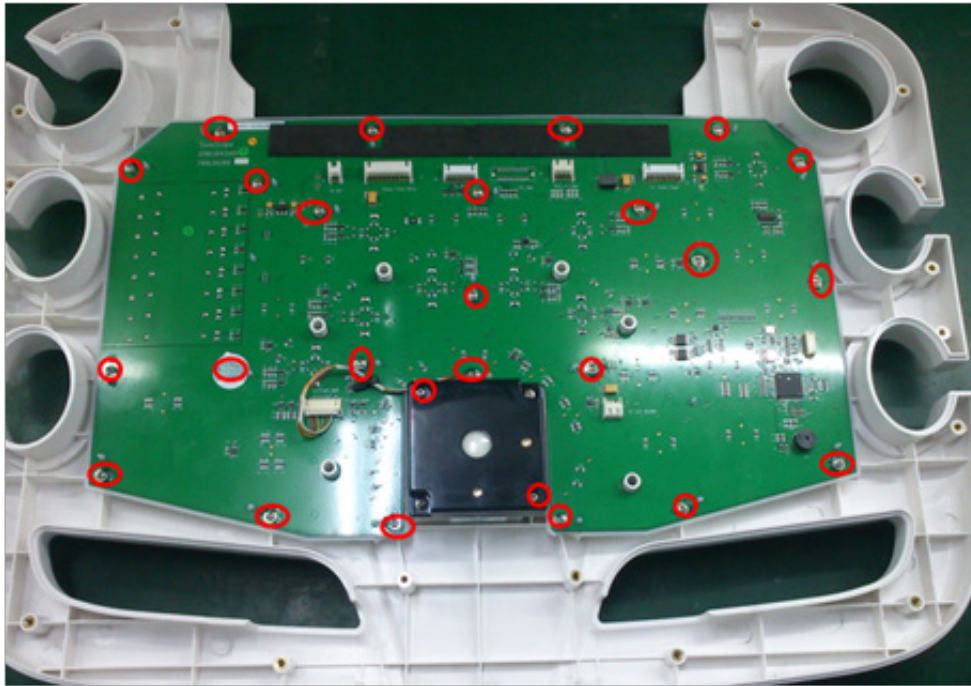
The disassembled key panel is as shown in the following figure.
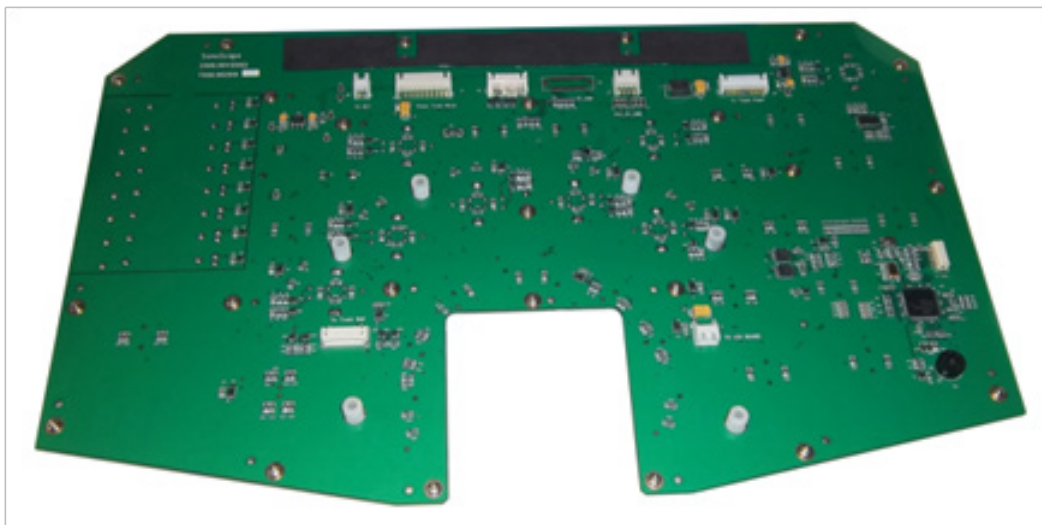
4.5 Pneumatic Spring Disassembly

Pneumatic spring consists of upper parts, back cover and lower parts.

One cross screwdriver, one short-handled screwdriver, two hex key wrenches (4mm and 5mm each) and one snap ring pliers are needed during the pneumatic spring disassembly.

4.5.1 Upper Parts Disassembly

Perform the following steps,

1. Disassemble the monitor arm and top cover assembly of the key panel. For details, refer to Section 10.2 Monitor Arm Disassembly and Section 10.4 Key Panel Assembly.

2. Remove four screws as shown in the following figure.
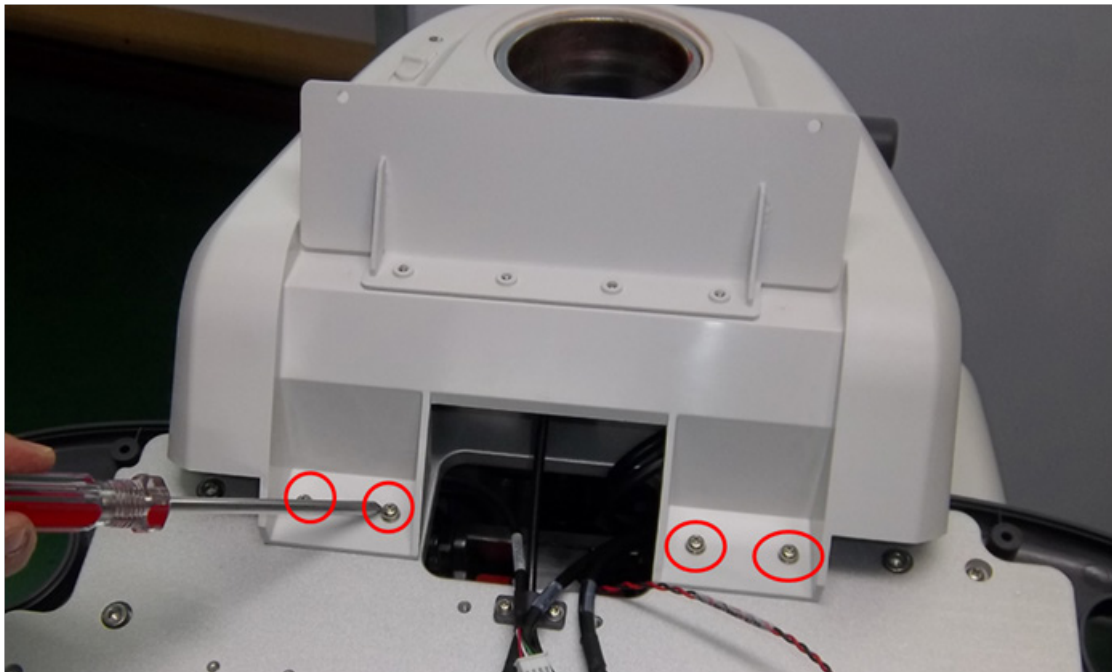
3. Remove four screws as shown in the following figure.

4. Remove one screw as shown in the following figure to take out the latch of monitor arm support.

5. Take out the top cover assembly of the monitor arm support.
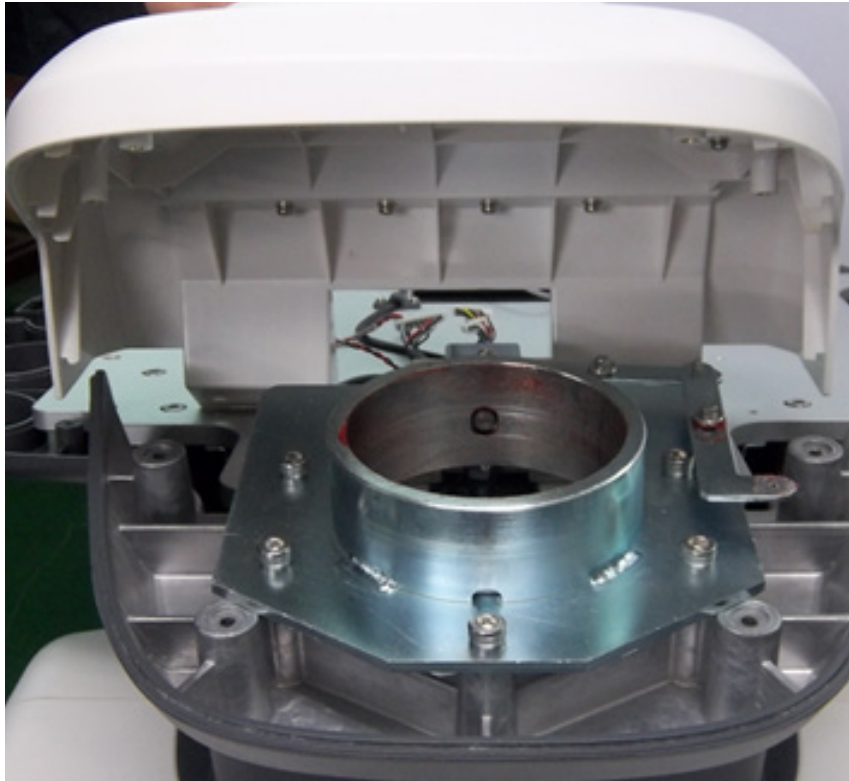
6. Use the screwdriver to remove two screws and take out the sheet-metal part.
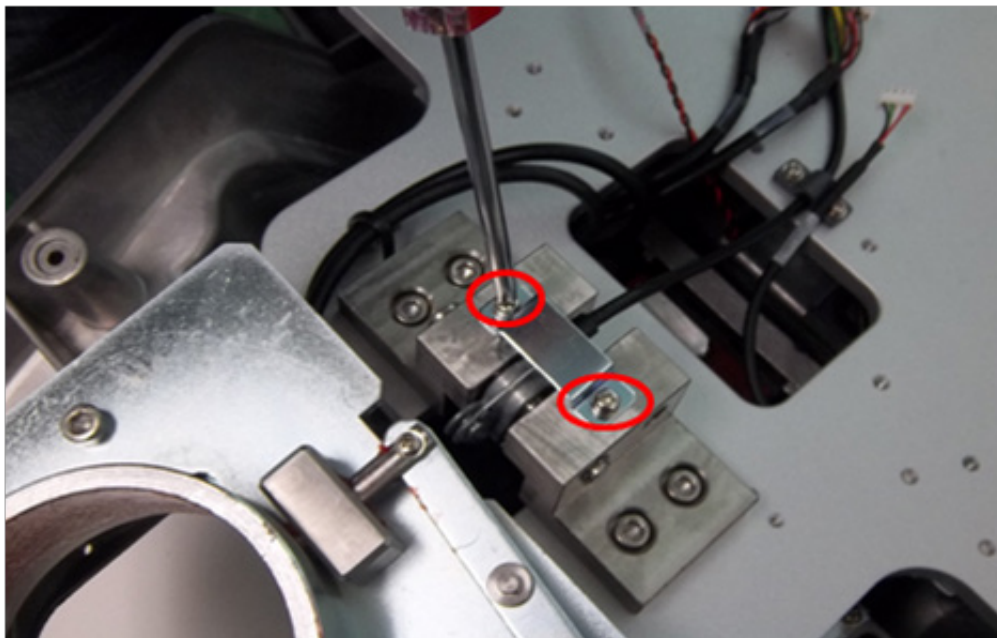
7. Use the screwdriver to remove two screws and take out the plastic part.
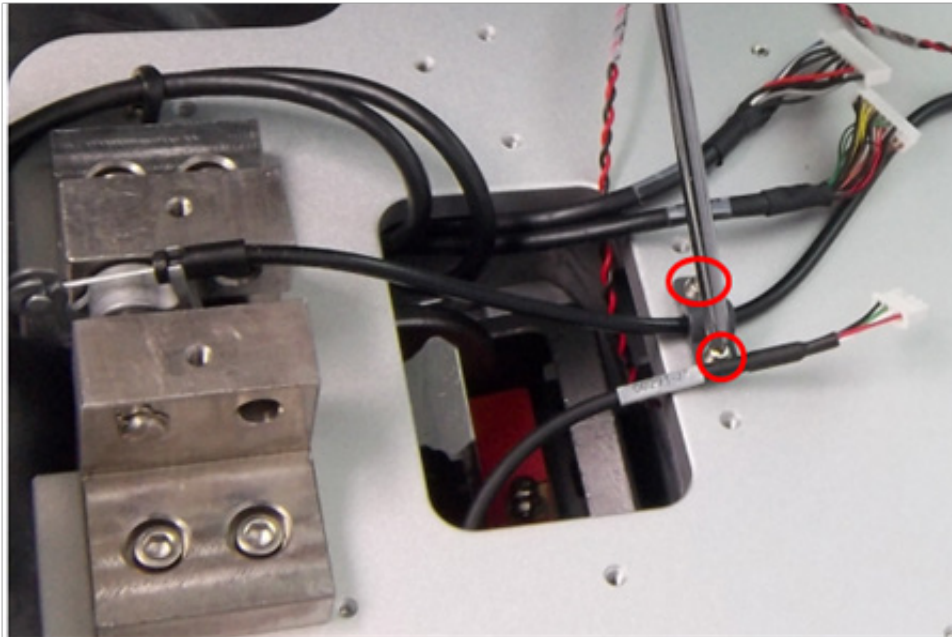
8. Take out the bourdon tube, and ensure the pneumatic spring is compressed for assembly.
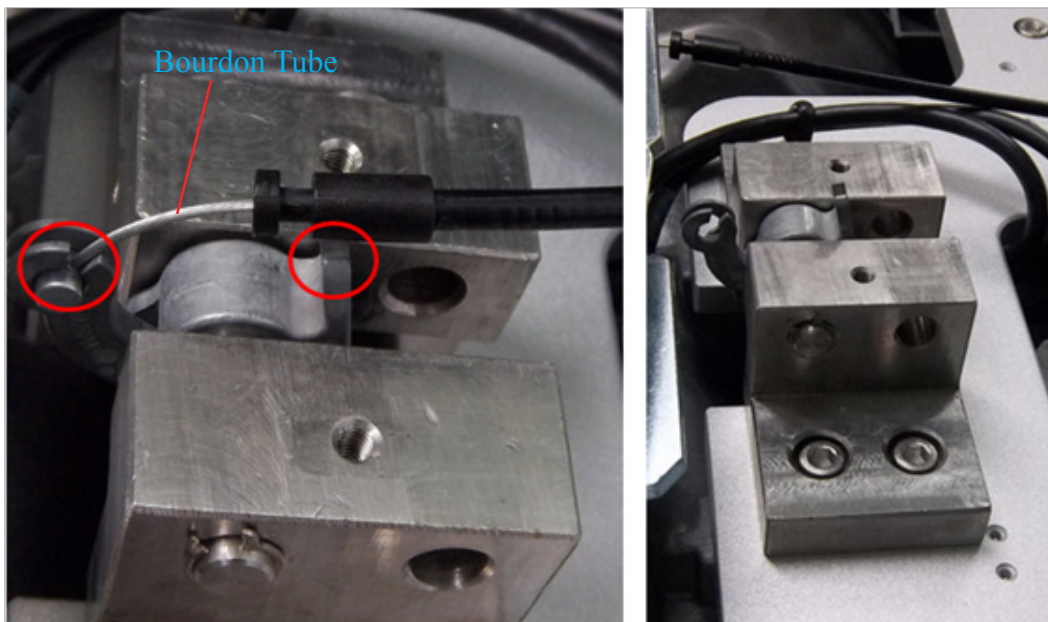
9. Use the snap ring pliers to remove two screws and take out the spring.

10. Use the hex key wrench (5mm) to remove four screws and complete the disassembly.
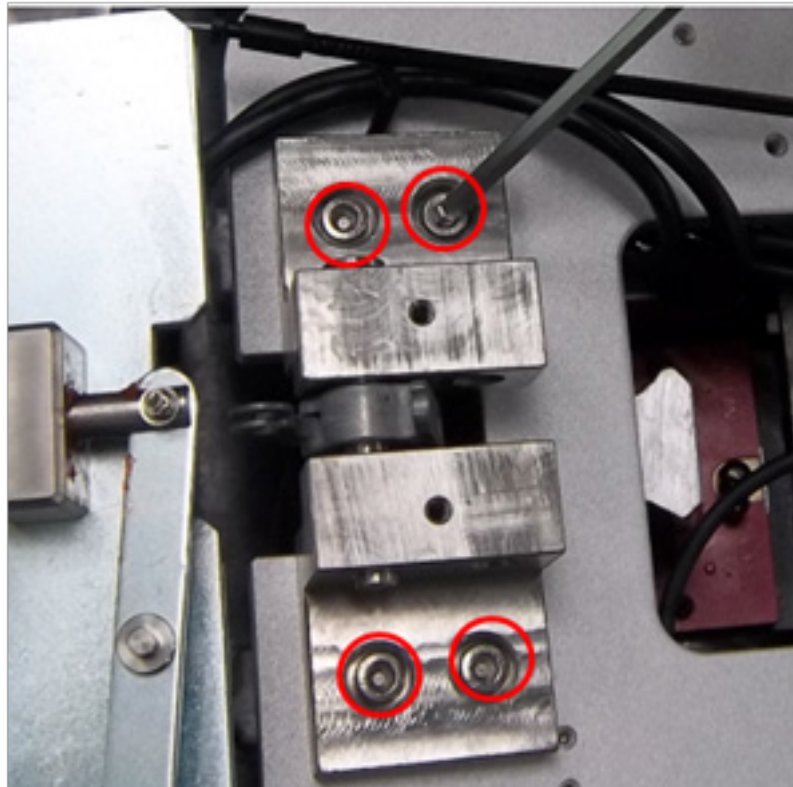
4.5.2 Back Cover Disassembly

Perform the following steps,

1. Use the screwdriver to remove six screws and take out the back cover.

2. Use the screwdriver to remove six screws and take out the sheet-metal back cover.

3. Use the screwdriver to remove four screws, pull out connection cables of the fan and take out the handle assembly.
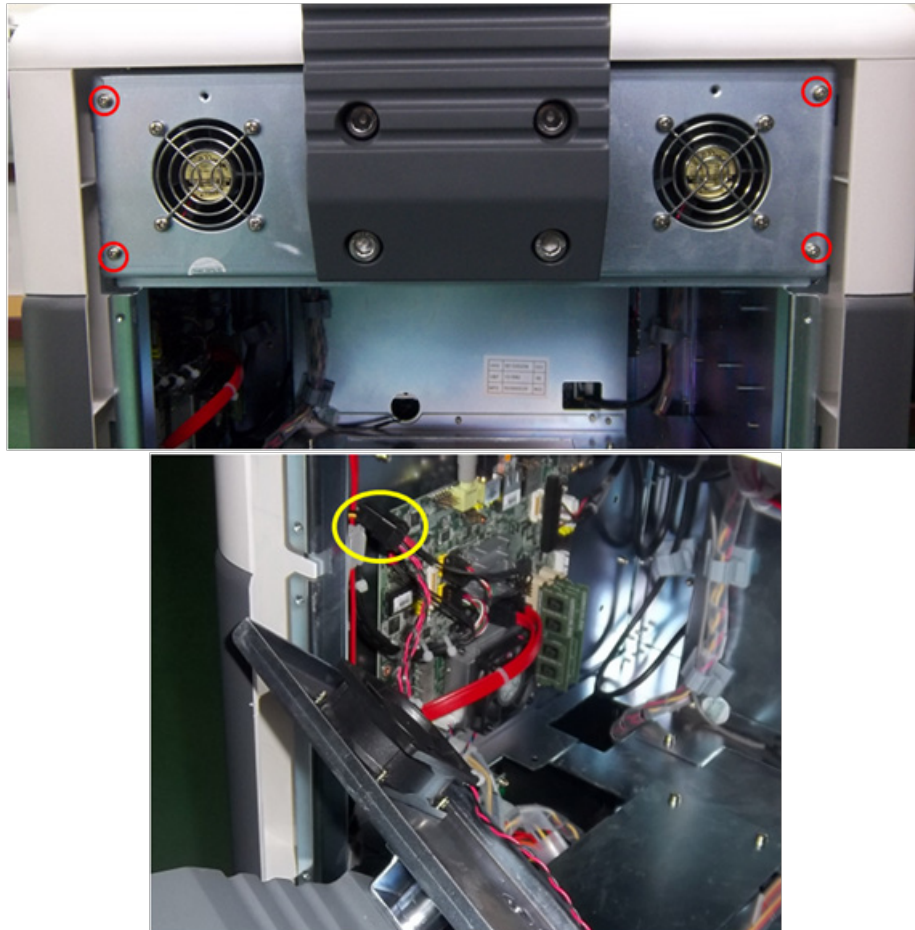
4.5.3 Lower Parts Disassembly

Perform the following steps,

1. Use the screwdriver to remove four screws, pull out connection cables of the fan and take out the handle assembly.

2. Take out the pneumatic spring to complete the disassembly.

The disassembled pneumatic spring is as shown in the following figure.

4.6 DVD Drive Disassembly

One screwdriver is needed during DVD drive disassembly.

Perform the following steps,

1. Disassemble the back cover. For details, refer to Section 4.5.2 Back Cover Disassembly.
2. Pull out all hardware connection cables.

3. Use the screwdriver to remove four screws and take out the DVD drive.
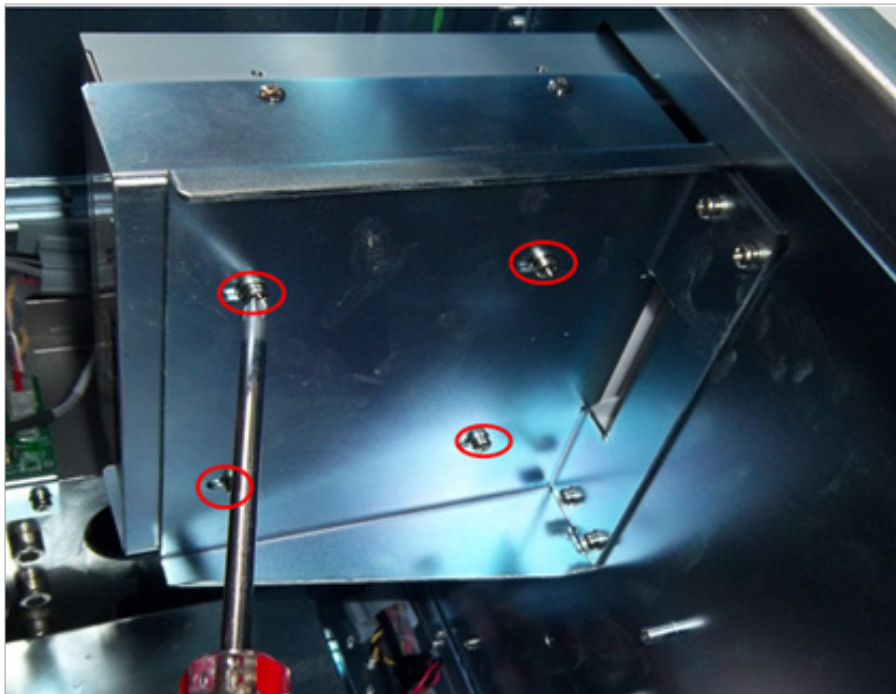
The disassembled DVD drive is as shown in the following figure.

4.7 Main Board Disassembly

One screwdriver is needed during the main board disassembly.

Perform the following steps,

1. Disassemble the back cover. For details, refer to Section 4.5.2 Back Cover Disassembly.

2. Pull out all connection cables and remove four screws to take out the main board.

The disassembled DVD drive is as shown in the following figure.
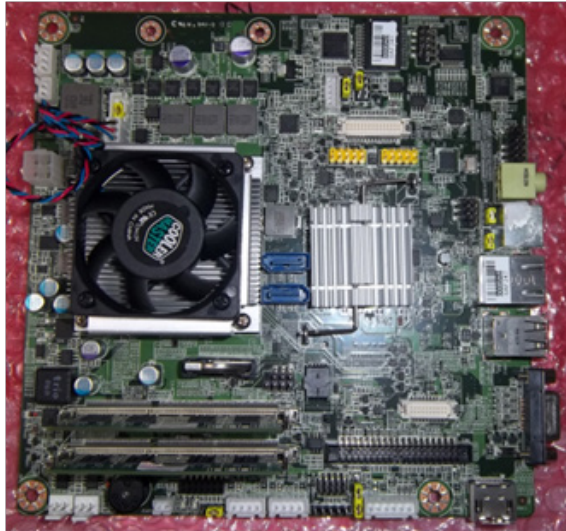
4.8 Hard Disk Disassembly

One screwdriver is needed during the hard disk disassembly.

Perform the following steps,

1. Disassemble the back cover. For details, refer to Section 4.5.2 Back Cover Disassembly.

2. Use the screwdriver to remove four screws.
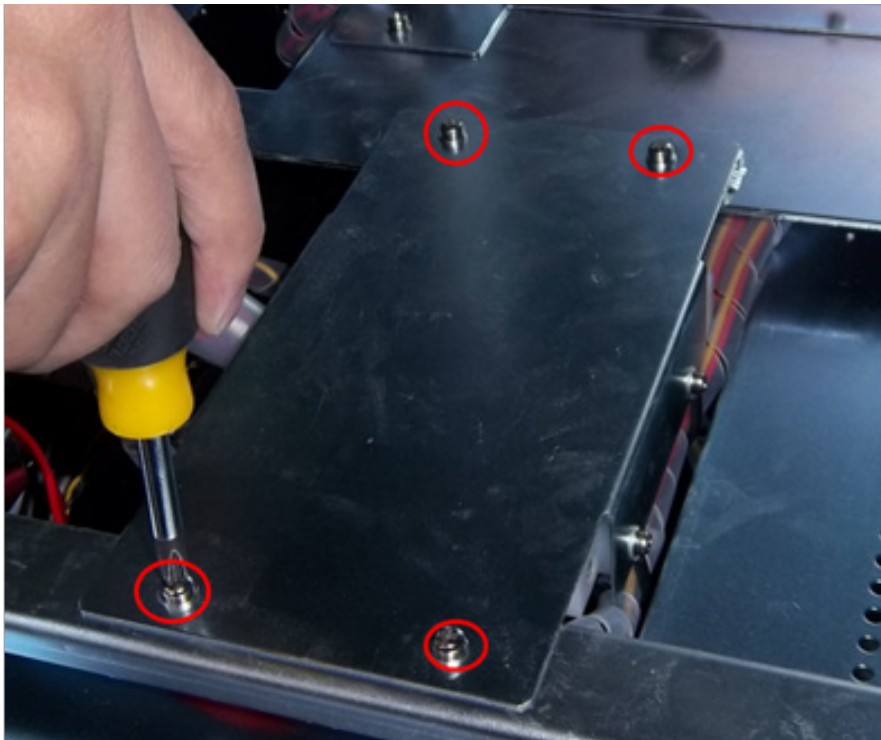
3. Pull all connection cables to take out the hard disk.
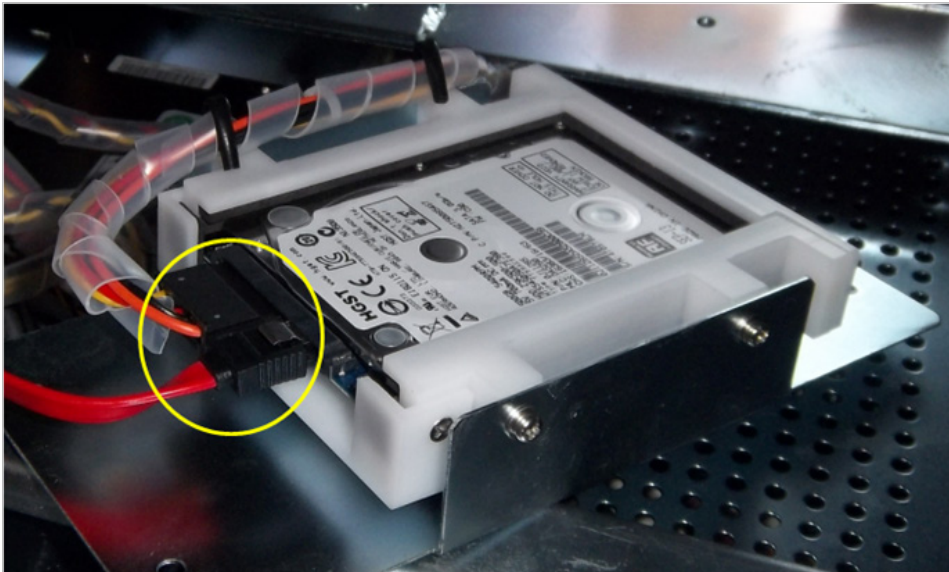
The disassembled hard disk is as shown in the following figure.
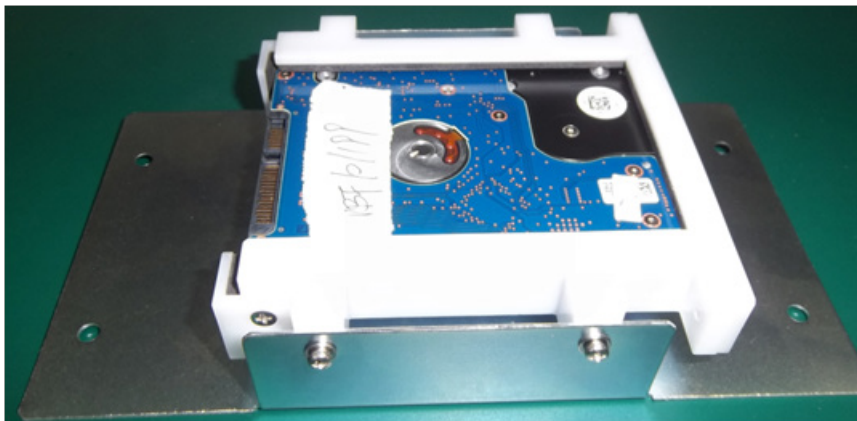
4.9 Power Supply Disassembly

One screwdriver and one hex key wrench (3mm) are needed during the power supply disassembly.

Perform the following steps,

1. Disassemble the hard disk. For details, refer to Section 4.8 Hard Disk Disassembly.
2. Use the hex key wrench (3mm) to remove four hex screws from the ultrasound system.
   The four hex screws are on the back and hard to be seen in a front view. You have to locate the four screws with your hand when removing them.
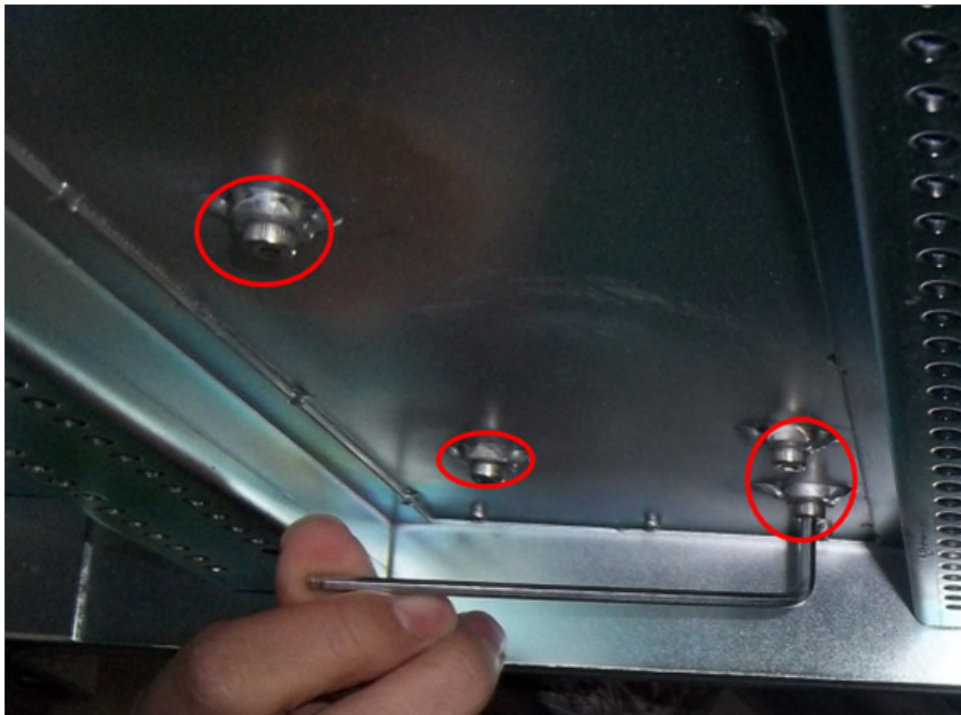
3. Take out the I/O assembly without removing cables or wires.
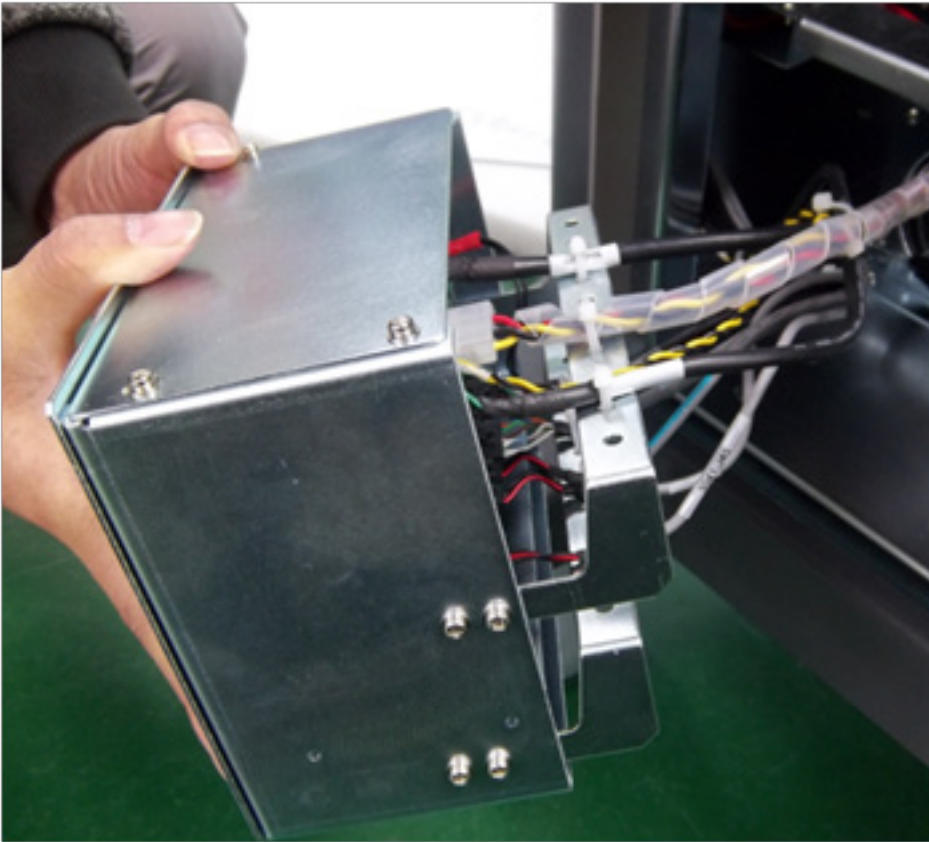
4. Pull out all connection cables of power supply modules.
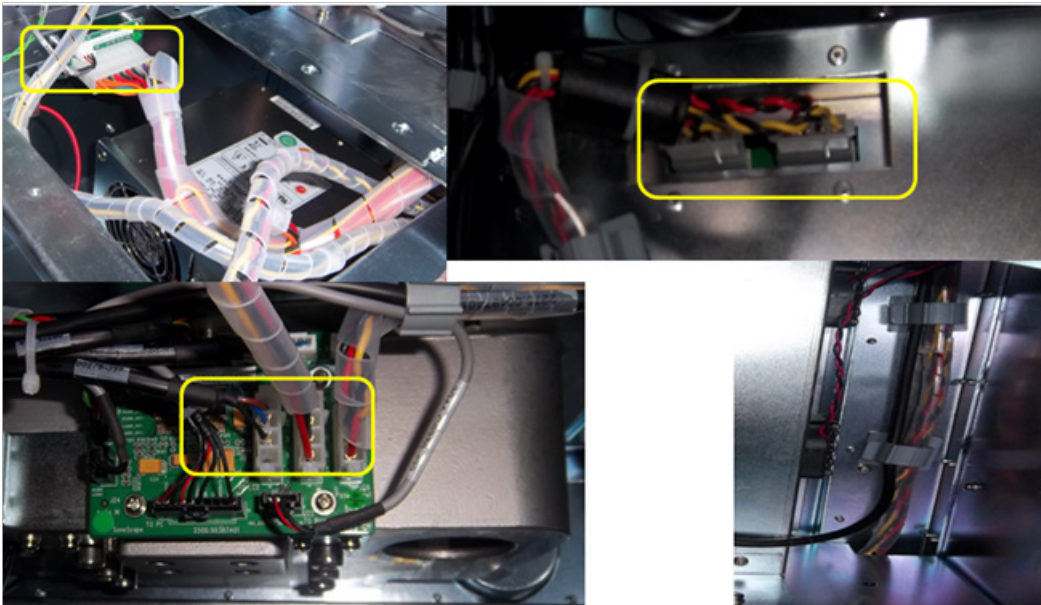
5. Use the screwdriver to remove two screws.
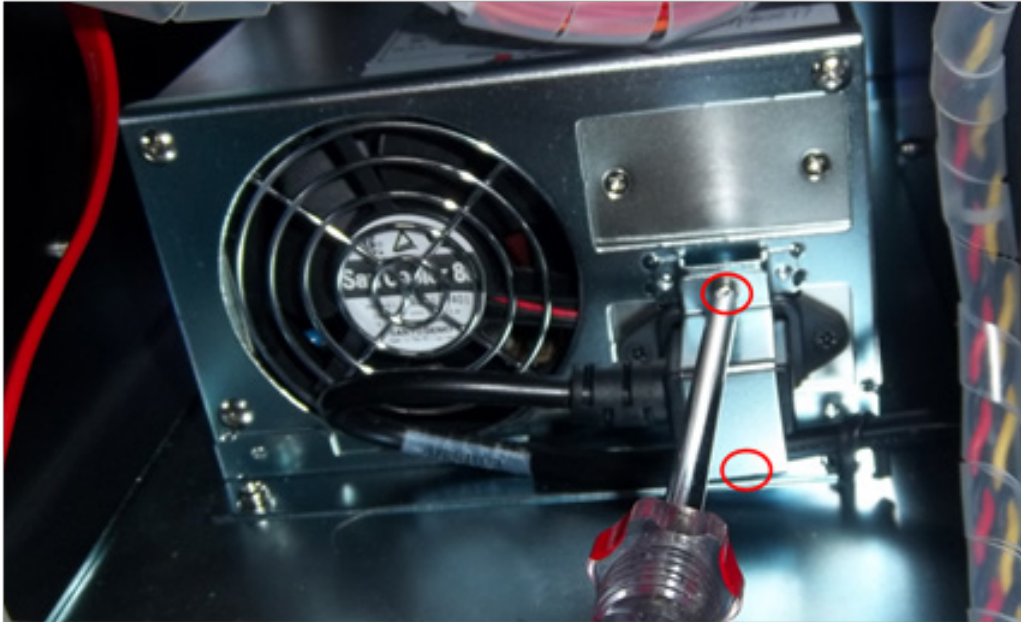
6. Pull out the power supply conversion cable, remove two screws to take out the power supply.
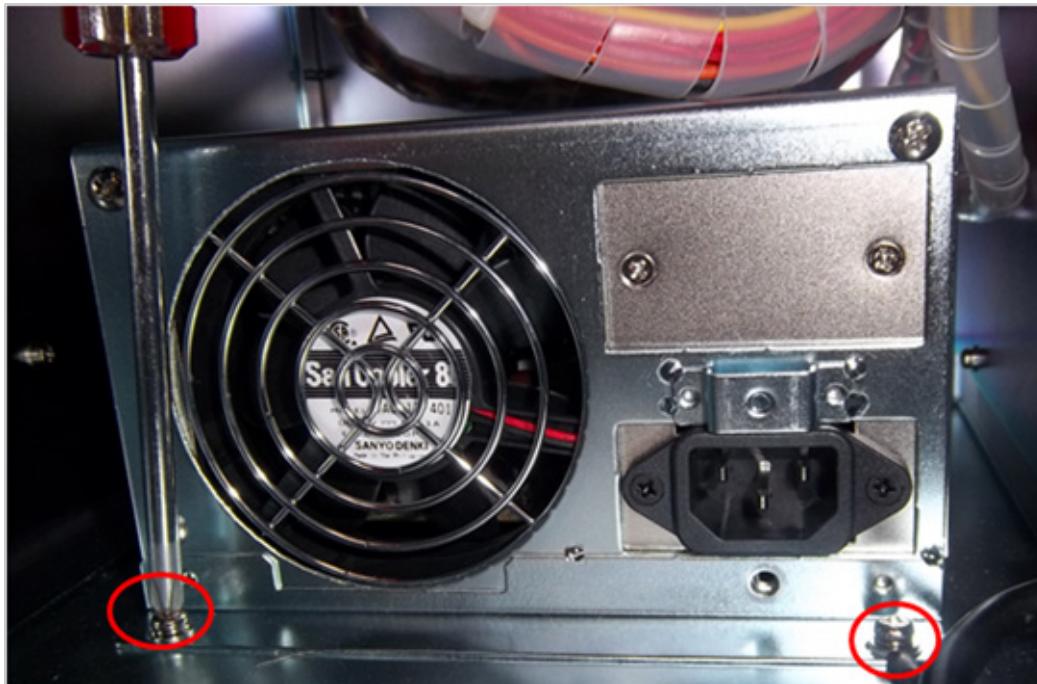
The disassembled power supply is as shown in the following figure.
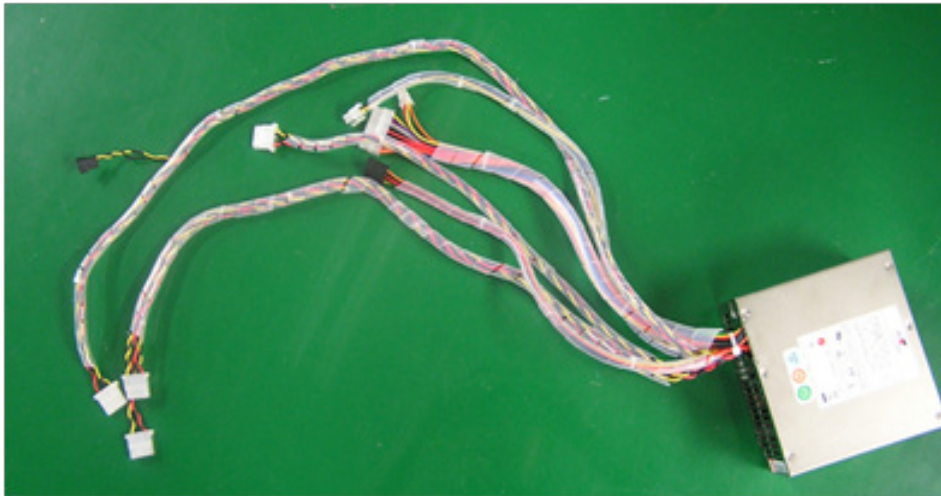
4.10 Ultrasound Unit Disassembly

One screwdriver is needed during the ultrasound unit disassembly.

Perform the following steps,

1. Disassemble the back cover. For details, refer to Section 4.5.2 Back Cover Disassembly.
2. Remove four screws to take out the DVD support.

3. Remove two screws.

4. Remove four screws.
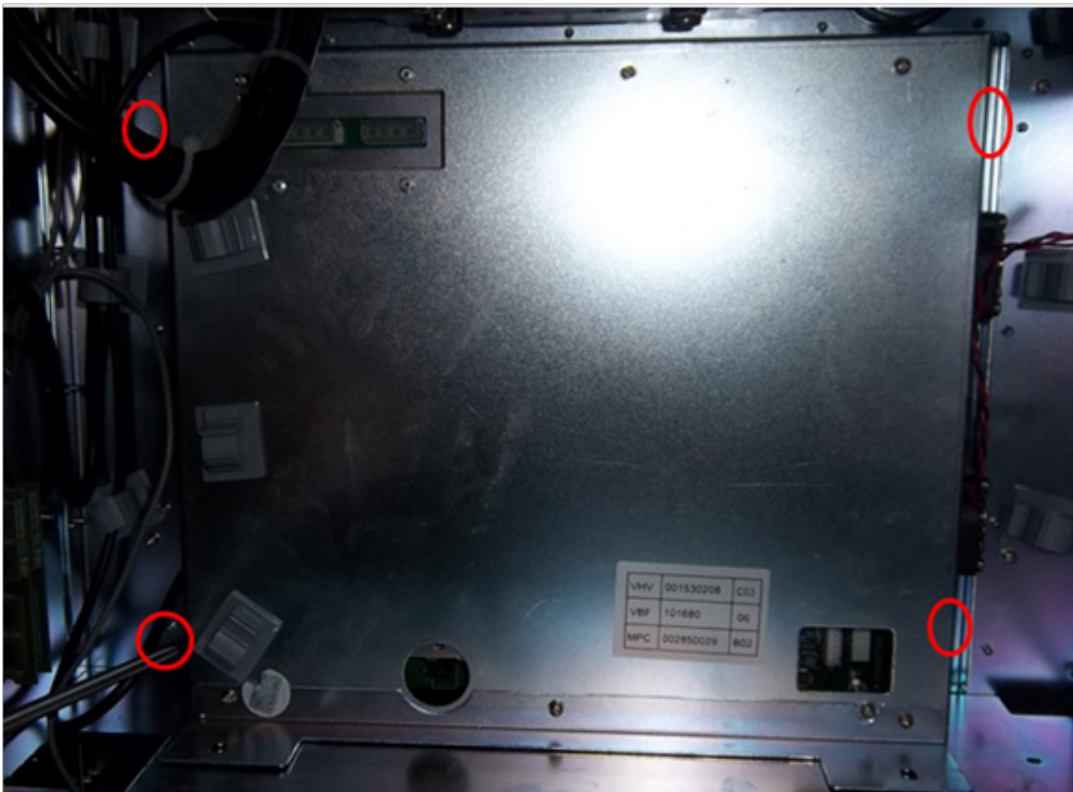
5. Pull out all connection cables to take out the ultrasound unit.
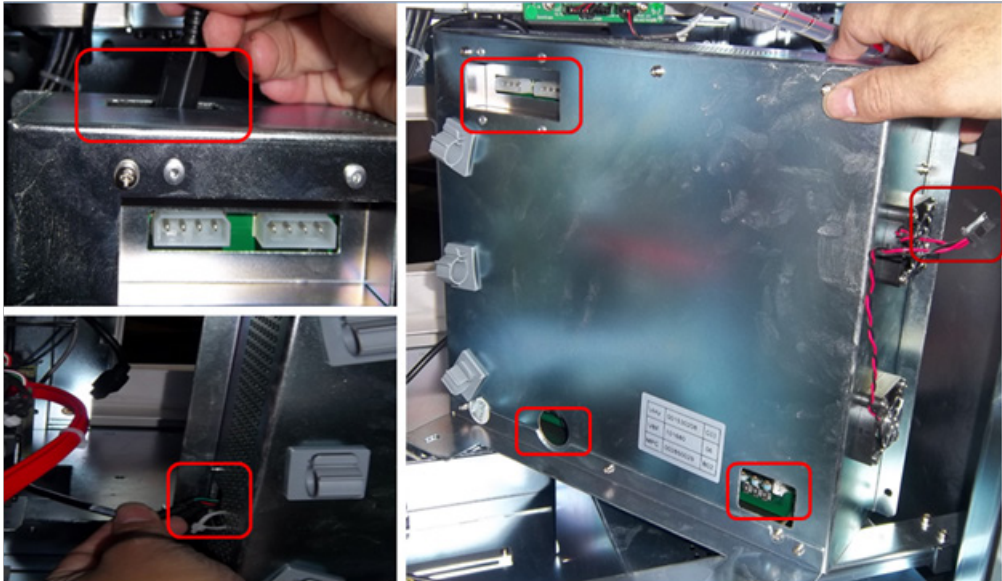
The disassembled ultrasound unit is as shown in the following figure.
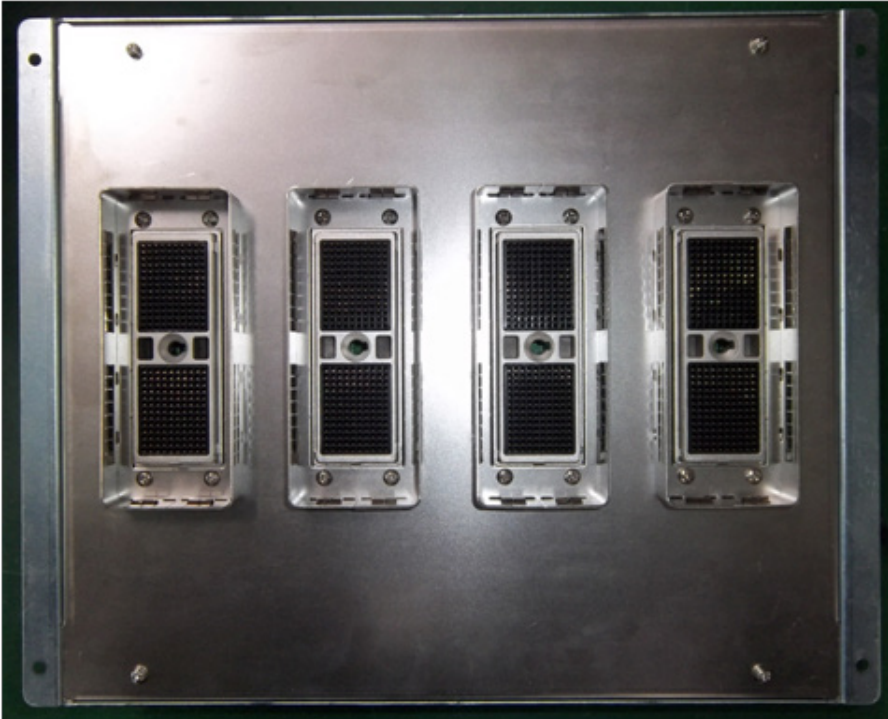
Chapter 5 Pin Descriptions

This chapter provides pin descriptions for wiring inside the system. You should get a general overview of pins before the service.

5.1 Concerns for Pin Connection

■ Connect the connection cables, and then install the main board in the ultrasound system. If you install the main board before connecting the cables, it is impossible to connect USB cable to the VBF board, connect ECG cable to the VHV board, main board fan to the power supply and connect two power cordes to the VHV board.

■ SATA cable is used to connect hard disk and drive, and interfaces of SATA, hard disk and CD-ROM are fragile and easily damaged. Handle them with care.

■ Ensure the startup switch is connected correctly to the main board. Otherwise, the ultrasound system cannot be started up.

■ The connection of IO board cables are complex, take attentions when connecting them. Otherwise, the ultrasound system may result in malfunction.
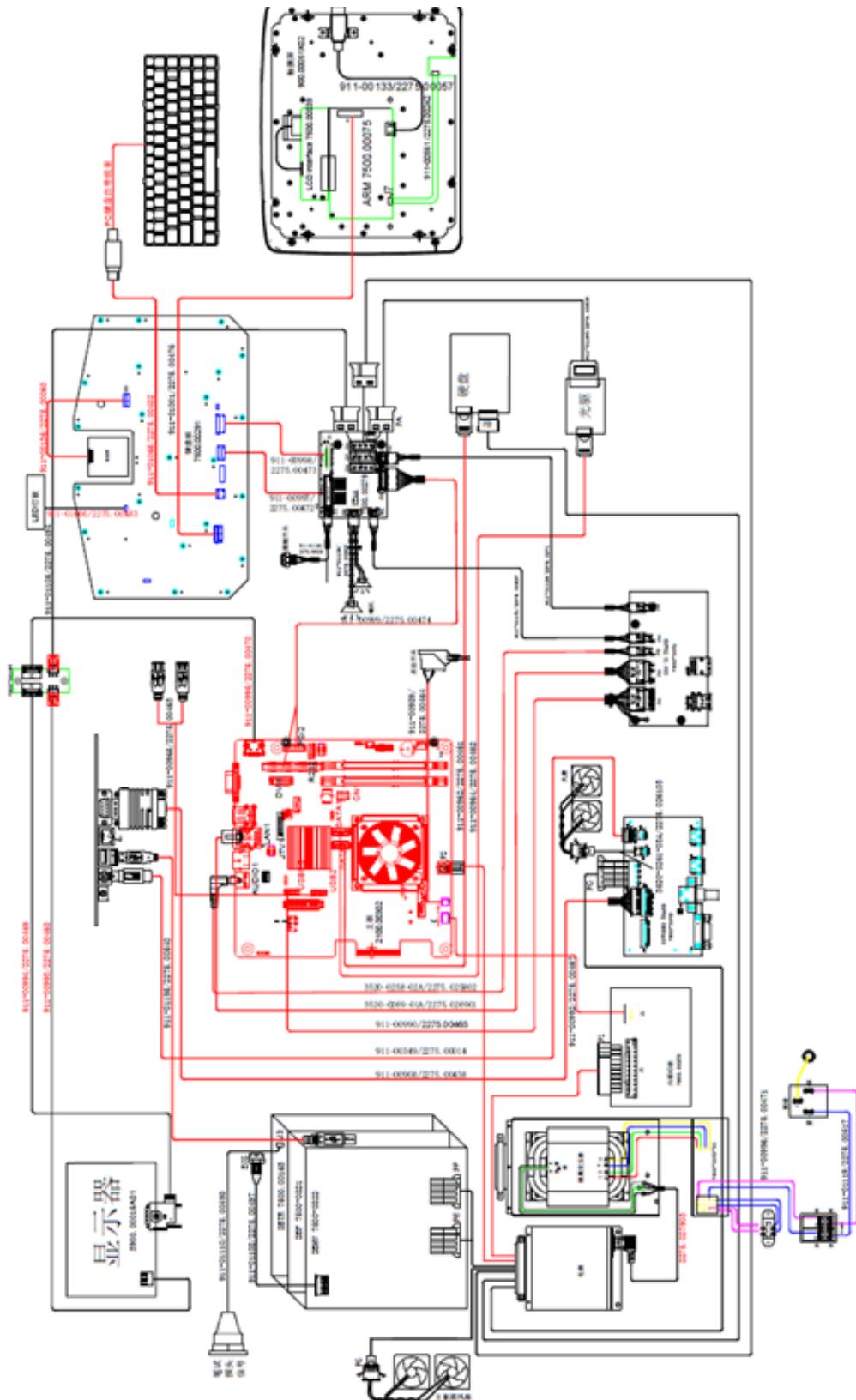
Figure 5-1 Overall System Connection

Refer to the following table and sections

Table 5-1 Codes and Names of Connection Cables

No.	P/N	Description	Figure
1	2275.00468	S30 Display Power Cable	See Figure 5-2
2	2275.00469	S30 Display DVI Signal Cable	See Figure 5-3
3	2275.00060	S40 Trackball Signal Cable	See Figure 5-4
4	2275.00482	S30 PS2 Conversion Cable	See Figure 5-5
5	2275.00472	S30 Keyboard Signal Cable	See Figure 5-6
6	2275.00473	S30 Keyboard Power Cable	See Figure 5-7
7	2275.00474	S30 Keyboard and Mouse Control Cable	See Figure 5-8
8	2275.00242	S40 9.7'' Signal Cable	See Figure 5-9
9	2275.00057	S40 ARM Board USB Signal Cable	See Figure 5-10
10	2275.00476	S30 Touch-Screen Signal Cable	See Figure 5-11
11	2275.00491	S30 LED Indicator Control Signal Cable	See Figure 5-12
12	2275.00483	S30 LED Indicator Board Cable	See Figure 5-13
13	2275.00517	SSI-8000 Back Panel Power Connection Cable	See Figure 5-14
14	2275.00471	S30 Power Switch Cable	See Figure 5-15
15	2275.027903	SSI-8000 Power Input Cable	See Figure 5-16
16	2275.00540	S30 DBF USB Transmission Cable	See Figure 5-17
17	2275.00438	SSI-8000 VGA Signal Cable	See Figure 5-18
18	2275.00014	SSI-8000 S Terminal Signal Cable	See Figure 5-19
19	2275.00470	S30 HDMI Signal Cable	See Figure 5-20
20	2275.00467	S30 PS-ON Signal Cable	See Figure 5-21
21	2275.00462	S30 Drive Signal Cable (with rings at two ends)	See Figure 5-22

No.	P/N	Description	Figure
22	2275.00463	S30 Peripheral Dual USB Transmission Cable	See Figure 5-23
23	2275.00464	S30 PC Main Board Startup Switch Signal Cable	See Figure 5-24
24	2275.00465	S30 Dual USB Transmission Cable	See Figure 5-25
25	2275.026901	SSI-8000 Network Signal Cable	See Figure 5-26
26	2275.00461	S30 Hard Disk SATA Signal Cable (with rings at two ends)	See Figure 5-27
27	2275.026103	SSI-8000 Back Casing Fan Conversion Cable	See Figure 5-28
28	2275.00527	S30 Audio Signal Conversion Cable	See Figure 5-29
29	2275.0271	SSI-8000 Print Remote Control Transmission Cable	See Figure 5-30
30	2275.00524	S30 Speaker Connection Cable	See Figure 5-31
31	2275.00539	S30 SATA Drive Power Cable	See Figure 5-32
32	2275.00526	S30 Footswitch Signal Cable	See Figure 5-33
33	2275.00497	S30 ECG Built-in Lead Wires	See Figure 5-34
34	2275.00498	S30 Pencil Probe Signal Cable	See Figure 5-35
35	2275.00494	S30 Display Power Conversion Cable	See Figure 5-36
36	2275.025802	SSI-8000 Audio Output Cable	See Figure 5-37

5.2 Pin Connection

5.2.1 Display Power Cable

P/N: 2275.00468

Cable Material:
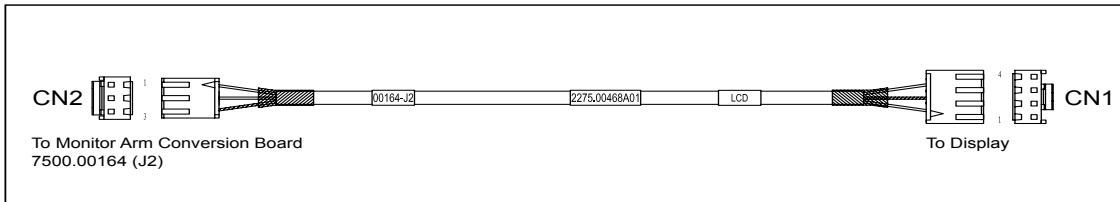
Figure 5-2 Display Power Cable

Pins:

Table 5-2 Display Power Cable Pins

Signal	12V	GND	GND	5V
Color	Brown	Blue	Shielded	NA
CN1	1	4	3	
CN2	1	2	3	

Instructions:

Connect CN1 to display, and connect CN2 to DVI conversion board 7500.00164 (J2).

5.2.2 Display DVI Signal Cable

P/N: 2275.00469

Cable Material:
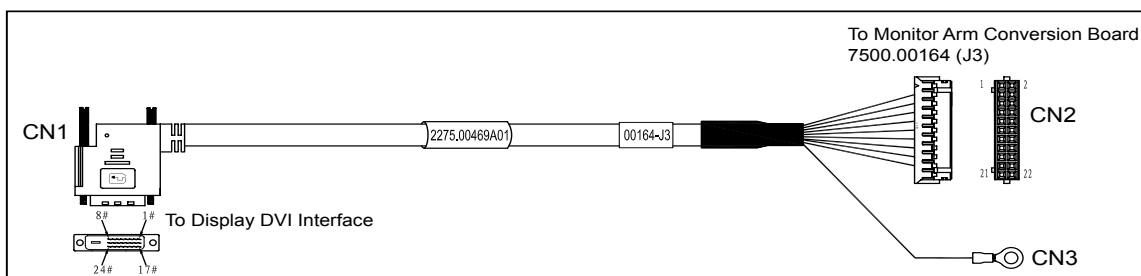
Figure 5-3 Display DVI Signal Cable

Pins:

Table 5-3 Display DVI Signal Cable Pins

Signal	GND	DVI_DATA0#	DVI_DATA0	GND	DVI_DATA2#	DVI_DATA2
Color	White/Brown	Twisted White and Brown Cables		White/Red	Twisted White and Red Cables	
CN1	3	17	18	11	1	2
CN2	17	21	19	5	9	7

Signal	GND	DVI_HT-PLG	+5V			GND
Color	White/Green	White	Red	NA	NA	Braid
CN1	19	16	14			
CN2	11	10	6	1	2	22

Signal	DVI-SPD	DVI_DATA1#	DVI_DATA1	GND	DVI_CLK#	DVI_CLK
Color	Yellow	Twisted White and Green Cables		White/Blue	Twisted White and Blue Cables	
CN1	7	9	10	22	24	23
CN2	12	15	13	16	20	18

Signal	DVI_SPC	GND			
Color	White/Green	Braid	NA	NA	
CN1	6				
CN2	14	8	3	4	

Instructions:

Connect CN1 to display DVI signal input interface, connect CN2 to DVI conversion board 7500.00164 (J3), and connect CN3 to DVI conversion board.

5.2.3 Trackball Signal Cable

P/N: 2275.00060

Cable Material:
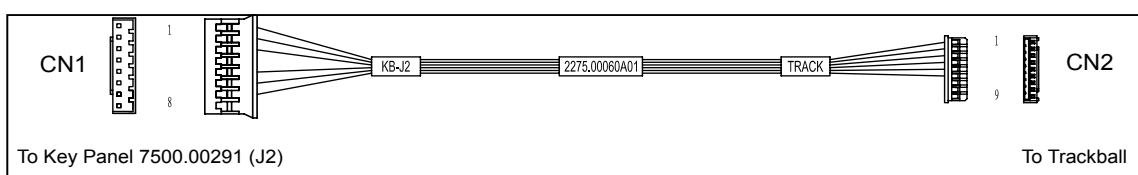
Figure 5-4 Trackball Signal Cable

Pins:

Table 5-4 Trackball Signal Cable Pins

Signal	VCC	GND	TBDT	TBCK	SET	Updata	GND	NC	NC
Color	Red	Green	White	Orange	Yellow	Brown	NA	NA	NA
CN1	1	5	7	6	3	2			
CN2	1	2	6	4	5	6			

Instructions:

Connect CN1 to key panel 7500.00291 (J2), and connect CN2 to trackball.

5.2.4 PS2 Conversion Cable

P/N: 2275.00060

Cable Material:
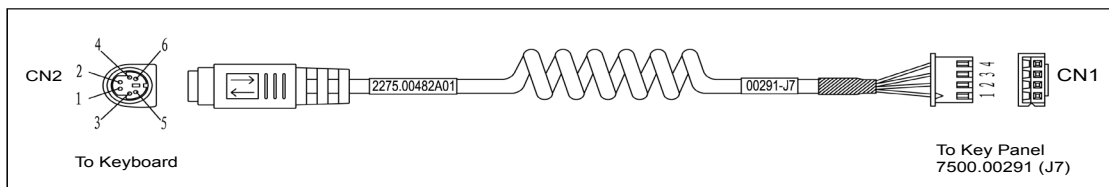
Figure 5-5 PS2 Conversion Cable

Pins:

Table 5-5 PS2 Conversion Cable Pins

Color	Red	White	Green	Black
CN1	1	2	3	4
CN2	4	5	1	3

Instructions:

Connect CN1 to key panel 7500.00291 (J7), and connect CN2 to pull-out keyboard.

5.2.5 Keyboard Signal Cable

P/N: 2275.00472

Cable Material:
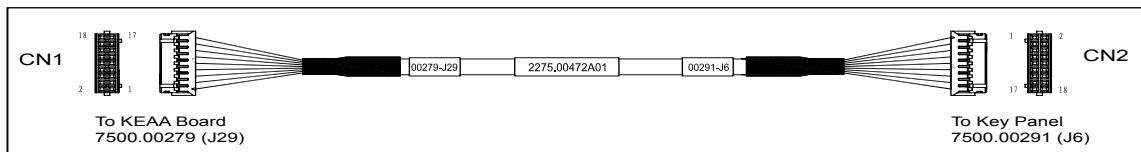
Figure 5-6 Keyboard Signal Cable

Pins:

Table 5-6 Trackball Signal Pins

Signal	FSW1	FSW2	GND	PRT CTRL	PRT BUSY	GND	TBDATA	TBCLK
Color	Brown/Twisted Brown and White Cables		Shielded	Red/Twisted Red and Black Cables		Shielded	Orange/Twisted Orange and Black Cables	
CN1	1	3	5	7	9	11	13	15
CN2	1	3	5	7	9	11	13	15

Signal	GND	GND	TX	RX	GND	TBDATA	TBCLK	GND
Color	Shielded	Shielded	Green/Twisted Green and Black Cables		Shielded	Yellow/Twisted Yellow and Black Cables		Shielded
CN1	17	6	8	10	12	14	16	18
CN2	17	6	8	10	12	14	16	18

Instructions:

Connect CN1 to KEAA board 7500.00279 (J29), and connect CN2 to key panel 7500.00291 (J6).

5.2.6 Keyboard Power Cable

P/N: 2275.00473

Cable Material:
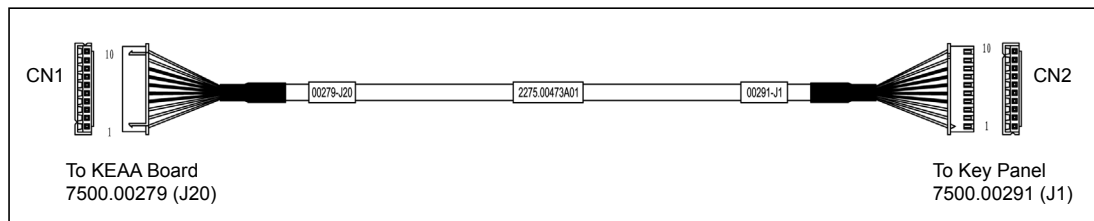
Figure 5-7 Keyboard Power Cable

Pins:

Table 5-7 Keyboard Power Cable Pins

Signal	VCC	VCC	VCC	GND	GND	GND	GND	GND	+12V	+12V
Color	Black	Grey	Red	Shielded	Shielded	Shielded	Shielded	Shielded	White	Blue
CN1	1	2	3	4	5	6	7	8	9	10
CN2	1	2	3	4	5	6	7	8	9	10

Instructions:

Connect CN1 to KEAA board 7500.00279 (J29), and connect CN2 to key panel 7500.00291 (J1).

5.2.7 Keyboard and Mouse Control Cable

P/N: 2275.00474

Cable Material:
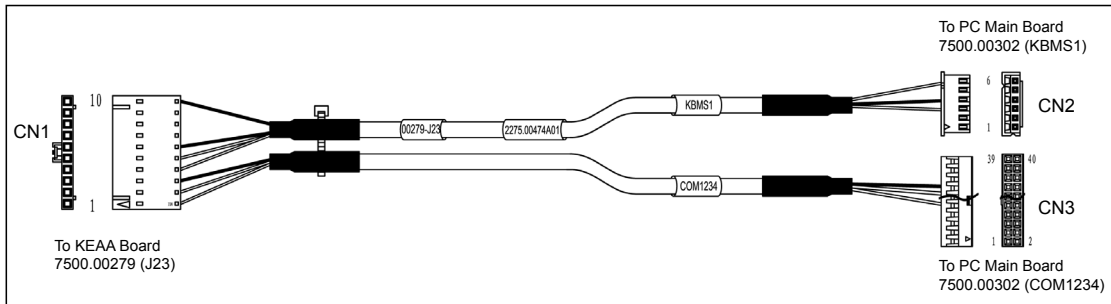
Figure 5-8 Keyboard and Mouse Control Cable

Pins:

Table 5-8 Keyboard and Mouse Control Pins

Signal	TX	RX	GND	TBDATA	TBCLK	GND	GND
Color	Red	Black	Shielded	Red	Black	Shielded	Shielded
CN1	1	2	3	4	5	6	10
CN2				3	6	4	
CN3	15	13	19				

Instructions:

Connect CN1 to KEAA board 7500.00279 (J23), connect CN2 to PC main board 7500.00302 (KBMS1), and connect CN3 to PC main board 7500.00302 (COM1234).

5.2.8 9.7"Signal Cable

P/N: 2275.00242

Cable Material:
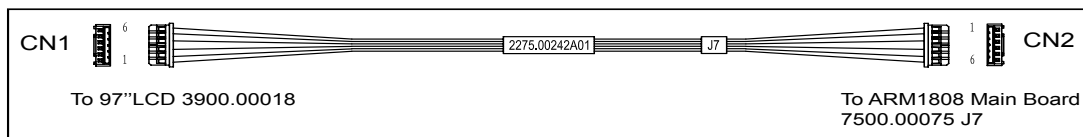
Figure 5-9 9.7" Signal Cable

Pins:

Table 5-9 9.7''Signal Cable Pins

Signal	INT	VDD (3.3)	SDA	SCL	GND	RESET
Color	Brown	Red	White	Orange	Black	Green
CN1	1	2	3	4	5	6
CN2	1	2	3	4	5	6

Instructions:

Connect CN1 to 9.7'' LCD 3900.00018, and connect CN2 to ARM1808 main board 7500.00075 (J7).

5.2.9 ARM Board USB Signal Cable

P/N: 2275.00057

Cable Material:
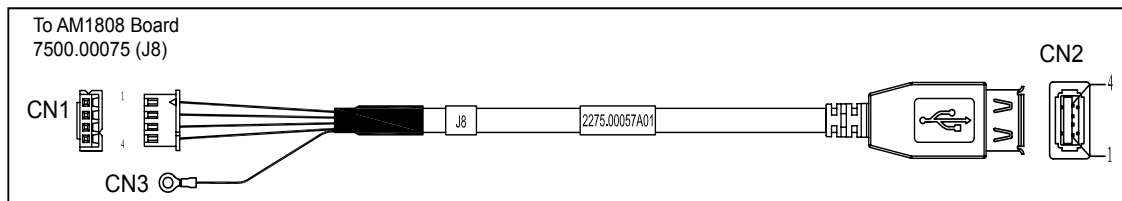
Figure 5-10 ARM Board USB Signal Cable

Pins:

Table 5-10 ARM Board USB Signal Cable Pins

Signal	+5V	D-	D+	GND	GND
Color	Red	White	Green	Black	Shielded
CN1	1	2	3	4	
CN2	1	2	3	4	Shell
CN3					Terminal

Instructions:

Connect CN1 to ARM1808 board 7500.00075 (J8), and connect CN3 to ARM1808 board 7500.00075.

5.2.10 Touch-Screen Signal Cable

P/N: 2275.00476

Cable Material:
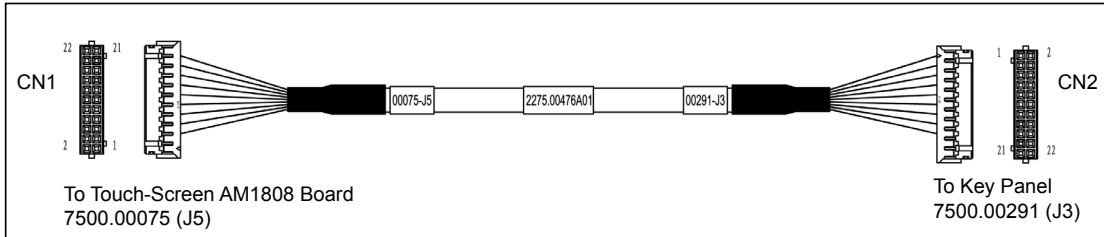
Figure 5-11 Touch-Screen Signal Cable

Pins:

Table 5-11 Touch-Screen Signal Cable Pins

Signal	GND	GND	12V	12V	12V	12V	GND	GND	RX1	TX1	GND
Color	Light Blue/Black	Grey/Black	Yellow	Yellow/Black	Orange	Orange/Black	Light Blue	Brown	Green	Green/Black	Grey
CN1	1	2	3	4	5	6	7	8	9	11	13
CN2	1	2	3	4	5	6	7	8	9	11	13
									Twisted-Pair Cables		

Signal	TX0	RX0	GND	5V	5V	5V	5V	GND	GND	NA	NA
Color	Blue	Blue/White	Purple/White	Red	Red/Black	Red/White	Pink	White	Pink/Black	Purple	Brown/White
CN1	10	12	14	15	16	17	18	19	20	21	22
CN2	12	10	14	15	16	17	18	19	20	21	22
	Twisted-Pair Cables										

Instructions:

Connect CN1 to touch screen 7500.00075 (J5), connect CN2 to key panel 7500.00291 (J3).

5.2.11 LED Indicator Control Signal Cable

P/N: 2275.00491

Cable Material:

1 Red
2 Black
00291-J9 2275.00491A01 CN2

To Key Panel 7500.00291 (J9)
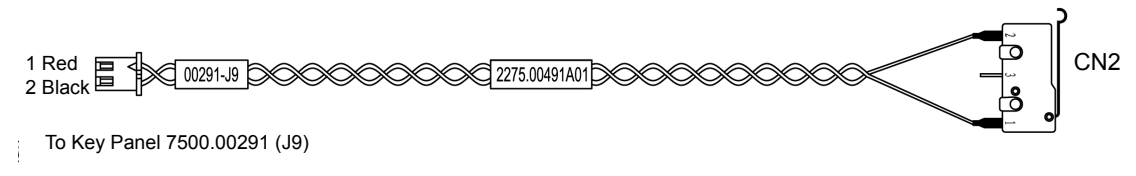
Figure 5-12 LED Indicator Control Signal Cable

Pins:

Table 5-12 LED Indicator Control Signal Cable Pins

Signal	+5V	5VLED
Color	Red	Black
CN1	1	2
CN2	1	2

Instructions:

Connect CN1 to keyboard 7500.00291 (J9).

5.2.12 LED Indicator Cable

P/N: 2275.00483

Cable Material:

CN1 00292-J1 2275.00483A01 00291-J8 CN2

To LED Indicator Board
7500.00292 (J1)

To Key Panel
7500.00291(J8)
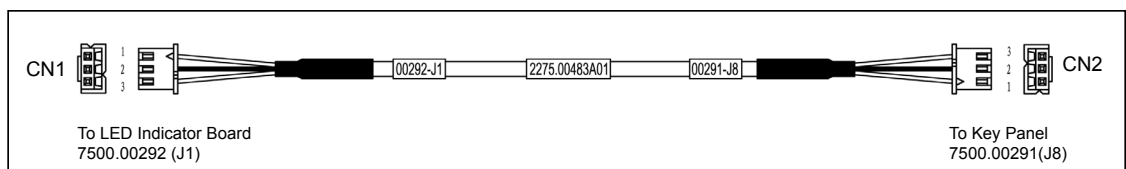
Figure 5-13 LED Indicator Cable

Pins:

Table 5-13 LED Indicator Cable Pins

Signal	+5V	GND	CTR
Color	Red	Shielded	Black
CN1	3	2	1
CN2	1	2	3

Instructions:

Connect CN1 to LED board 7500.00292 (J1), and connect CN2 to key panel 7500.00291 (J8).

5.2.13 Back Plane Power Cable

P/N: 2275.00517

Cable Material:
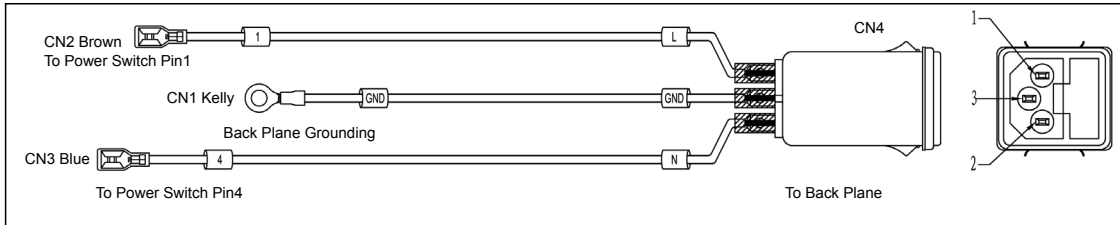
Figure 5-14 Back Plane Power Cable

Pins:

Table 5-14 Back Plane Power Cable Pins

Signal	L	N	GND
Color	Brown	Blue	Kelly
	CN2	CN3	CN1
CN4	1	2	3

Instructions:

Connect CN1 to back plane grounding, connect CN2 to power switch pin1, connect CN3 to power switch pin4, and then connect CN4 to back plane.

5.2.14 Power Switch Cable

P/N: 2275.00471

Cable Material:
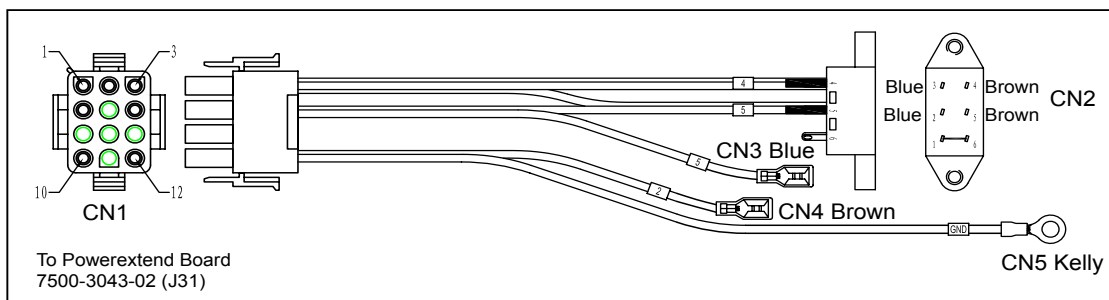
Figure 5-15 Powr Switch Cable

Pins:

Table 5-15 Powr Switch Cable Pins

Signal	L2	N1	N2	L1		N				GND		L		
Identifier	4	2	3	5		5				GND		2		
Color	Brown	Blue	Blue	Brown	NA	Blue	NA	NA	NA	Kelly	NA	Brown	Barer copper wire connection	
CN1	1	2	3	4	5	6	7	8	9	10	11	12		
CN2	4	2	3	5									1	6
						CN3				CN5		CN4		

Instructions:

Connect CN1 to back plane grounding, CN2 to power switch pin1, CN3 to power switch pin4, CN4 to back plane.

5.2.15 Power Input Cable

P/N: 2275.027903

Cable Material:
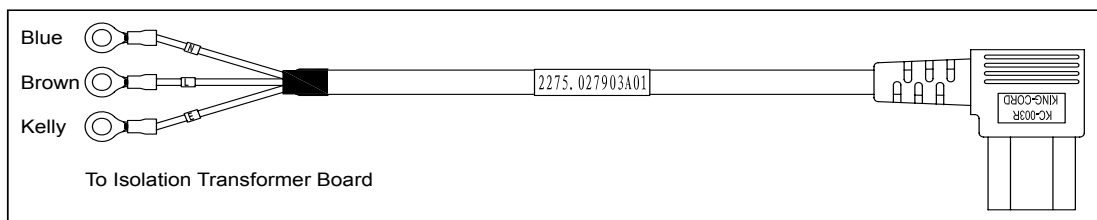
Figure 5-16 Power Input Cable

Pins: None

Instructions:

Connect CN1 to isolation transformer board.

5.2.16 DBF USB Signal Cable

P/N: 2275.00540

Cable Material:
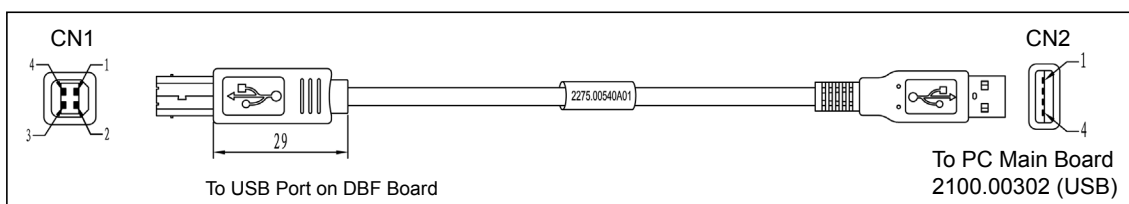
Figure 5-17 DBF USB Signal Cable

Pins:

Table 5-16 DBF USB Signal Cable Pins

Color	Brown	White	Green	Black	Shielded
CN1	1	2	3	4	Shell
CN2	4	2	3	5	Shell

Instructions:

Connect CN1 to USB port on DBF board, and connect CN2 to PC main board 2100.00302 (USB).

5.2.17 VGA Signal Cable

P/N: 2275.00540

Cable Material:
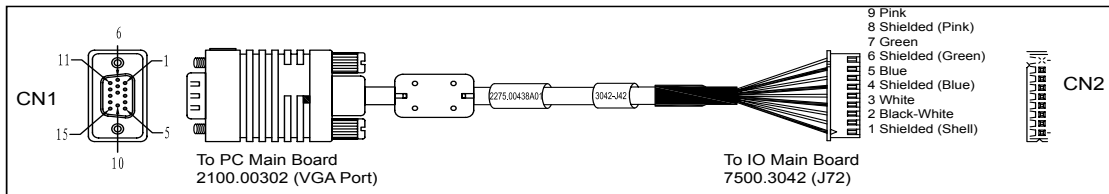
Figure 5-18 VGA Signal Cable

Pins:

Table 5-17 VGA Signal Cable Pins

Signal	R	GND	G	GND	B	GND	H	V	GND
Identifier	Pink	Shielded (Pink)	Green	Shielded (Green)	Blue	Shielded (Green)	White	Black-White	Shielded (Shell)
Color	Brown	Blue	Blue	Brown	NA	Blue	NA	NA	Kelly
CN1	1	6	2	7	3	8	13	14	Shell
CN2	9	8	7	6	5	4	3	2	1

Instructions:

Connect CN1 to PC main board 2100.00302 (VGA port), and connect CN2 to IO main board 7500.3042 (J72).

5.2.18 S Terminal Signal Cable

P/N: 2275.00014

Cable Material:
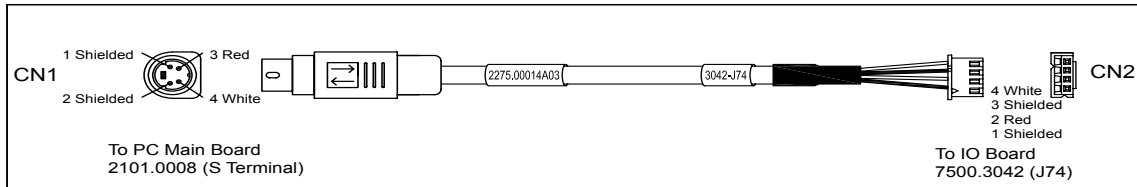
Figure 5-19 S Terminal Signal Cable

Pins:

Table 5-18 S Terminal Signal Cable Pins

Signal	GND	AY	GND	AC
Color	Shielded	Red	Shielded	White
CN1	1	3	2	4
CN2	1	2	3	4

Instructions:

Connect CN1 to PC main board 2100.00302 (S terminal), and connect CN2 to IO board 7500.3042 (J74).

5.2.19 HDMI Signal Cable

P/N: 2275.00470

Cable Material:
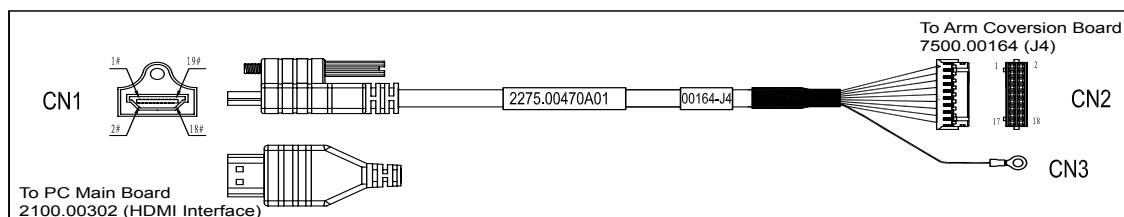
Figure 5-20 HDMI Signal Cable

Pins:

Table 5-19 HDMI Signal Cable Pins

Signal	GND	DATA0-	DATA0+	GND	DATA2-	DATA2+	GND	HPTLG	+5V
Color	White/Brown	Twisted White and Brown Cables		White/Red	Twisted White and Red Cables		White/Blue	Purple	Red
CN1	8	9	7	2	3	1	11	19	18
CN2	5	1	3	17	13	15	2	14	18

Signal	GND	SPD	DATA1-	DATA1+	GND	CLK-	CLK+	SPC	GND	GND
Color	Braid	Yellow	Twisted White and Green Cables		White/ Green	Twisted White and Blue Cables		Orange	Braid	Braid
CN1		16	6	4	2	12	10	15		Shell
CN2	8	12	7	9	17	4	6	10	16	
CN3										Terminal

Instructions:

Connect CN1 to PC main board 2100.00302 (HDMI port), CN2 to monitor arm conversion board 7500.00164 (J4), CN3 to monitor arm conversion grounding.

5.2.20 PS-ON Signal Cable

P/N: 2275.00467

Cable Material:
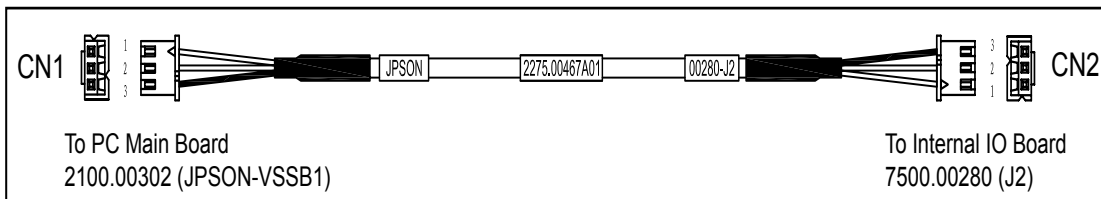
Figure 5-21 PS-ON Signal Cable

Pins:

Table 5-20 PS-ON Signal Cable Pins

Signal	5VSB	PS-ON	GND
Color	Shielded	Red	Shielded
CN1	1	2	3
CN2	1	2	3

Instructions:

Connect CN1 to PC main board 2100.00302 (JPSON-V5SB1), and connect CN2 to internal I/O board 7500.00280 (J2).

5.2.21 Drive Signal Cable (With Locks at Two Ends)

P/N: 2275.00462

Cable Material:
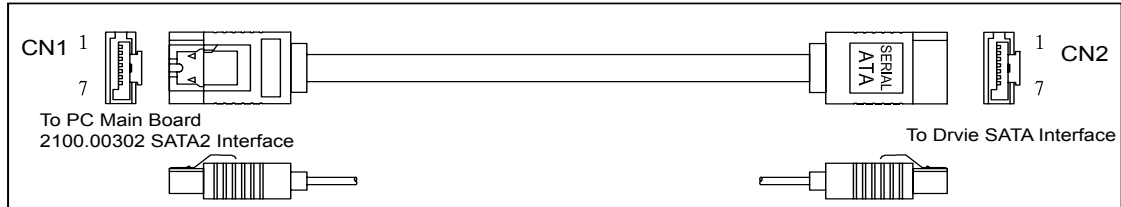
Figure 5-22 Drive Signal Cable

Pins:

Table 5-21 Drive Signal Cable Pins

Signal	GND	TX0+	TX0-	GND	TR0+	TR0-	GND
Color	Shielded	Blue	White	Shielded	Blue	White	Shielded
CN1	1	2	3	4	5	6	7
CN2	1	2	3	4	5	6	7

Instructions:

Connect CN1 to PC main board 2100.00302 (SATA2), and connect CN2 to drive SATA interface.

5.2.22 Peripheral Dual USB Cable

P/N: 2275.00463

Cable Material:
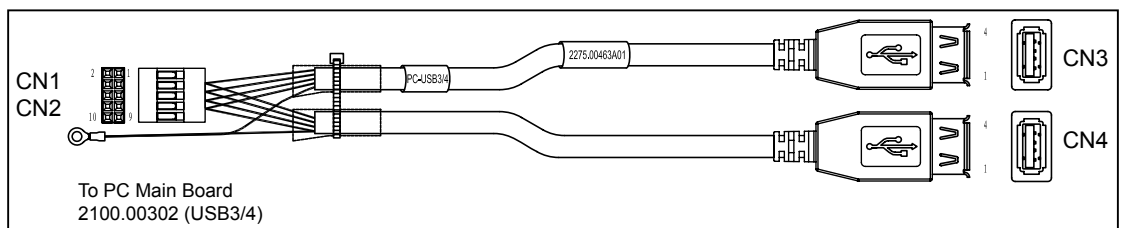
Figure 5-23 Peripheral Dual USB Cable

Pins:

Table 5-22 Peripheral Dual USB Cable Pins

Signal	+5V	D-	D+	GND	N/C	+5V	D-	D+	GND	N/C	GND
Color	Red	White	Green	Black		Red	White	Green	Black		Shielded
CN1	1	3	5	7	9	**2**	**4**	**6**	8	10	
CN2											Shielded
CN3	1	**2**	**3**	**4**		1	**2**	**3**	**4**		Shielded
CN4											Shielded

Instructions:

Connect CN1 to PC main board 2100.00302 (USB3/4), and connect CN2 to main board grounding.

5.2.23 Signal Cable for PC Main Board Startup Switch

P/N: 2275.00464

Cable Material:
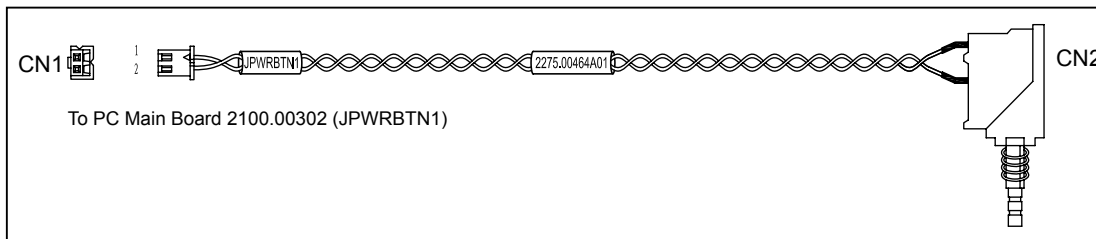
Figure 5-24 Signal Cable for PC Main Board Startup Switch

Pins:

Table 5-23 Peripheral Dual USB Cable Pins

Signal	PWR BTN	GND
Color	Green	Green
CN1	1	2
CN2	1	2

Instructions:

Connect CN1 to PC main board 2100.00302 (JPWRBTN1).

5.2.24 Dual USB Transmission Cable

P/N: 2275.00465

Cable Material:
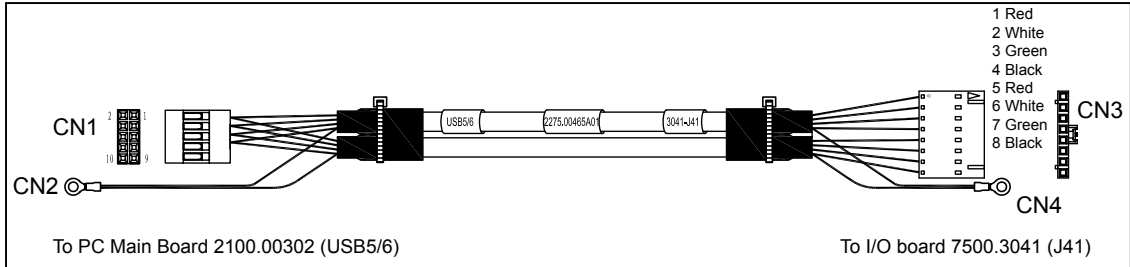
Figure 5-25 Drive Signal Cable

Pins:

Table 5-24 Peripheral Dual USB Cable Pins

Signal	VBUS1	D1-	D1+	GND	N/C	VBUS2	D2-	D2+	GND	N/C	GND
Color	Red	White	Green	Black		Red	White	Green	Black		Shielded
CN1	1	3	5	7	9	2	4	6	8	10	
CN2											Shielded
CN3	1	2	3	4		5	6	7	8		
CN4											Shielded

Instructions:

Connect CN1 to PC main board 2100.00302 (USB5/6), CN2 to PC main board grounding, CN3 to I/O board 7500.3041 (J41), and CN4 to I/O board grounding.

5.2.25 Network Signal Cable

P/N: 2275.026901

Cable Material:
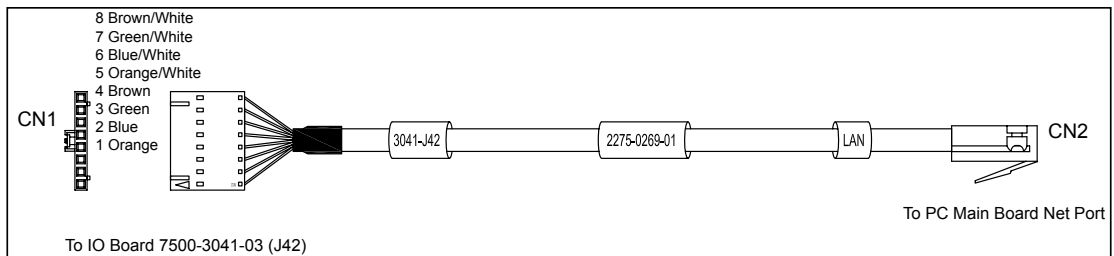
Figure 5-26 Network Signal Cable

Pins:

Table 5-25 Network Signal Cable Pins

Signal	TX+	TX-	RX+	NC	NC	RX-	NC	NC
Color	Orange	Orange/White	Blue	Blue/White	Green	Green/White	Brown	Brown/White
CN1	1	5	2	6	3	7	4	8
CN2	1	2	3	3	5	6	7	8

Instructions:

Connect CN1 to IO board 7500.3041 (J42), and connect CN2 to PC main board 2100.00302 net port.

5.2.26 Hard Disk SATA Signal Cable (With Locks at Two Ends)

P/N: 2275.00461

Cable Material:
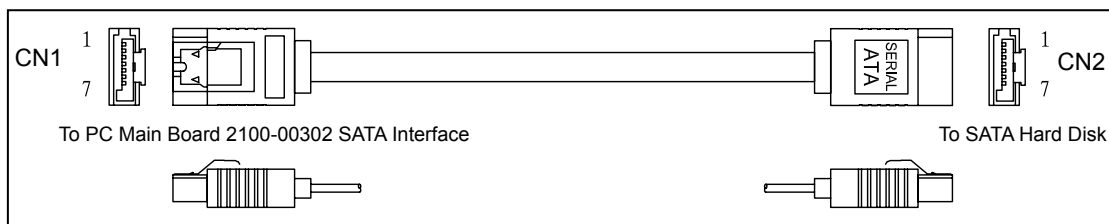
Figure 5-27 Hard Disk SATA Signal Cable

Pins:

Table 5-26 Hard Disk SATA Signal Cable Pins

Signal	GND	TX0+	TX0-	GND	TR0+	TR0-	GND
Color	Shielded	Blue	White	Shielded	Blue	White	Shielded
CN1	1	2	3	4	5	6	7
CN2	1	2	3	4	5	6	7

Instructions:

Connect CN1 to PC main board 2100.00302 (SATA2), and connect CN2 to drive SATA interface.

5.2.27 Back Plane Fan Conversion Cable

P/N: 2275.026103

Cable Material:
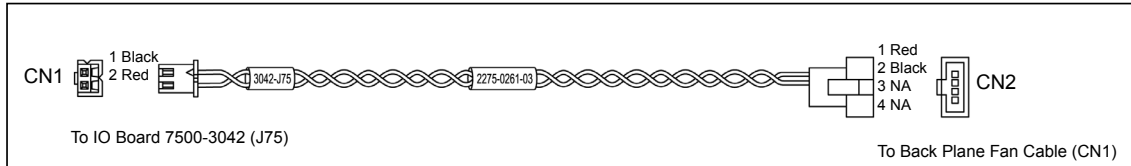
Figure 5-28 Back Plane Fan Conversion Cable

Pins:

Table 5-27 Back Plane Fan Conversion Cable Pins

Signal	+12V	GND		
Color	Yellow	Black	NA	NA
CN1	2	1		
CN2	1	2	3	4

Instructions:

Connect CN1 to IO board 7500.3042 (J75), and connect CN2 to back plane fan cable.

5.2.28 Audio Signal Conversion Cable

P/N: 2275.00527

Cable Material:
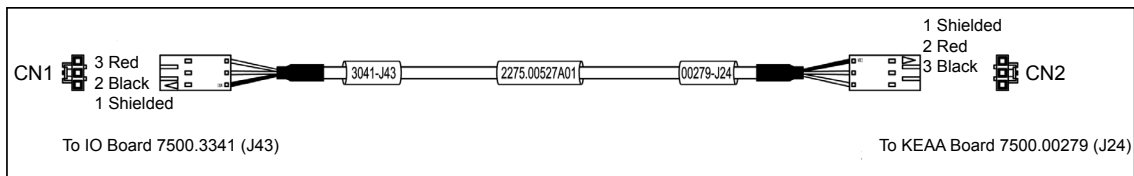
Figure 5-29 Audio Signal Conversion Cable

Pins:

Table 5-28 Audio Signal Conversion Cable Pins

Signal	GND	R	L
Color	Shielded	Red	Black
CN1	1	3	2
CN2	1	2	3

Instructions:

Connect CN1 to IO board 7500.3041 (J43), and connect CN2 to KEAA board 7500.00279 (J24).

5.2.29 Print Remote Control Cable

P/N: 2275.00271

Cable Material:
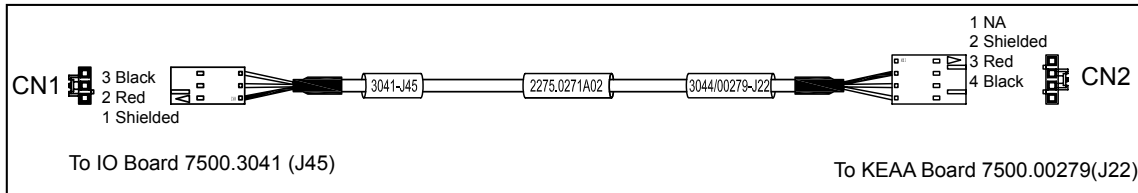
Figure 5-30 Print Remote Control Cable

Pins:

Table 5-29 Print Remote Control Cable Pins

Signal	GND	BUSY	CTRL	
Color	Shielded	Red	Black	NA
CN1	1	2	3	
CN2	2	3	4	1

Instructions:

Connect CN1 to IO board 7500.3041 (J45), and connect CN2 to KEAA board 7500.00279 (J22).

5.2.30 Speaker Cable

P/N: 2275.00524

Cable Material:
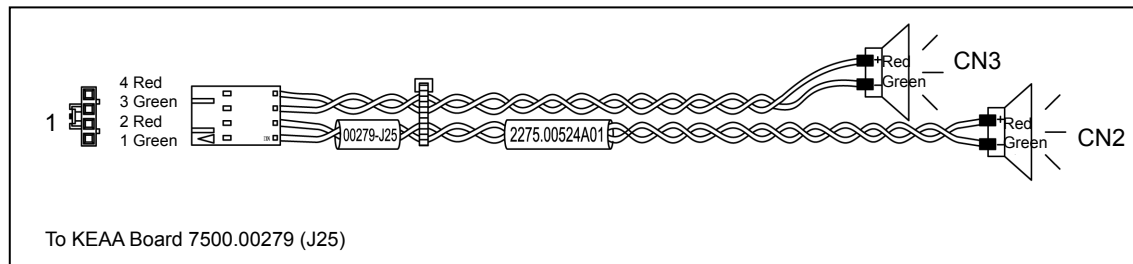
Figure 5-31 Speaker Cable

Pins:

Table 5-30 Speaker Cable Pins

Signal	R-	R+	L-	L+
Color	Green	Red	Green	Red
CN1	1	2	3	4
CN2	-	+		
CN3			-	+

Instructions:

Connect CN1 to KEAA board 7500.00279 (J25).

5.2.31 SATA Drive Power Cable

P/N: 2275.00539

Cable Material:
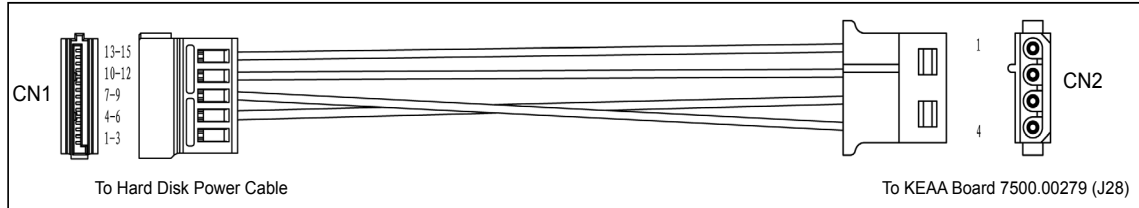
Figure 5-32 SATA Drive Power Cable

Pins:

Table 5-31 SATA Drive Power Cable Pins

Signal	12V			GND			VCC			GND			3.3V		
Color	Yellow			Black			Red			Black			NA		
CN1	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1
CN2	1			2			3								

Instructions:

Connect CN1 to hard disk, and connect CN2 to KEAA board 7500.00279 (J28).

5.2.32 Footswitch Signal Cable

P/N: 2275.00526

Cable Material:
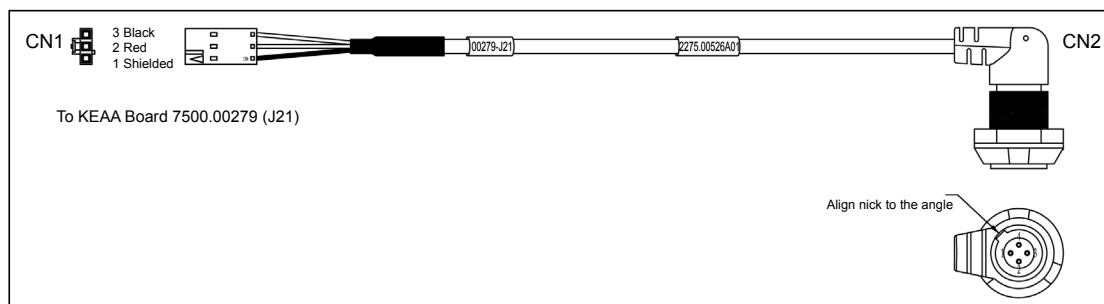
Figure 5-33 Footswitch Signal Cable

Pins:

Table 5-32 Footswitch Signal Cable Pins

Signal	GND	FSW2	FSW1
Color	Shielded	Red	Black
CN1	1	2	3
CN2	1, 4	2	3

Instructions:

Connect CN1 to KEAA board 7500.00279 (J21).

5.2.33 ECG Built-in Lead Wire

P/N: 2275.00497

Cable Material:
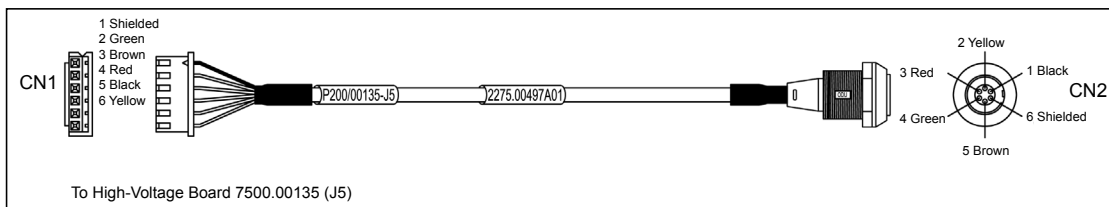
Figure 5-34 ECG Built-in Lead Wire

Pins:

Table 5-33 ECG Built-in Lead Wire Pins

Signal	RA	LA	LL			GND
Color	Shielded	Green	Brown	Red	Black	Yellow
CN1	1	2	3	4	5	6
CN2	6	4	5	3	1	2

Instructions:

Connect CN1 to high-voltage board 7500.00135 (J5).

5.2.34 Pencil Probe Signal Cable

P/N: 2275.00498

Cable Material:
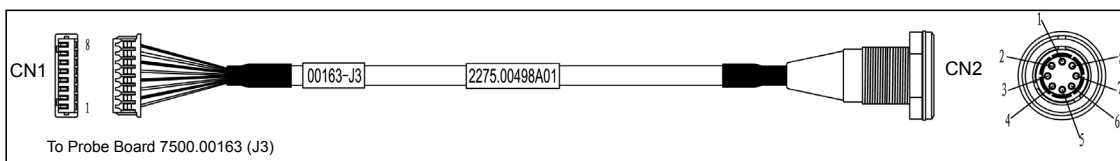
Figure 5-35 Pencil Probe Signal Cable

Pins:

Table 5-34 Pencil Probe Signal Cable Pins

Signal	TX	GND	IDOE	GND	RX	GND	Reserved	GND
Color	White	Shielded	Black	Shielded	Red	Shielded	Green	Shielded
CN1	1	2	3	4	5	6	7	8
CN2	1	2	3	4	5	6	7	8

Instructions:

Connect CN1 to probe board 7500.00163 (J3).

5.2.35 Display Power Conversion Cable

P/N: 2275.00494

Cable Material:
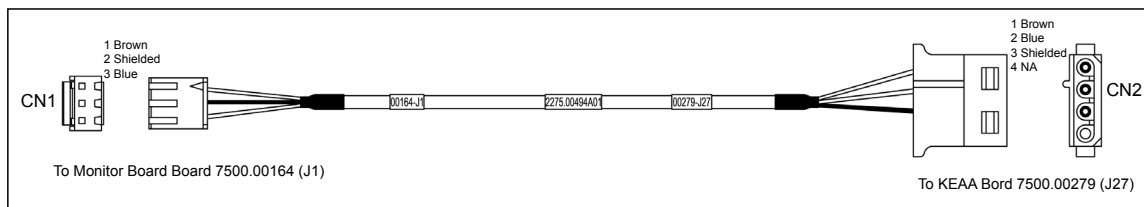
Figure 5-36 Display Power Conversion Cable

Pins:

Table 5-35 Display Power Conversion Cable Pins

Signal	+12V	GND	GND	5V
Color	Brown	Blue	Shielded	NA
CN1	1	3	2	
CN2	1	2	3	4

Instructions:

Connect CN1 to monitor arm board 7500.00164 (J1), and connect CN2 to KEAA board 7500.00279 (J27).

5.2.36 Audio Output Cable

P/N: 2275.025802

Cable Material:
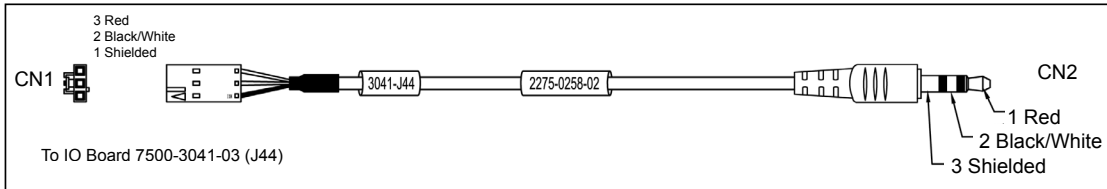
Figure 5-37 Audio Output Cable

Pins:

Table 5-36 Audio Output Cable Pins

Signal	R	L	GND
Color	Red	Black/ Red	Shielded
CN1	3	2	1
CN2	1	2	3

Instructions:

Connect CN1 to IO board 7500.3041 (J44).

Chapter 6 Software Installation and Update

The service department or local distributer copies the updated software obtained from the manufacturer into the USB2.0 drive. You can install or update the software by using the USB2.0 drive with a reference to this chapter.

6.1 Preparation before Update

Ensure versions of master file and control code file are consistent, the kernel is wrote into a USB drive.

6.1.1 Preparation Concerns

● The kernel version of this ultrasound system software is 13.5 or above (refer to compact disk), the software version is 0.0.09 or above.

● Ensure the prepared USB drive works normally on the desired ultrasound system. You can confirm the USB drive works normally by saving the system image successfully to the USB drive.

● Ensure names of update file and control number are consistent, the ultrasound can be started up normally.

● Ensure only one update file is saved in the USB drive.

● Do not alter the formate and file name of the update file in the USB drive. Otherwise, the ultrasound system may result in a failure update.

● Ensure the ultrasound system displays the current date. Otherwise, the ultrasound system may result in a failure update.

● Expectations may happen if the update file is sent through E-mail. In such case, you can correct its name manually. For example, you can correct asecurexxxxxx.tar.gz(1) to asecurexxxxxx.tar.gz.

6.1.2 Master and Control No. Files

The master file is in a format of adata_*.*.*.*.tgz, and the control file is in a format of asecure******_*.*.*.*.tgz. *.*.*.*. stands for software version, ******stands for a 6-digital control code, versions of the master and the control code files must be consistent. Take master file adata_0.0.09vt.tgz and control No. file asecure101106_0.0.09vt.tgz for instance, 0.0.0.9vt stands for the current software version, 101106 is consistent with VBF board No., standing for the control number.

You can view the control number in the following ways,

■ Choose **Menu** -> **System Information t**o view the control number on the System Information screen.

```
Lincense Valid Days:                         No expire

Software Build On 2012/09/12

Probe table Version  2

User setting Version  2

Control Number:  101106
Software Version:  0.0.0.9v
Kernel Version:  2

RTC Rev:  1.7
ACM Rev:  1.5
TTG Rev:  1.0
FIFO Rev:  1.0
DBF Rev:  0.8
DBF BID Rev:  1.b
HV BID Rev:  1.2
EC Rev:  3.0
ECG Rev: 0.0



                                              EXIT
```
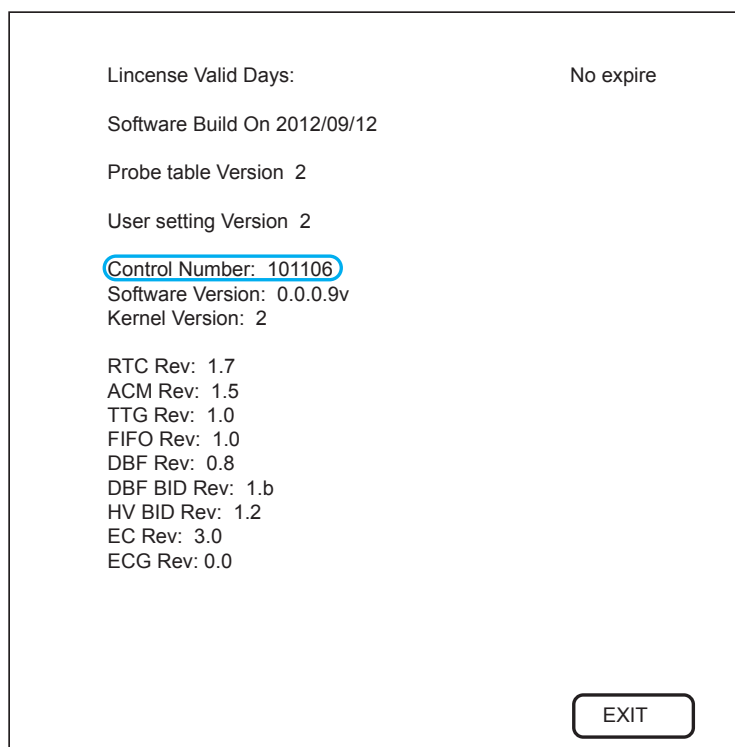
■ The control number is consistent with serial number of VBF board. If the ultrasound system cannot work normally, you can view the serial number of VBF board by removing the shell.

6.1.3 Tool Preparation

You need prepare the following tools before the update.

Tool	Specification	Remark
USB Drive	Kingston Data Traveler 4G	4G Capacity
USB Keyboard	3	USB Port
CD Written with Kernel Files (13.5)	1	Latest Kernel

■ To write the update file to USB drive through PC

1. Place the CD written with kernel files on the PC drive, and connect the USB drive to PC.

2. Start up the CD, press the **Enter** key on the USB keyboard when **Press any key to make bootable USB key** pops up. Press the **Enter** key again to complete the writing when **Press ENTER key to shutdown** pops up.

3. Remove the USB drive and CD, restart PC.

■ To write the update file to USB drive through ultrasound system

1. Start up the ultrasound system, and connect the USB keyboard to the system when the user interface displays.

2. Long press the **Delete** key for 5 seconds to enter the BIOS screen.

3. Place the CD written with kernel files on the PC drive, and then connect the USB drive to the system.

4. Set **First Boot Device of Advanced BIOS Features** to **CDROM** on the BIOS screen.

6.2 Touch-Screen Software Update

1. Back up the touch-screen software to the USB drive.

2. Long press ⬚ to display the following screen.
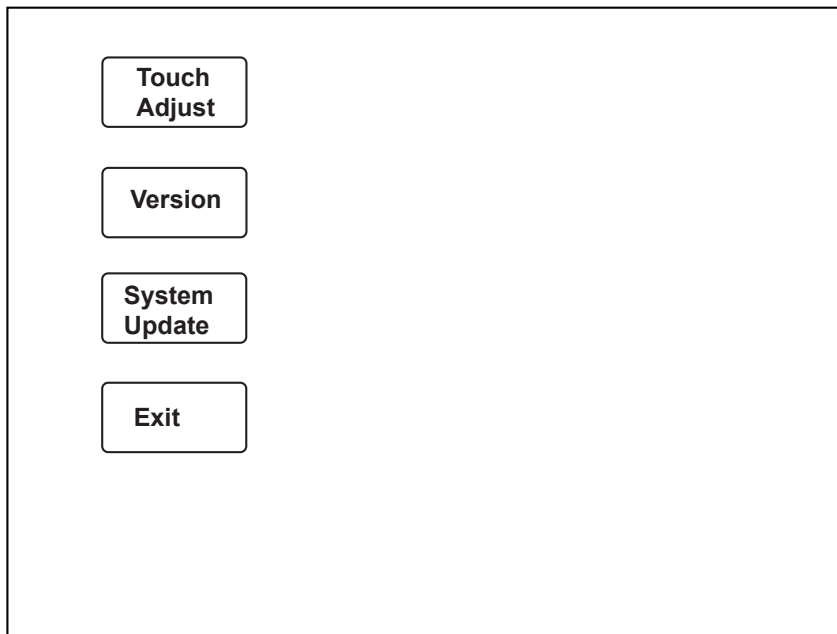
3. Connect the USB2.0 drive written with kernel files to the system.

4. ⬶ appears if the USB drive is detected.

5. Select **System Update** on the touch screen to upgrade the system with a prompt **Updating Standby**.

6. The upgrade needs several minutes, and it completes when **Update Finished, Restart!** pops up. You can remove the USB drive and reboot the system for future use.
   If **Illegal Update File** pops up, select **OK** to back to the above screen.

⚠ CAUTION During the system update, messages or icons are displayed to indicate that the system is busy. You should wait and not to shut down the system until the system update completes. Otherwise, the system cannot be started up.

6.3 System Software Update

You can make a simple update if the system installed with low software but standard hard disk files. If hard disk files are damaged, you need to update kernel and software by the USB drive.

6.3.1 Simplified Update (Non-Kernel Update)

1. Connect the USB drive written with update files to the ultrasound system.

2. Start up the ultrasound system, enable the touch screen, and then tap **Shift**, **E** and press the **Menu** key successively.

3. Enter the year password (2013 password: JMP12**)**with the following prompt, and then press the **Enter** key.

```
Password:
```
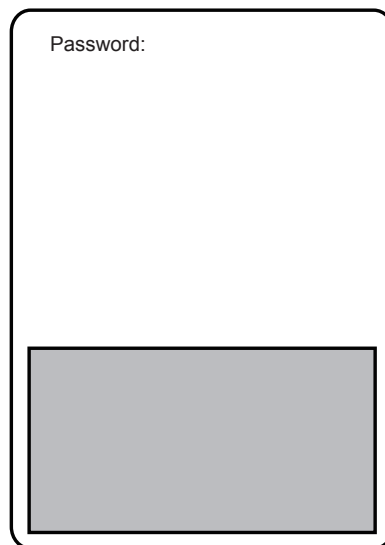
4. Select **Software Update** in the following dialogue, and press the **Set** key.

```
Software Update

Exit
```
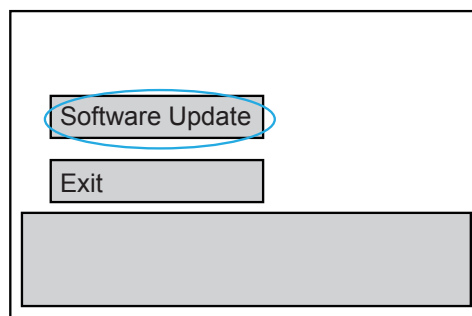
5. Select **Exit** when **Files successfully copied. Please exit and reboot system to complete update.** pops up. Remove the USB drive, and then reboot the ultrasound system.

NOTE:

- The password is not case sensitive. If the password is wrong, **invalid password** is displayed to remind you for password retry.

- You need to re-insert the USB drive or use another USB port if **check the USB** pops up.

- Do not remove the USB drive during the system reboot. Otherwise, the system cannot be started up.

- The stored images or patient information will not be damaged or lost if you update the software by the USB drive.

6.3.2 Kernel and Software Installation

6.3.2.1 Update Concerns

- System data on the hard disk will be erased during software installation. Ensure you back up all data before the installation.

- Ensure the USB drive is written with the latest kernel files.

- Place the master file (adata file) and the control code file (asecure file) into the updated directory of the USB drive. Ensure only one asecure file is in the Update directory.

- Unload the USB drive before you remove it.

- When configuring BIOS, use the arrow keys on the USB keyboard to highlight an item, and press the **Enter** key to confirm. Or, press the **Freeze** key to back to the previous screen.

6.3.2.2 BIOS Settings

■ To enter BIOS
Connect the USB drive written with kernel and updated files, the USB keyboard to the ultrasound system. Hold down the **Delete** key on the USB keyboard, a prompt reminds you to enter the password. Enter **service**, and then press the **Enter** key to enter the BIOS Settings screen.

■ To enable priority
1. Select **Hard Drive BBS Priorities** in the **Boot** menu, set **Boot Option1** to the desired USB drive.

```
Boot Option  #1                    [Kingston Data Travel...]
Boot Option  #2                    [Built-in EFI Shell]
```

2. Exit the **Boot** menu, ensure **Boot Option1** is set to the desired USB drive in the **Boot Option Priorities** menu.

```
Boot Option Priorities
Boot Option  #1                    [Kingston Data Travel...]
Boot Option  #2                    [Built-in EFI Shell]
   ..................................
```
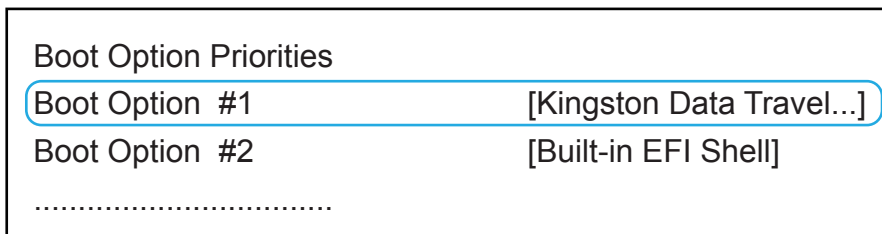
■ To set display mode
Choose **Chipset -> System Agent (SA) Configuration -> Graphics Configuration -> LCD Control -> Primary IGFX Boot Display -> HDMI**.

■ To set time and date
Set **System Date** and **System Time** in the **Main** menu to the current time and date.

■ To save settings
Highlight **Save Changes and Exit**, and press the **Set** key to save settings.

6.3.2.3 Software Installation

1. Remove the USB keyboard before the system reboot, wait for Linux self-test until the following massage appears.

```
Image Recovery Version 13.5
Warning!     System Recovery Starting.
Continue?    (y/n)
```

2. Connect the USB keyboard to the specific USB port, type **y** or **forcekill**, and then press the **Enter** key on the USB keyboard to install the software. The software installation needs 7-10 minutes.

NOTE:

If **FAIL** pops up during the installation process, check that kernel files in the USB drive is complete, UPDATE folder is decompressed and the hardware parts are connected well. Type **y** or **forcekill** in the dialogue box after the above troubles are cleared, and press the **Enter** key on the USB keyboard to re-install the software. If the software still cannot be installed, check the USB drive or hard disk, and then re-install the software.

3. Press the **Enter** key when **Press Enter key to shutdown** appears, and the ultrasound system automatically shuts down after exiting the USB drive system.

4. Remove the USB drive, reboot the ultrasound system.

NOTE:

If error message pops up during the start-up process, check that asecurexxxxxx.tar.gz is consistent with the control number.

6.3.2.4 Writing in aconfig File

For details, refer to Section 6.5.1.

6.3.2.5 μ-Scan Key Activation

1. Insert the μ-scan key into the ultrasound system.

2. When the system displays the **Exam** screen, connect the USB drive written with the **keypass** file.

NOTE:

Ensure the keypass file is placed in the root directory of the USB drive.

3. Enable the touch-screen keyboard, tap **Shift**, **E** and press the **Menu** key successively. Type the month password when the following dialogue box pops up, and then press the **Enter** key to confirm.

Password:
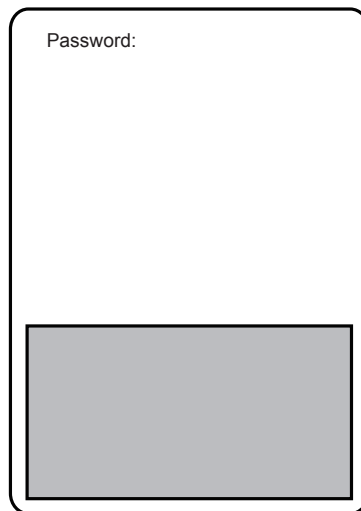
4. Select **Probe Table In** in the following dialogue box, press the **Set** key to import the **keypass** file, and select **Exit** after a successful import.

Probe Table Out

Probe Table In

Software Update

Exit
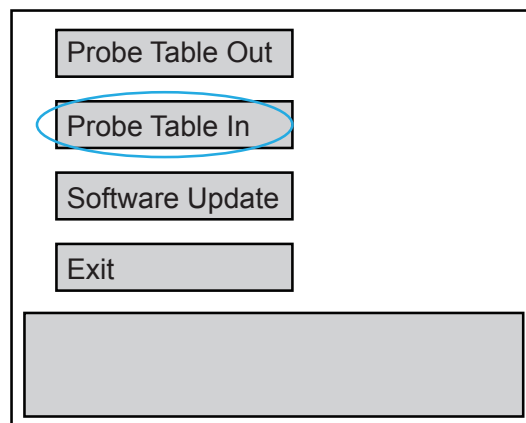
5. Press the **Menu** key to display the **System Settings** menu, selec**t System Information** to enter the **System Information** screen.

6. Type the month password, and press the **Enter** to enter the engineering mode.

☐ System Memory
☐ EC <——>FIFO Bus
☐ Detector to FIFO
☐ ADC Test (RxOn)
☐ Probe ID, HV&Temp
☐ Speaker test
☐ Probe Security Test

☐ Select All ☐ Repeat

▶

Engineer Config   Key Simulation   Screen Pattern   Exit

7. Select **Engineer Config** to display the following screen, and type **i** to activate keypass. Select **Exit** after all items are activated.

```
┌─────────────────────────────────────────────────────┐
│                                                       │
│   ☐ Force Probe ID          ┌─────────────────┐      │
│   ☐ Engineer Status         │ License set!     │      │
│   ☐ Frame Rate Limit        │ Check License    │      │
│   ☐ Key Record              │ License OK!      │      │
│   ☐ C Frame Rate            └─────────────────┘      │
│   ☐ Change LOGO              TDI support        ON    │
│   ☐ Mouse Threshold         HPRF support       ON    │
│   ☐ N/A                     .......                   │
│                              .......                   │
│                              .......                   │
│      Sonoscape               .......                   │
│                              .......                   │
│                              .......                   │
│                              Image Rotate support  ON │
│                                                       │
├─────────────────────────────────────────────────────┤
│  ( Engineer Config ) ( Key Simulation ) ( Screen Pattern )      ( Exit ) │
└─────────────────────────────────────────────────────┘
```

8. Reboot the system, and ensure the touch screen contains the u-scan item in the B mode.

This page is intentionally left blank.

Chapter 7 Settings Import/Export

This chapter describes how to import/export the settings, which is closely related to system settings, customized application mode or presets and engineering probe table.

Settings export is mainly used to back up system settings, and settings import mainly used to restore or replace system settings.

7.1 Versions of System Settings and Probe Table

Press the **Menu** key to enter the **System Settings** menu, select **System Information** to view versions of system settings and probe table on the **System Information** screen.

```
Lincense Valid Days:                    No expire

Software Build On 2012/09/12

Probe table Version  2

User setting Version  2

Control Number:  101106
Software Version:  0.0.0.9v
Kernel Version:  2

RTC Rev:  1.7
ACM Rev:  1.5
TTG Rev:  1.0
FIFO Rev:  1.0
DBF Rev:  0.8
DBF BID Rev:  1.b
HV BID Rev:  1.2
EC Rev:  3.0
ECG Rev: 0.0

                                        EXIT
```
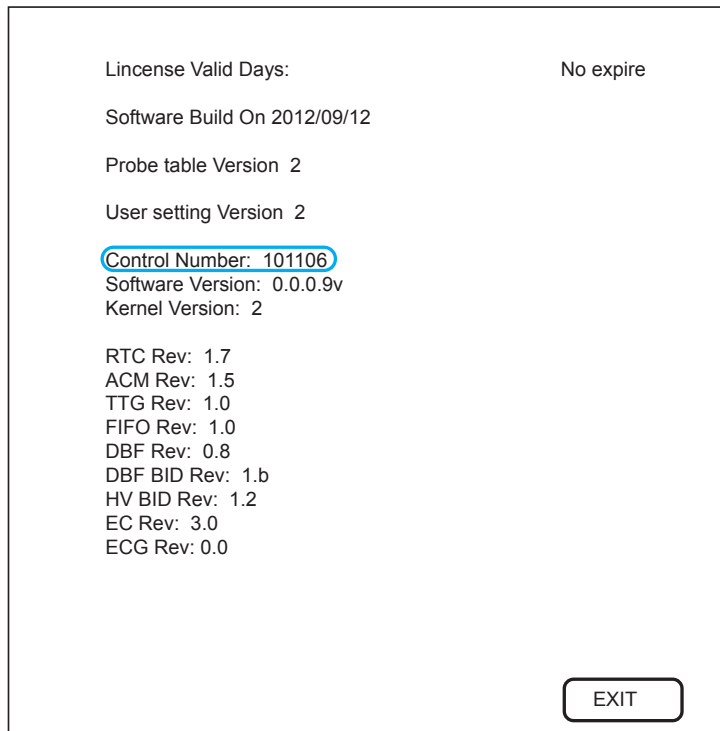
7.2 System Settings

The system settings file is in a format of userdataX.X.X.X-oo.tar.gz, X.X.X.X stands for the current software version, oo stands for the system settings version. X.X.X.X is only for reference, but oo must be consistent with the system settings version. Otherwise, the system settings could not be imported.

7.2.1 System Settings Export

You can back up system settings, including general settings, printer settings, customized obstetrics and measurement settings, to the USB drive.

Perform the steps as follows,

1. Connect the USB drive to the ultrasound system.
2. Choose **Menu** -> **System Settings** -> **Load Default** -> **Retrieve** to display the following menu.
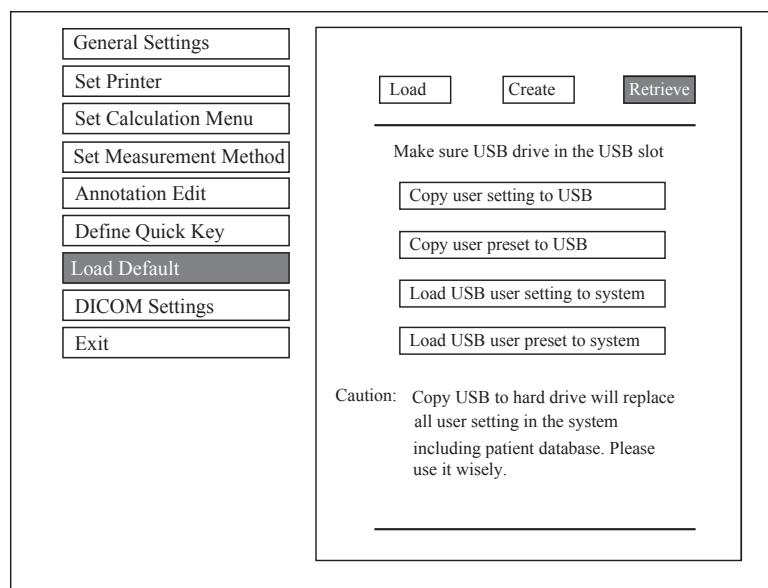
3. Select **Copy user setting to USB**, and then press **Y** in the following dialogue box to export settings to the USB drive.
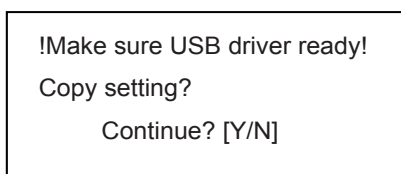
7.2.2 System Settings Import

1. Copy the system settings file into the root directory of the USB drive, and ensure its version is consistent with that of the ultrasound system. Otherwise, a failure prompt **Version is not match** is displayed.

2. Start up the ultrasound system, and connect the USB drive to the system when the **Exam** screen is displayed.

3. Choose **Menu** -> **System Settings** -> **Load Default** -> **Retrieve -> Copy user setting to USB** -> **Y** to confirm.

4. Remove the USB drive from the system when **Load userdata successful** pops up.

NOTE:

Ensure only one **userdataX.X.X.X.-oo.tar.gz** file is in the USB drive. Otherwise, a failure import may result or the imported file cannot be recognized.

7.3 Application Presets

The application preset file is in a format of probedataX.X.X.X-oo.tar.gz, X.X.X.X stands for the current software version, oo stands for the system settings version. X.X.X.X is only for reference, but oo must be consistent with the system settings version. Otherwise, the application presets could not be imported.

7.3.1 Customizing Application Presets

Perform the steps as follows,

1. Select an exam type to be applied.

2. Select an imaging mode, and then make settings of imaging parameters.

3. Press the **S** key on the key panel, and press the **Y** key to confirm.
   Or, press the **N** key to ignore the setting.

```
Going to
User Pre-Set Menu
Are you sure(Y/N) ?
```

4. Click **Create New Exam** on the **User preset** menu, and press the **Set** key to confirm.

5. Enter the name of the application preset, and click **Create Exam**.

6. Click **Exit**, and the application preset you customized displays on the touch screen.

7.3.2 Exporting Application Presets

Perform the steps as follows,

1. Connect the USB drive to the ultrasound system.

2. Choose **Menu** -> **System Settings** -> **Load Default** -> **Store -> Copy user setting to USB**.

7.3.3 Importing Application Presets

Perform the steps as follows,

1. Connect the USB drive to the ultrasound system.

2. Choose **Menu** -> **System Settings** -> **Load Default** -> **Store -> Copy user setting to USB**.

NOTE:

● Ensure only one **userdataX.X.X.X.-oo.tar.gz** file is in the USB drive. Otherwise, a failure import may result or the imported file cannot be recognized.

● The default system icons would not be replaced or deleted when you import application presets to the ultrasound system.

7.4 Engineering Probe Table

The engineering probe table is in a format of probedataX.X.X.X-oo.tar.gz, X.X.X.X stands for the current software version, oo stands for the system settings version. X.X.X.X is only for reference, but oo must be consistent with the system settings version. Otherwise, the application presets could not be imported. It is used to change probe parameters.

7.4.1 Exporting Probe Table File

Perform the steps as follows,

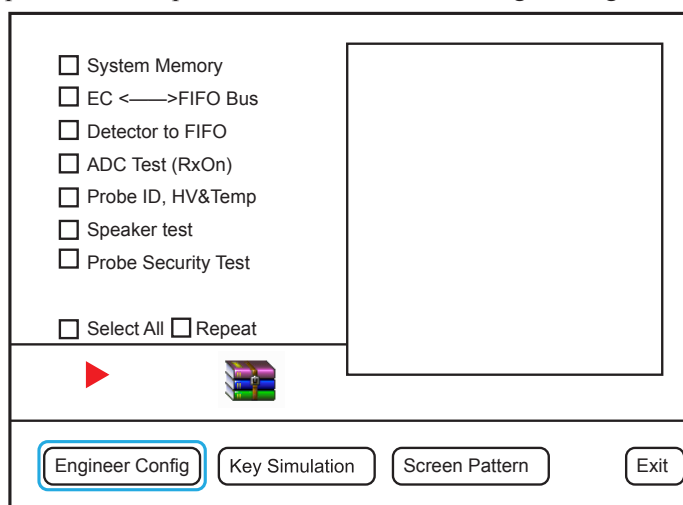1. Connect the USB drive to the ultrasound system.

2. Enable the touch-screen keyboard, tap **Shift**, **E** and press the **Menu** key successively. Type the month password when the following dialogue box pops up, and then press the **Enter** key to confirm.

Password:
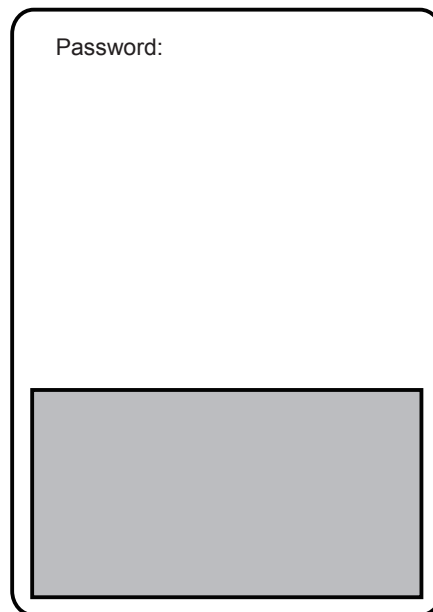
3. Select **Probe Table Out** in the following dialogue box, press the **Set** key to back up the probe table into the USB drive. A prompt **Successful** is displayed to indicate the probe table is successfully backed up.

Probe Table Out

Probe Table In

Software Update

Exit
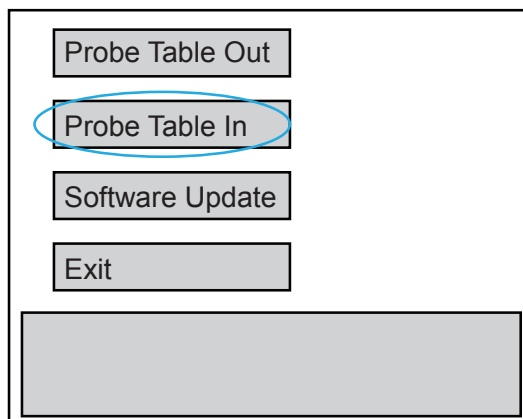
7.4.2 Importing Probe Table File

You can import the engineering probe table to replace all engineering probe tables in the system.

1. Back up the engineering probe table into the root directory of the USB drive, and ensure its version is consistent with the version of system engineering probe table. Otherwise, the performance may fail with a prompt **Wrong Version**.

2. Connect the USB drive to the ultrasound system.

3. Enable the touch-screen keyboard, tap **Shift**, **E** and press the **Menu** key successively. Type the month password in the pop-up dialogue box, and then press the **Enter** key to confirm.

4. Select **Probe Table In**, and press the **Set** key to back up the probe table into the USB drive. A prompt **Successful** is displayed to indicate the probe table is successfully backed up.

NOTE:

- Keypass and probe table are written in by selecting **Probe Table In**, and writing in keypass file owns a higher priority. Therefore, ensure no keypass file and only one **userdataX.X.X.X.-oo.tar.gz** file are in the USB drive before you import probe table. Otherwise, a failure import may result or the imported file cannot be recognized.

- Only the engineering probe table configuration can be imported to the ultrasound system. Take notice of probe table configuration in the ultrasound system before the import. The probe table import/export is only available between same system models, equivalent system models for human and veterinary usages, or same system models with and without dongles.

Chapter 8 System Software Tests

You should perform system software tests with a reference to this chapter after software installation or update. In case of any test fails, you should solve it and perform the system software test again until the system works normally.

NOTE:

- Only service engineers / representatives trained or qualified by the manufacturer could perform the system functional tests on the ultrasound system.

- To maintain the safety and functionality of the ultrasound system, do not remove or replace any circuit boards when the system is powered on.

- Due to the potential hazardous voltage in the system, do not remove the insulation unit of the system.

8.1 Testing System Software

The system has a built-in testing software which can be utilized to test the performance and functionality of the system hardware. The software supports both in-factory and field tests. After the system passed all the necessary functional tests, service personal should reset and restart the system before delivering it for normal usage.

The testing software can be used to test storage function, FIFO function, FIFO wave-detector, analogue-to-digital conversion, probe code, HV and temperature. During the test, the green identifier on the screen indicates that the testing item works normally and passes the test. While, the red identifier indicates that the tested item results in malfunction, and you should re-test it after servicing it.

8.1.1 Testing Software Activation

1. Press the **Menu** key on the control panel, select **System Information** to enter the **System Information** screen.

2. Enter a correct password to enter the engineering mode screen.
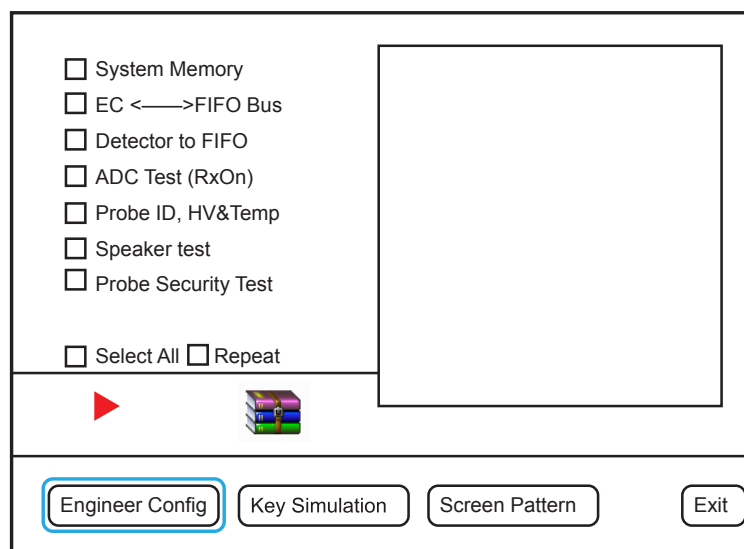
Figure 8-1 Engieering Mode Screen

8.1.2 Storage Test

You can use the testing software to test all available registers and memories in the scanning module.

1. Move the cursor on the check box before **System memory** by using the trackball, and then press the **Set** key to select it.

2. Click to start the test, the testing status is displayed in the right information box.
   A green icon appears if the test passes, but a red icon appears if the test fails.

3. If necessary, select **Repeat** to re-test the item.

4. All testing status reports are saved to the system hard disk. You can click , tap the up or down arrow on the touch screen to view the reports.

5. Move the cursor on the check box before **System memory** by using the trackball, and then press the **Set** key to cancel the test.

8.1.3 FIFO Test

You can check FIFO function on the VBF board by testing **EC<->FIFO**. For details, refer to Section 8.2.1.

8.1.4 FIFO Wave-Detector Test

You can check FIFO circuits inter-function on the VBF board by testing **Detector to FIFO**. For details, refer to Section 8.2.1.

8.1.5 Analogue-to-Digital Conversion Test

The analogue-to-digital converter is located on the VBF board, used to test amplitude and phase. Its working is closely related storage and transception bus.

You can check this function by testing **ADC Test (Rx on)**. For details, refer to Section 8.2.1.

8.1.6 Speaker Test

You can check speaker test function by testing **Speaker Test**. For details, refer to Section 8.2.1.

8.1.7 Probe, HV and Temperature Test

If the probe is connected to the ultrasound system, ID information is displayed on the screen. If no probe is connected to the ultrasound system, **255** is displayed on the screen. You can use the testing software to test the high-voltage generator and regulator, or test the temperature of the high-voltage regulator board on the basis of VHV test.

You can check this function by testing **Probe ID, HV and Temp**. For details, refer to Section 8.2.1.

8.1.8 Monitor Test

Move the cursor on **Screen pattern** by using the trackball, press the **Set** key to enter the monitor test screen. You can check the function by viewing images, display color or display information.

8.2 System Simulation Test

Select **Dealer Config** on the engineering mode screen to enter the following screen. You can test about virtual probe settings, virtual functions and power.
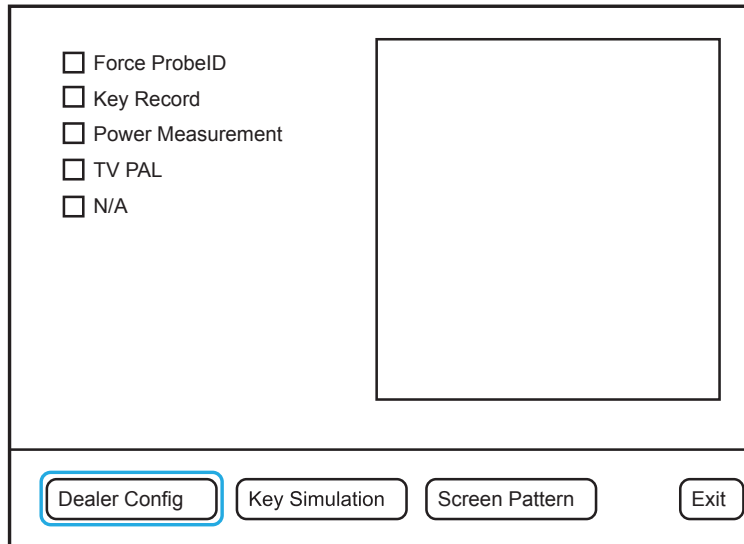
Figure 8-2 System Simulation Screen

8.2.1 Virtual Probe

NOTE:

The virtual probe is only a demo, and do not use it when performing an exam.

The virtual probe allows you to test the system function without probes.

1. Move the cursor on the check box before **Force probe ID** by using the trackball, and press the **Set** key to select it with a × mark.
2. Press 📖 to enable the keyboard, tap the left or right arrow to select the desired virtual probe.
3. Select **Exit**, and the touch screen displays the desired virtual probe.

8.2.2 System Simulation Operation

You can apply system simulation operation to check the system operating or perform the aging test.

1. Move the cursor on the check box before **Key record** by using the trackball, and press the **Set** key to select it with a × mark.
2. Select **Exit** to back to the main screen.
3. Press the **T-Ball** key on the control panel to activate system simulation operation with **PLAY BACK** identifier.

8.2.3 Probe Power Test

You can perform probe power test to check probe working.

1. Connect L742 to the ultrasound system, enter the configuration screen, and select **Power Measurement**.

2. Select **Exit** to back to the main screen.

3. Select Neck as exam type, and enter the B mode.

4. Adjust the gain to the maximum, and adjust the depth to the minimum. To enhance the brightness of the initial waveform, you can immerse the acoustic window of the probe into water.

5. Press the **Print** key to display the Power Test menu.

6. Tap the up or down arrow on the touch screen to select **S.Elm**, and then press the **Enter** key to confirm.

7. Tap the left or right arrow on the touch screen to set **S.Elm** to **All**, the initial waveform image is smooth without obvious dark strips. If there are dark strips, you should promptly find in the malfunction array on the imaging area.

8. Tap the left or right arrow on the touch screen to locate the malfunction array, and record the number of the malfunction array.

9. Ensure there are no disturbances or separating images in the B/THI/Color/B+THI+Color/M/PW/ CW mode.
    Special Concern: There are no regular color bars or abnormal color disturbances when the gain is adjusted to the maximum and D gain is set to 50 or above in the Color/PW/CW mode.

NOTE:

If the channel is damaged, you can check probe, MPC board, VBF board or connection among the three parts to find the problem before the delivery.

8.3 Touch-Screen Testing Software

The system has a built-in testing software which can be utilized to test the performance and functionality of the system hardware. The software supports both in-factory and field tests. After the system passes all the necessary functional tests, service personal should reset and restart the system before delivering it for normal usage.

Touch-screen testing software is used to calibrate the touch screen, test the keyboard, import, export, display, USB, HV or temperature of the touch screen.

8.3.1 Testing Software Enable

1. Press ⌨ to display the keyboard of the touch screen.
2. Tap **Enable**, type **S40.test** in the textbox, tap **OK** to enter the touch-screen test screen.
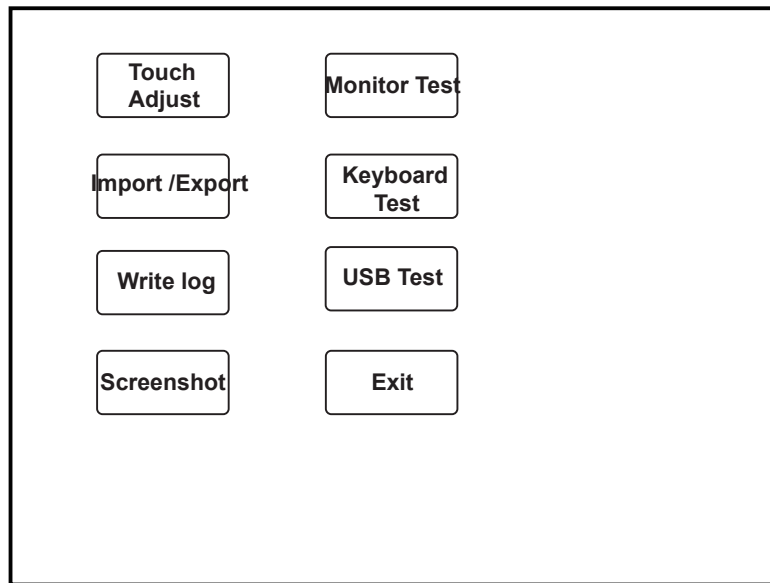
Figure 8-3 Touch-Screen Test Screen

- Tap the test item to display corresponding options. Touch screen may result in malfunction if there are no relevant options, and you should immediately contact the service personnel.
- If the key does not respond, you should immediately contact the service personnel.
- Select **Exit** after the test.

8.3.2 USB Port Test

You can test USB port of the touch screen by inserting the USB drive.

1. Connect the USB drive written with files to the ultrasound system after entering the touch screen test software screen, and appears.
2. Select **USB Test**, USB works normally if the USB drive is read by the software. However, USB port works abnormally if the USB drive cannot be read by the software.

8.3.3 Display Test

You can check the display by viewing images.

1. Tap **Monitor Test** after entering the touch screen test software screen, images are played in turns. If the USB drive written with pictures is connected, the pictures are played in turns.
2. Rotate the **Depth** knob to exit the test screen.

8.3.4 Touch Screen Calibration Test

You can verify the functions of touch screen and display monitor.

1. Tap **Touch Adjust** or press the **Freeze** key to enter the touch-screen calibration test screen.
2. Tap the center of every pop-up continuously to calibrate the touch screen.

   Press the **Freeze** key on the control panel to exit at any time.

8.3.5 Keyboard Emulations Test

You can test keys, knobs, TGC by viewing the corresponding display information. They are verified to work normally with correct display information.

NOTE:

Power on/off button, trackball, **Update**, **Set** and **Video print** keys cannot be tested.

Perform the steps as follows,

1. Tap **Keyboard Test** to enter the keyboard test screen.
2. Test keys, knobs, TGC or the corresponding keys on the touch screen.
3. Tap **Exit** to exit the screen.

This page is intentionally left blank.

Chapter 9 System Checks

This chapter contains important information for system checks.

9.1 General Checks

9.1.1 Overview

You can check the following items or log with the user to make the diagnostics.

- Any exceptions occurred during system running

- Accidental exception

- Other requirements proposed by the user

9.1.2 Operating Environment

You should check the operating environment of the system. The measurement accuracy is closely related to humidity, measurement application and circuit.

The system insulation worsens with life-to-date depreciation or malfunction, and the measurement error may be larger with a greater humidity.

9.1.3 System Configuration

You should check the system configuration, including system settings, contrast and brightness of the LCD monitor, optional probes.

9.1.3.1 System Settings

Press the **Menu** key, and select **System Settings** in the pop-up menu to display **System Settings** menu. You can check the relevant settings by viewing this menu.

9.1.3.2 Contrast and Brightness of LCD Monitor

Adjusting the LCD monitor's brightness is one of the most important factors for proper image quality.

The proper setup displays a complete gray scale. The lowest level of black should just disappear into the background and the highest white should be bright, but not saturated.

Use the buttons located on the side of the monitor to adjust the brightness and contrast settings of the monitor.

- Press **Enter t**o enter the monitor menu.
- Press **–** to display the setting menu for Contrast. Pressing **+** can increase the value of the contrast; pressing – can decrease the value.
- Press **+** to display the setting menu for Brightness. Pressing **+** can increase the value of the brightness; pressing – can decrease the value.

9.1.3.3 Probe Checks

Perform the following steps to check the basic functions of the probe.

1. Connect the probe to the ultrasound system.
2. Ensure the touch screen displays the correct icon for the desired probe. Tap the icon to select the desired probe, and the system automatically enters the B mode.
3. Tap **Color** to enter the Color Flow mode, and ensure color ROI displays on the screen. Adjust the color gain to the maximum to check whether color noise is normal.
4. Press the **Freez**e key, replay the cine by using the trackball to check whether data display correct.
5. Tap **M** to enter the M mode, press the **Update** key to ensure the M trace displays, and TGC, depth and frequency can be adjusted.
6. Tap **PW** to enter the PW mode, press the **Update** key to ensure the spectral Doppler trace displays and no nosies exist.
7. Tap **THI** to ensure the system enters the THI mode.
8. Disconnect the probe from the ultrasound system.

9.1.4 System Information

Press the **Menu** key, and select **System Information** in the pop-up menu to display the **System Information** menu. You can check the system information by viewing this menu.

9.1.5 System Running Status

You can check the following items to identify whether the system runs well.

- All menus or screens can be displayed normally.
- Measurements can be performed in every exam mode.
- All display mode can be switched normally.
- The desired probe can be selected.

9.2 Functional Checks

9.2.1 Workflow

```
┌─────────────────────────────┐
│  Check System Time and Date │
└─────────────────────────────┘
              │
              ▼
┌─────────────────────────────┐
│   Check Intital Operations  │
└─────────────────────────────┘
              │
              ▼
┌─────────────────────────────┐
│   Check General Operations  │
└─────────────────────────────┘
              │
              ▼
┌─────────────────────────────┐
│    Check Keyboard and Keys  │
└─────────────────────────────┘
              │
              ▼
┌─────────────────────────────┐
│       Check Trackball       │
└─────────────────────────────┘
              │
              ▼
┌─────────────────────────────┐
│   Check Peripheral Devices  │
└─────────────────────────────┘
              │
              ▼
┌─────────────────────────────┐
│         Check Fan           │
└─────────────────────────────┘
```
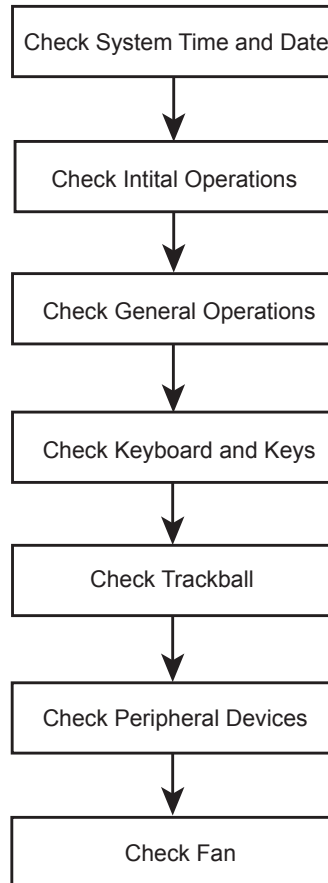
9.2.2 Checklist

■ System Time and Date
 Ensure system time and date are consistent with the current time and date.

■ Initial Operations
 ● Features can be applied in every exam mode.
 ● Images can be scanned normally by using the corresponding probe and can be printed out.
 ● Peripheral devices can work normally.

■ General Operations
 ● The **Freeze** key can respond.
 ● The **Gain** knob can be rotated normally.
 ● The CW/Color/PW/M/B mode can be switched from one to another.

■ Keyboards and Keys
 ● Keys can respond to the up-down and left-right functional tests.
 ● The **Print** key can respond when the video printer is connected.

- The frozen mode can be entered by pressing the **Freeze** key, and the measurement can be started by pressing the **Calc** key.

■ Trackball

The trackball can be moved well.

■ Peripheral Devices

- The DVD drive can eject normally.

- The circuit breaker can work normally.

■ Fan

- Fan works well when the ultrasound system is powered on.

- No noises are produced during fan working.

9.3 Mechanical Safety Checks

9.3.1 Workflow

NOTE:

The ultrasound system is verified to work abnormally if some functional test fails. In this case, you should stop using the system immediately and seek for help.

```
┌─────────────────────────┐
│     Check Footswitch    │
└─────────────────────────┘
             │
             ▼
┌─────────────────────────┐
│      Check Handle       │
└─────────────────────────┘
             │
             ▼
┌─────────────────────────┐
│ Check Control Panel Support Part │
└─────────────────────────┘
             │
             ▼
┌─────────────────────────┐
│ Check Keyboard Sliding Structure │
└─────────────────────────┘
             │
             ▼
┌─────────────────────────┐
│  Check Monitor Fixing and        │
│      Tilting Structure           │
└─────────────────────────┘
             │
             ▼
┌─────────────────────────┐
│   Check System Firmness │
└─────────────────────────┘
             │
             ▼
┌─────────────────────────┐
│  Check Cable Connection │
└─────────────────────────┘
```
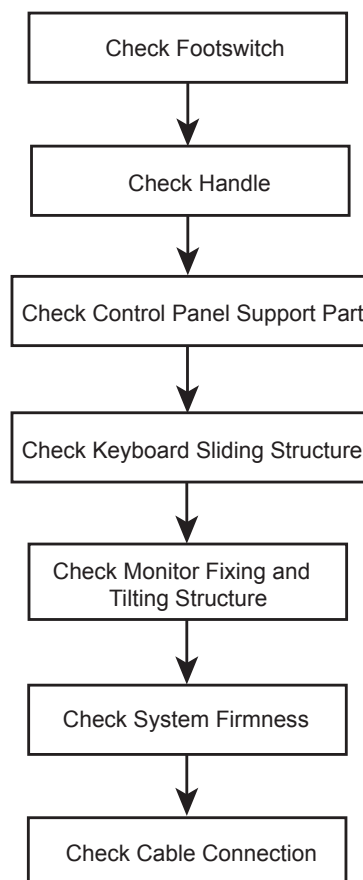
9.3.2 Checklist

Parts	Check Items
Casters	■ No cracks on the casters. ■ Foot brakes work well. ■ Casters are connected well without deviations, and fixing screws are firm without any visible damages. ■ Casters and fixing screws should be fastened by using a hex key wrench.
Handle	■ No cracks on the front and back handles. ■ Shake front and back handles with hands to ensure they are firm.
Control Panel Support Part	Shake the whole support part with hands to ensure it is firm.
Keyboard Sliding Structure	■ No visible deformation or cracks on the guide rail of the keyboard. ■ The keyboard can be pushed in or pulled out. ■ The keyboard is embedded in the guide rail firmly by shaking the keyboard with hands. ■ Inspect connection cables by pulling out the keyboard, and ensure they are connected well and complete.
Monitor Fixing and Titling Structure	■ The monitor is connected well without deviations. ■ The monitor can be tilted forward or backward, and also can be swiveled to left or right. No noises are produced during the adjustment. ■ The monitor is connected well by swiveling it left or right.
Peripheral Devices	Shake peripheral devices with hands to ensure they are connected firmly.
Cables	■ No cracks or damages on the cables inside or outside the system. ■ Drag the cables to ensure they are connected well.
Probe	No cracks, deformations or damages on the probe.
Other Parts	No cracks or exposed conductive parts.

9.4 Image Tests

9.4.1 B Image Test

Adjust the B gain to the maximum in accordance with depths or frequencies, and check the following items in the B mode.

■ The initial echo field of the image should be displayed in an appropriate brightness without any aberrations.

■ No strikes or artifacts are displayed on the image.

9.4.2 THI Image Test

Adjust the B gain to the maximum in accordance with depths or frequencies, and check the following items in the THI mode.

■ The initial echo field of the image should be displayed in an appropriate brightness without any aberrations.

■ No strikes or artifacts are displayed on the image.

9.4.3 Color/DPI/TDI Image Test

Adjust the B gain and ROI to the maximum with the default depth and frequency, adjust the Color/DPI/TDI gain until few color interferences occur. In this case, there are no strikes or artifacts on the image. However, it is normal if some color noises appears accidentally.

9.4.4 PW/CW Image Test

Adjust the PW/CW gain in the real time PW/CW mode, until a clear spectral Doppler image displays. Adjust the pulse repetition frequency, and no noises appears on the image.

9.4.5 3D Image Test

Perform the following steps to take the test.

1. Select a probe type and an exam type, the system automatically enters the B mode.
2. Ensure no strikes or artifacts are displayed on the image.
3. Press the **Freeze** key, and tap **3D** to enter the 3D mode.
4. Ensure the 3D image is not separated or deformed.

9.4.6 4D Image Test

Perform the following steps to take the test.

1. Select a probe type and an exam type, the system automatically enters the B mode.
2. Ensure no strikes or artifacts are displayed on the image.
3. Tap **4D** to enter the 4D mode.
4. Ensure 4D probe motor start working, and run at a uniform speed.
5. Ensure the 4D image is not separated or deformed.
6. Quit 4D imaging, and ensure 4D probe stop working immediately.

This page is intentionally left blank.

Chapter 10 System Troubleshooting

This chapter contains important information for system troubleshooting. You can make fault diagnostics and resolute it with a reference to this chapter.

⚠ **WARNING**
- Potentially hazardous voltage exists inside the ultrasound system. Remove personal jewelry that contains metallic substances when you operate the system.
- Do not disassembly or remove any circuit boards when the ultrasound system is powered on.

10.1 Diagnostic Preparation

All precautions in this manual should be thoroughly read before you attempt to service the system.

■ Identify whether the system malfunction is caused by incorrect operations or system hardware/ software failures to make a fault diagnostics.

■ Propose all possible factors, including system running time and external interferences, that affect system functions.

■ Identify whether the system malfunction is a common fault. Fault caused by power supply socket, (extension) power cord or fuse can be attributed to a common fault.

■ If the system malfunction is identified as a unusual fault, you can make the fault recurrence in a similar test environment.

■ You can identify the system malfunction and solve it with your knowledge, experience or a reference to Section 10.3 and Chapter 3.

■ Consider the service cost. Do not replace a component if you are unsure if it is the cause. Avoid introducing extra factors that might interrupt the test or cause another problem. If certain component is identified to be the fault cause, you should replace it only, but not replace the whole circuit board that holds it. For example, a faulty capacitor is identified to be fault cause, you should replace it only, but not the PCB board that holds it.

■ Only the fault cause is identified, you should solve it and perform necessary tests described in Chapter 8 to ensure the system performance.

10.2 Fault Diagnostics

The common faults are listed as follows, you can take them as reference.

NOTE:

The following sections are for reference only, you should make a on-site fault diagnostics with care.

10.2.1 Startup Faults

Fault	Description	Solution
Unable to start up the system	The ultrasound system cannot be started up by pressing the Power On/Off button, and the keyboard indicator does not illuminate.	■ Ensure the ultrasound system is connected to the mains supply and powered on, the input voltage meets the requirement. ■ Ensure the fuse is not a blown one. ■ If the fault cannot be solved, replace the power supply.
No Display	No display on the monitor or the monitor indicator illuminates in red or orange after the system startup.	Replace the VGA monitor, and connect it to the VGA port of the ultrasound system.
Prompt for Password	A password prompt appears after the system self-test screen is displayed.	Ensure there are no stuck keys, and clean the keyboard.
Black Screen	The ultrasound system stops at a black screen after startup.	■ Update the touch-screen software if it cannot be started up. ■ Ensure the touch screen is connected well if it can be started up. Power off the ultrasound system, and reboot it. ■ If the fault cannot be solved, replace RAM or reinstall the system software.

10.2.2 Operating Faults

Fault	Description	Solution
Flashing Probe Icons	Probe icons appear after the system enters the **Exam** screen, but they are constantly flashing.	■ Replace the probes. ■ Ensure the probe and VBF boards are connected well or there are no dry joints.
Unable to select probe	Probe cannot be selected or in partial display.	■ Ensure the probe board works well ■ Ensure no sound produced when selecting a probe. ■ Ensure the probe and VBF boards are connected well.
No initial echo on the image	No initial echo displayed on the image.	■ Ensure voltages on the high-voltage board are normal. ■ Ensure there are high voltage output. ■ Ensure the VBF board works well.
Trackball Malfunction	■ The **Set** key cannot respond. ■ The **Update** key cannot respond. ■ The cursor cannot be moved by using the trackball.	■ Reboot the system. ■ Clean the trackball. ■ If the fault cannot be solved, replace the trackball.
Auto Shutdown	The ultrasound system automatically shuts down when you perform general system operations, such as performing measurements, connecting the USB drive or freezing an image.	■ Identify the operation causing the auto shutdown, and inform the malfunction frequency to the manufacturer. ■ Update the system software.
Monitor Color Deviation	The monitor displays non-homogeneous with spots.	■ Swivel the monitor, and its degaussing circuit could eliminate color deviation. ■ If the fault cannot be solved, replace the monitor.

10.3 System Troubleshooting

Ensure you are similar to the internal system structure, software installation, parts assembly, corresponding principles and you can make a correct fault diagnostics before you attempt to service the system.

NOTE:

- If the ultrasound system requires a password to continue during startup, type the password (consist of case-sensitive letters and numbers, taping **Shift** to change letter case), tap **Enter**, and reboot the system. You can get the password from the manufacturer.

- If the ultrasound system cannot work normally or abnormal startup screen is display, you can ignore serial port or keyboard failure as follows. Firstly, ensure the serial port of the main board is connected well, touch screen communicates well with the ultrasound system. Secondly, ensure there are no failure keys and knobs. Lastly, tap all keys on the touch screen to ensure their performance.

10.3.1 On-Site Inspection

Get detailed information from the user before the on-site inspection, including system working environment, fault description, fault frequency and frequency of system being moved.

1. Check power supply and operating environment of the ultrasound system, also get a knowledge of local weather.

2. Make a detailed record of the system malfunction, including malfunction duration and fault cause proposed by the user, and then make an initial solution plan with a reference to Chapter 3 or your experiences.

10.3.2 Fault Identification

1. If there is burn smell from the ultrasound system, identify the burned board by checking power supply, VHV board, VBF board and main board successively.

2. Ensure all connection cables, especially hard disk cables, USB cable between the main board and the VBF board, power supply cable, are complete and connected well before servicing the ultrasound system.

10.3.3 Fault Resolution

1. Disassembly Parts
   Observe and record the location and connection direction of parts when you replace them. The parts in incorrect location or connection direction may result in system startup failure, system malfunction, board burning, or even serious damages.

2. Replace Parts
   Replace failure parts one by one and test it after each replacement until the fault is solved. You are not recommended to replace failure parts before system test. Meanwhile, make a detailed record of the replacement sequence.

3. Assembly Parts

Install all replaced parts in the ultrasound system by fastening all necessary screws. Meanwhile, ensure there are no screws left and the ultrasound system is in the original cable routing. Otherwise, interferences may result.

4. Take a Simple Test

Take a simple test with a reference to Chapter 8 after you replace all failure parts. If the ultrasound system is connect to a server, ensure all images can be backed up to the server. Ensure all images can be displayed normal and available in all working modes, such PW/CW/4D. Moreover, adjust contrast and brightness of the monitor or other imaging parameters, such as dynamic range, grayscale or gain, based on the user's needs.

10.3.4 Post Maintenance

10.3.4.1 Inspection after Critical Parts Replacement

The ultrasound system mainly consists of keyboard, touch screen, power supply, computer system and ultrasound module. It is very important to ensure the full connections among these parts. Therefore, you should check the connections both before and after servicing the equipment.

■ Keyboard

Ensure all keys, knobs, switches and trackball work normally after you re-install the keyboard.

■ Touch Screen

Ensure the touch screen is not squeezed by any frames and frames are installed without any deviations. Ensure all probes, all imaging modes or keys are available after the replacement.

■ Probe Board

The probe board serves as the important transmission channel between the probe and the front end, it is connected to the VBF board by J1. The probe board transmits ultrasound signals and probe codes, connects the power supply by J2 and provides power for relay and other parts. Connection failure between J1 and VBF board may result in strikes on the diagnostic image or even probe detection failure. J2 connection failure may result in probe detection failure.

■ Main Board

The main board is the control center of the ultrasound system, any failure part or connection may result in system malfunction. Ensure power supply socket, RAM and hard disk SATA are connected well. Any failure of the above parts, especially serial cable between the ultrasound system and touch screen, may result in system startup failure, auto shutdown, no video output, and/or other system malfunctions.

CPU fan is an easily worn out part, ensure it can work well when the ultrasound system is running.

■ Ultrasound Unit

The ultrasound unit consists of VBF, VHV and probe boards, processes most signals and time sequence. Ensure all boards in it are connected well, especially the following items.

- USB2.0 Cable

  The ultrasound unit is connected to the main board through USB2.0 port on the VBF board. Ensure USB2.0 cable is connected well, or else system crash or auto shutdown may result.

- Power Supply

  All the power consumed by the ultrasound unit is transferred through P3 and P4 (or P1 and P2 on some models), the current flowing through power supply socket is rather large. Failure connection of power supply may result in great resistance, low voltage inputted to components, overheat socket, or even system damage. Ensure P3 and P4 (or P1 and P2 on some models) are in good contacts, hold the plug not the cable when unplug the power supply socket.

10.3.4.2 Maintenance Items

- Start up or shut down the ultrasound system for several times to ensure no malfunction occurs.

- Clean the ultrasound system if it has been used for a long period. For details, refer to Chapter 11.

- Record or solve problems proposed by the user.

- Make a detailed service record for future maintenance or service. The fault cause, replaced parts and their corresponding part numbers, repairing procedures should be detailed in this record. Moreover, a signature from the hospital on this record is required.

This page is intentionally left blank.

Chapter 11 System Maintenance

To maintain the safety and functionality of the ultrasound system, you should periodically perform the maintenance for the ultrasound system and accessories.

⚠ **WARNING**
- To avoid electrical shock and damage to the ultrasound system, power off and unplug the system from the AC power outlet before cleaning.
- To maintain the safety and functionality of the ultrasound system, maintenance must be performed at least every 6 months. Electrical safety tests must also be performed at regular intervals as specified by local safety regulations.

11.1 Cleaning the System

■ To clean the system surface

1. Power off and unplug the ultrasound system from the AC power outlet.
2. Dampen a lint-free soft cloth with 75% ethanol.
3. Use this lint-free soft cloth to clean the surfaces of the monitor screen, the touch screen, the control panel, the keyboard and the main unit. Take special care and avoid to scratch the screens.
4. Use a cotton swab to remove solids from between keys and controls.
5. In case of blood or any infectious, use a lint-free soft cloth dampened with 70% ethanol.

■ To clean the dust filter
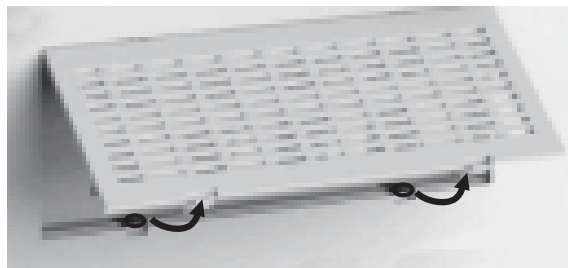
The dust filter must be clean at least every 3 months for ventilation.

1. Power off and unplug the ultrasound system from the AC power outlet.
2. Pinch the dust filter with fingers as the figure shown above.
3. Rinse the taken out sponge with refresh running water, and use a brush to rinse the dust filter with refresh running water.
4. Place the sponge and dust filter back to the ultrasound system after a thorough airing.

■ To clean the trackball

1. Power off and unplug the ultrasound system from the AC power outlet.

2. Press the bulges in the ring by both hands.

3. Turn the ring anticlockwise until the ring lifts.
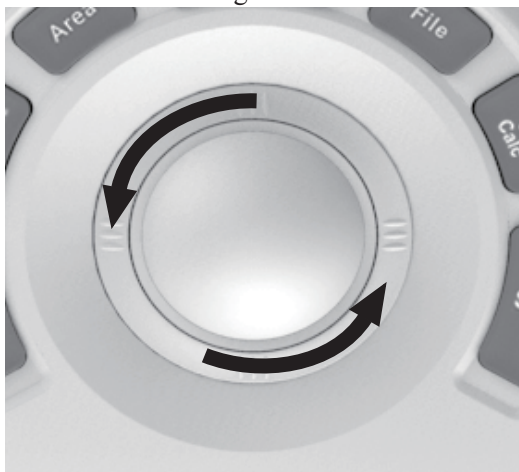
4. Take out the ring and ball (careful not to drop the ball) from the control panel.

5. Use a lint-free soft cloth dampened with 75% to clean the trackball.

6. Use a cotton swab dampened with 75% to remove stains from the ring.

7. Place the trackball and the ring back to the control panel, press the bulges in the ring by both hands and turn the ring clockwise to install the trackball.

11.2 Probe Maintenance

11.2.1 Cleaning the Probe

⚠ WARNING
- To avoid probe damages, do not bump the probe on hard surfaces during the cleaning.
- To avoid the electric shock, disconnect the probe from the ultrasound system before the cleaning.
- To avoid the potential disease transmission, you should wear medical sterile gloves and protective goggle during the cleaning.

Perform the following steps to clean the probe.

1. Remove all coupling gel from the transducer surface.

2. Disconnect the probe from the ultrasound system, and remove the probe sheath and the biopsy bracket from the probe.

3. Clean the probe with a lint-free soft cloth slightly dampened with the potable water. If the probe surface carries too much residue, remove all visible residue with a lint-free soft cloth soaked in the cleaner (such as mild soap water or enzyme detergent), then remove all cleaner residue with a lint-free soft cloth dampened with the potable water.

4. Rinse the probe with the fresh running water, and then dry it with a lint-free soft cloth dry cloth.

11.2.2 Disinfecting and Sterilizing the Probe

⚠ **WARNING**
- Use the liquid disinfectant/sterilant that meets the local laws and regulations.
- If you use the recommended disinfectant/sterilant, ensure its level and the probe soaking period meets the requirements. Otherwise, the probe could be damaged and your warranty might be void. If you have other use or needs, ensure the level of the make-up disinfectant and the probe soaking period are suitable for the intended clinical application.
- Do not use the expired disinfectant/sterilant.
- Store the probe in a sterile environment, and mention its expiry date before use.
- Do not disinfect or sterilize the probe through autoclaving or contact with ethylene oxide.
- Do not use thermal disinfection. Temperatures higher than 66°C or 150°F will damage the probe.
- Not allow any disinfectant to be air-dried on the probe.

■ Disinfection Levels
To choose an appropriate disinfectant/sterilant, you first must determine the required level of disinfection, based on the probe classification.

Classification	Definition	Level of Disinfection	Application
Critical	Device enters otherwise sterile tissue (intraoperative applications)	Sterilization	Intraoperative probe
Semi-critical	Device contacts mucous membranes (intracavity applications)	High (tuberculocial)	Endocavitary probe
Noncritical	Device contacts intact skin	Intermediate or low	Body surface probe

■ Soaking Requirements
Do not immerse the probe beyond its junction line.

NOTE:

Disinfectants listed in this manual are recommended because of their chemical compatibility with product materials, not their biological effectiveness. For the biological effectiveness of a disinfectant, refer to the guidelines and recommendations of the disinfectant manufacturer, Association for Practitioners in Infection Control, U.S. Food and Drug Administration, and U.S. Centers for Disease Control.

■ To disinfect the body surface probe

You should disinfect the surface probe after each use.

Perform the steps as follows:

1. Clean the probe.

For details, refer to Section 12.1.3 Cleaning the Probe.

2. Perform the medium-level disinfection to the surface probe as shown in Table 12-1.

NOTE:

If you do not use the recommended disinfectant, make up it as the manufacturer's instructions.

3. Take out the probe from the disinfectant when the recommended soak period expires.

4. Rinse the probe with the fresh running water, and then dry it with a soft dry cloth.

Table 12-1 Recommended Method for Medium-level Disinfection

Disinfectant	Manufacturer	Active Ingredient	Level for Active Ingredient	Contact Type	Contact Period
Cidex	J&J	Glutaraldehyde	2.4%	Wipe/ Soak	<20min
ResertXLHLD	STERIS	Hydrogen peroxide	2.0%	Wipe/ Soak	<8min
T-spray	Pharm. Inc.	Quaternary ammonium salts	2.0-2.2%	Spray/ Wipe	<10min
T-spray	Pharm. Inc.	Quaternary ammonium salts	/	Spray/ Wipe	<10min

■ To disinfect the intracavitary probe

You should disinfect the intracavitary probe before and after each use.

Perform the steps as follows:

1. Clean the probe.

For details, refer to Section 12.1.3 Cleaning the Probe.

2. Perform the high-level disinfection to the surface probe as shown in Table 12-2.

NOTE:

If you do not use the recommended disinfectant, make up it as the manufacturer's instructions.

3. Take out the probe from the disinfectant when the recommended soak period expires.

4. Rinse the probe with the fresh running water, and then dry it with a soft dry cloth.

Table 12-2 Recommended Method for High-level Disinfection

Disinfectant	Manufacturer	Active Ingredient	Level for Active Ingredient	Contact Type	Contact Period
Cidex	J&J	Glutaraldehyde	2.4%	Soak	45-50min
ResertXLHLD	STERIS	Hydrogen peroxide	2.0%	Soak	8min

■ To sterilize the intraoperative probe
You should sterilize the intraoperative probe after each use. Perform the steps as follows:

1. Clean the probe.

   For details, refer to Section 12.1.3 Cleaning the Probe.

2. Sterilize the intraoperative probe as shown in Table 12-3.

Table 12-3 Recommended Method for Sterilization

Disinfectant	Manufacturer	Active Ingredient	Level for Active Ingredient	Contact Type	Contact Period
Cidex	J&J	Glutaraldehyde	2.4%	Soak	10h

NOTE:

If you do not use the recommended sterilant, make up it as the manufacturer's instructions.

3. Take out the probe from the sterilant when the recommended soak period expires.

4. Rinse the probe with the fresh running water, and then dry it with a soft dry cloth.

11.2.3 Storage and Transportation

Store and transport the probe to ensure the probe is in a good condition.

■ To transport the probe
1. Ensure the probe is cleaned and disinfected before the transportation.
2. Place the probe fully into the carrying case, and carefully wind the cable.
3. Ensure no parts of the probe left outside the carrying case before the package.
4. Pack the carrying case with sponge, and place it in a carton.

■ To store the probe
The following items are recommended to be performed for the storage.

● Always store the probe in the probe holder or the specific package.
● Ensure the probe holder or the specific package is clean.
● Do not expose it in direct sunlight or environmental temperature of sudden changes.

- Store the probe alone to avoid any impact on the probe head.
- Carefully wind the probe cable.
- Dry the probe before the storage.

## 11.3 Biopsy Bracket Maintenance

11.3.1 Cleaning, Disinfecting and Sterilizing the Biopsy Bracket

1. Remove the biopsy guide bracket from the probe, and then remove the sheath from biopsy guide. (If using intracavitary biopsy bracket, you should detach the bracket by separating the inner part from the top housing.)

2. Brush and rinse the biopsy bracket to remove the residue.

3. Dry the bracket with a sterile lint-free soft cloth.

4. After each use, the surface biopsy bracket and intracavitary biopsy bracket should be high-level disinfected. For details, refer to Section 12.1.4 Disinfecting and Sterilizing the Probe.

11.3.2 Storage

Store the biopsy bracket is stored in a sterile environment.

11.4 Replacing the Fuse
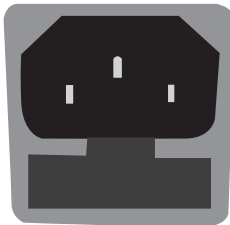
Two fuses with specifications of 50CT-T3.15AH 250V are provided by the manufacturer. You can also purchase the fuse with the same specifications for the fuse replacement.

You can replace the fuse with the instructions of the service personnel if the fuse is blown.

If the fuse is blown again after a replacement, please stop using the ultrasound system immediately and contact customer service.

11.5 Equipment Disposal

You should dispose of the main unit, the probe, the biopsy bracket or other accessories in accordance with the local laws or regulations.

For the detailed disposal information, consult the manufacturer or the local distribution. The manufacturer is not responsible for any system content or accessories that have been discarded improperly.

This page is intentionally left blank.

Appendix A   Renewal Parts

Parts		P/N	Quantity
Ultrasound System Board	VHV Board	7500.00445	1
	MPC Board	7500.00285	1
	VBF Board	7500.00479	1
Circuit Board	Key Panel	7500.00291	1
	KEAA Board	7500.00279	1
	Touch-Screen Control Board	7500.00294	1
	LED Indicator Board	7500.00292	1
	Internal IO Board	7500.00280	1
	DVI Conversion Board	7500.00164	1
	SVDCIO Conversion Board	7500.00371	1
	Power Conversion Board	7500.3043	1
Display	LCD	3900.00058	1
	Touch Screen	3900.00051	1
Power Supply	Power Supply	1700.002002A	1
PC System	Trackball	2100.00314	1
	PC Main Board	2100.00302	1
	PC Keyboard	2100.00356	1
	Hard Disk Drive	2100.00083	1
	Dongle	2101.002801	1
	Drive	2100.00214	1
Accessories	Speaker	3406.000603R	1
	12V Fan	2100.00422	1
	Footswtich	2100.00007	1
	Probe Holder A/B	1063.01031/1063.01032	1
	Caster	1065.216801A	1