About This Manual

P/N: 4710-00979A03

Product Model: P60/P60 CV/P60 Pro

Release Date: December, 2019

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Statement

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in this user manual are provided for operating instruction only and may be different from what is displayed on the screen or

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Manufacturer's Responsibility

SonoScape is responsible for the effects on safety, reliability and performance of this product, only if all the following requirements are met.

- 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.
- The product is used in accordance with the instructions for use.

Documentation

SonoScape provides the documentation consisting of various manuals:

- The basic user manual describes the basic functions and operating procedures of the system.
- The advanced user manual provides information about the measurements and calculations available in each mode.

Understand the meanings of the following items clearly before reading this manual.

Item	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.
☣	Indicates a potentially biological hazardous situation which, if not avoided, may result in disease transmission.
NOTE	Indicates precautions or recommendations that should be used in operating the system.

Item	Meaning
Boldfaced Word	Indicates controls on the control panel, or on-screen objects such as menu items or keys.
Click	Move the cursor to the controls on the display and press the confirm button on the control panel.
>	Select a menu item or a key following the path.

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1 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 system.

1.1 Intended Use

The Digital Color Doppler Ultrasound System is a general-purpose ultrasonic imaging instrument intended for use by a qualified physician for evaluation of Fetal, Abdominal, Pediatric, Small Organ (breast, testes, thyroid), Cephalic (neonatal and adult), Trans-rectal, Trans-vaginal, Peripheral Vascular, Cerebral Vascular, Musculo-skeletal (Conventional and Superficial), Cardiac (pediatric and adult), Trans-esoph (Cardiac), Laparoscopic, OB/Gyn and Urology.

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

1.2 Safety Precautions

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

1.2.1 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 the system.
- Do not service or maintain the system while it is in use with a patient.
- Do not position the system to make it difficult to disconnect it.
- Do not use the system with flammable anaesthetics (category AP) or flammable anaesthetics with oxidants (category APG).
- Do not use the system with other equipment such as an electric knife, high-frequency therapy equipment, or a defibrillator. Otherwise, electrical shock may occur.
- Connect the protective earth conductor only before powering on the system. Disconnect the ground wire only after powering off the system. Otherwise, electrical shock may occur.
- Connect the system to the other electrical equipment by using the potential-equalization lead wire before connecting the power plug of the system to an electrical outlet.
- Do not place the multiple socket-outlet on the floor.

- The video printer should be connected to the specific interface by using the cable provided by the manufacturer. Otherwise, electrical shock may occur.

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

- Within the patient environment, when removing the covers or the connectors from the non-medical electrical equipment without tools during maintenance, calibration or other operations, do not touch the parts of the non-medical electrical equipment and the patient simultaneously.

- Use only the probes provided by the manufacturer. Otherwise, the system will not perform, 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's performance and even cause electrical shock.

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

- The AC power plug for the system is a three-prong grounded plug and should never be adapted to any two-prong outlet or by using an adapter. Connect the AC power plug of the multiple socket-outlet to a hospital-grade power outlet.

⚠ CAUTION

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

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

- Select the conformed multiple socket-outlet with protective grounding, and ensure that its maximum output power exceeds the requirement of the system.

- The multiple socket-outlet can only be used to provide power to the recommended peripherals of the system.

- Do not connect other devices to the multiple socket-outlet. Otherwise, the rated output power of the multiple socket-outlet may be exceeded, and it may result in failure.

- 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.

- Do not use an endocavitary probe on the body surface of a patient. Otherwise, the electromagnetic compatibility of the probe may be degraded.

- If the non-medical electrical equipment used with the system is supplied by a multiple socket-outlet with separating transformer, connect the AC power plug of the multiple socket-outlet to a hospital-grade power outlet. Consult a professional to ensure that the connection complies with the safety standards.

1.2.2 Mechanical Safety

⚠ WARNING

- To avoid possible personnel injury and system damage, move the system slowly and carefully.
- During the movement, the system could cause injury if the casters roll over feet or into shins. Exercise extreme caution while moving the system for a long distance, and up or down the ramp.
- Lock the foot brakes after arrival.

⚠ CAUTION

- Do not place other objects on top of the control panel. Do not sit on the control panel or any other part of the system.

- Disconnect the foot switch and the power cable before moving the system.

- Do not knock or shake the system.
- Ensure that the casters are intact and can rotate well before moving the system.
- Always use the handle to move the system.
- Ensure that the foot brakes are released and all cables are away from the casters before moving the system.

1.2.3   Accessories Caring

⚠ **WARNING**
- Disconnect the probe from the system after freezing an image or powering off the system. Otherwise, the system or the probe could be damaged.
- Do not use the foot switch in the operating room.
- Use the probe carefully. If any part of the transducer surface is scratched, stop using the probe immediately. Otherwise, electrical shock may occur.
- After disinfecting the accessories, wash out chemicals or discharge gases thoroughly from the accessories. Residual chemicals or gases could result in damage to the accessories, and be harmful to human bodies.
- Only 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 to avoid undue discomforts, unnecessary risks or injuries to the patient.
- Use the legally marketed probe sheath. Refer to package labeling to determine latex content. Natural rubber latex may cause anaphylactic reactions in some individuals. Avoid contact with items containing natural rubber latex. Refer to the FDA Medical Alert, March 29, 1991.
- Use the legally marketed coupling gel in accordance with relevant local regulations. Read and understand all precautions in the relevant manual of the coupling gel before use.
- Prepare, use, store and dispose the cleaner, disinfectant and sterilant according to the instructions provided by manufacturers.

⚠ **CAUTION** Do not disconnect the probe during the real-time scan. Otherwise, it may damage the probe and the system.

1.2.4   Biohazard Considerations

☣
- To minimize the risk of cross-contamination or infectious diseases when performing a biopsy, the operator should wear disposable gloves, protective clothing or protective goggles if it is needed. Follow the working regulations strictly in case the skin contacts the samples.
- Some disinfectants or sterilants are acid or alkaline. Use them with caution, and prevent hands or clothing from coming into direct contact with them. Wash hands or eyes immediately in case of any contamination by disinfectants.
- Dispose of cleaners, disinfectants or solutions in accordance with local standards or regulations.

1.3   Acoustic Power Principle

⚠ **WARNING**
- Perform ultrasound procedures prudently under the guidance of the ALARA (as low as reasonably achievable) principle. Only expose the patient to the lowest practical transmit power levels in the shortest possible period to achieve a satisfactory diagnosis.
- Freeze the image at any time if you are not operating the system for a long period of time.
- Do not scan the same part of an patient continuously or expose the patient to prolonged scanning. Doing so may harm the patient.
- Do not expose the fetus to prolonged scanning in the Doppler mode.
- 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 at all times.

1.3.1 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.

1.3.2 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 the patient and utilize the ultrasound deliberately. Deliberate use of the ultrasound means that output power of the ultrasound must be selected based on ALARA. Additional information regarding the concept of ALARA and the possible bioeffects of Ultrasound are available in a document from the AIUM (American Institute of Ultrasound in Medicine) titled "Medical Ultrasound Safety".

1.3.3 Mechanical and Thermal Indices

The display of the 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 different types 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 on 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 trimester, 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.

1.3.4 Transducer Surface Temperature Limits

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

The maximum surface temperature of the endocavitary probes 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 is displayed on the right side of the screen.

```
PAT：37.0℃ ————— Patient Threshold Temperature
TIP： < 28℃ ————— Transducer Tip Temperature
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1.3.5 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.

1.4 Safety Symbols

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

Symbol	Meaning
⚠	Caution
⚡	Dangerous voltage
⚠	Pinch hazard
🚫	Risk of explosion if used in the presence of flammable anesthetics
CE 0197	This product is provided with a CE marking in accordance with the regulations stated in Council Directive 93/42/EEC.
EC REP	Authorized representative in the European community

Symbol	Meaning
	Type BF Applied Part
	Powers main switch OFF
	Powers mains switch ON
	On/Off switch
	Foot switch Connector
	Protective earth (ground)
	Equipotentiality
	Alternating current
IPN$_1$N$_2$	Degree of IP protection-
	Non-ionizing electromagnetic radiation
	Manufacturer
	Date of manufacture
	Follow instructions for use
	Network Port
	Control port of color video printer
	USB Port
	Video Input
	Video Output
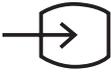
Symbol	Meaning
	Audio
	Fragile
	Keep dry
	No stacking
	Keep this way upward
	This symbol indicates that waste electrical and electronic equipment must not be disposed of as unsorted municipal waste and must be collected separately. Please contact an authorized representative of the manufacturer for information concerning the decommissioning of your equipment.
SN	Serial Number
	Heating
	Control panel can be rotated left or right
	Control panel can be rotated up or down
	General warning, caution, risk of danger. DO NOT push the system when the casters are locked. Beware of excessive stress exerted to the system. DO NOT sit on the system.

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2 System Overview

This ultrasound system adopts advanced ultrasonic Doppler technologies.

To ensure the performance and availability of this ultrasound system, you should be thoroughly familiar with the operations of system components, the control panel, the key panel and the basic screen.

2.1 Standard System Configuration

The standard system configuration mainly consists of the following items:

- Main unit
- Probes
- Others: See the Packing List in the packaging box.

2.2 Physical Specifications

- Lifting range: 0-230mm
- System dimensions: approx. 743 mm (W) × 1360 mm (H) × 550 mm (D)
- System weight: approx. 83.7 kg

2.3 System Components
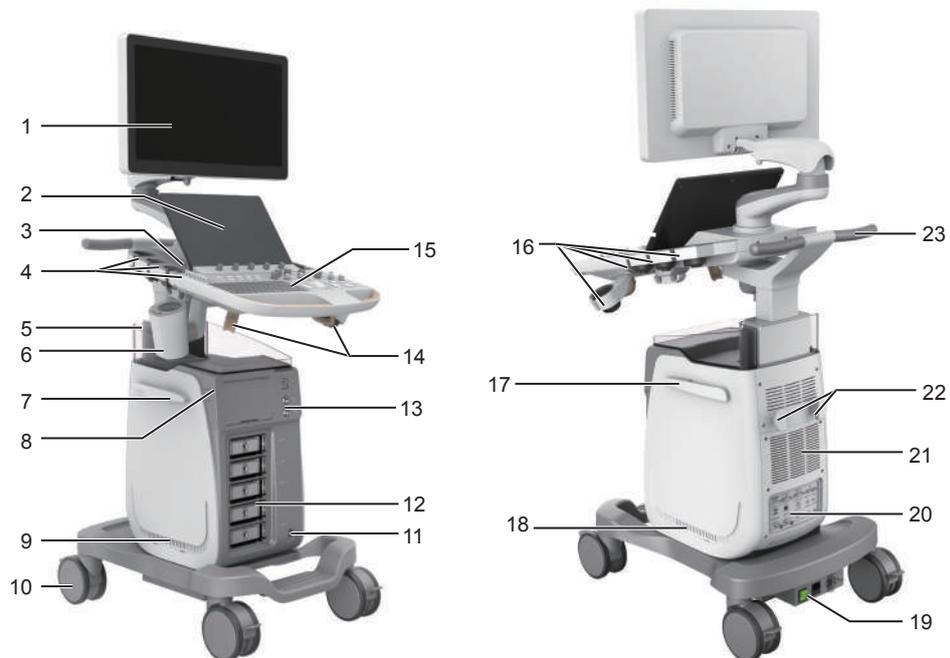
Figure 2-1 Overview of the System

1	Monitor	13	Front Panel
2	Touch Screen	14	Probe Cable Hanger
3	Speaker	15	Control Panel
4	Probe Holder	16	Probe Holder
5	Document Basket	17	Cable Hanger
6	Probe Holder Hanger/ Coupling Gel Heater	18	Dust Filter
7	Cable Hanger	19	Power Supply Panel
8	On/Off Button	20	Peripheral Device Panel
9	Dust Filter	21	Ventilation Holes
10	Caster	22	Cable Hanger
11	Footswitch Port	23	Handle
12	Probe Port		

2.3.1   Peripheral Device Panel
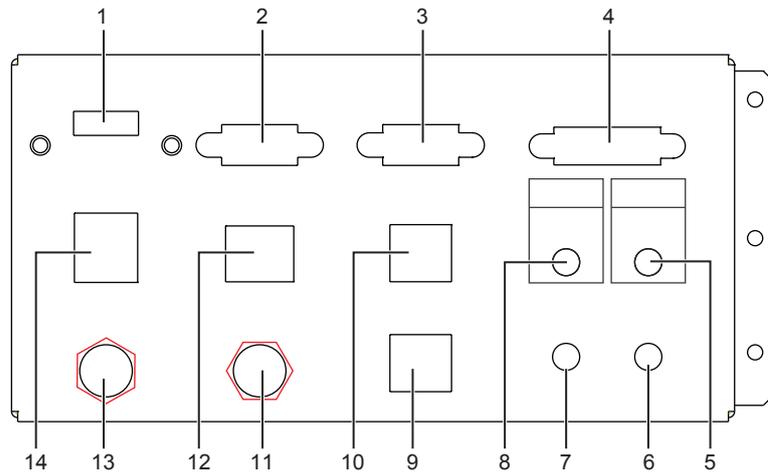
Figure 2-2 Peripheral Device Panel

No.	Name	Description
1	**HDMI** port	Connect a video device to acquire HDMI signals.
2	**VGA OUT** port	Connect a video device to acquire VGA signals, such as a monitor or projector.
3	**RGB OUT** port	Connect a video device to acquire VGA signals, such as a monitor or projector.
4	**DVI** port	Connect a video device to acquire DVI signals.
5	**PRINT** port	Connect a video printer.
6	**MIC IN** port	Reserved function
7	**AUDIO IN** port	Reserved function
8	**AUDIO OUT** port	Connect an audio device.

No.	Name	Description
9	**S-VIDEO IN** port	Reserved function
10	**S-VIDEO OUT** port	Connect a video device to acquire S-VIDEO signals, such as a monitor or projector.
11	**VIDEO IN** port	Reserved function
12	Net port	Connect to the DICOM server or network.
13	**VIDEO OUT** port	Connect a video device to acquire standard signals, such as a video printer.
14	USB port	Connect USB devices.

2.3.2   Power Supply Panel
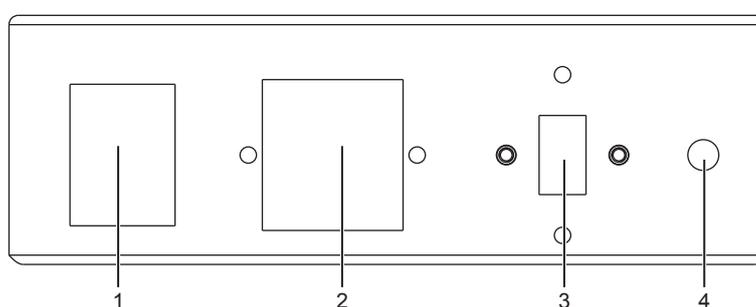
Figure 2-3 Power Supply Panel

No.	Name	Description
1	POWER switch	Power on or off the system.
2	Power input	Connect the power cable.
3	Voltage conversion switch	Convert the voltage.
4	Equipotentiality	Balance the protective earth potentials between the system and the other electrical equipment for equipotential connection.

2.3.3   Front Panel
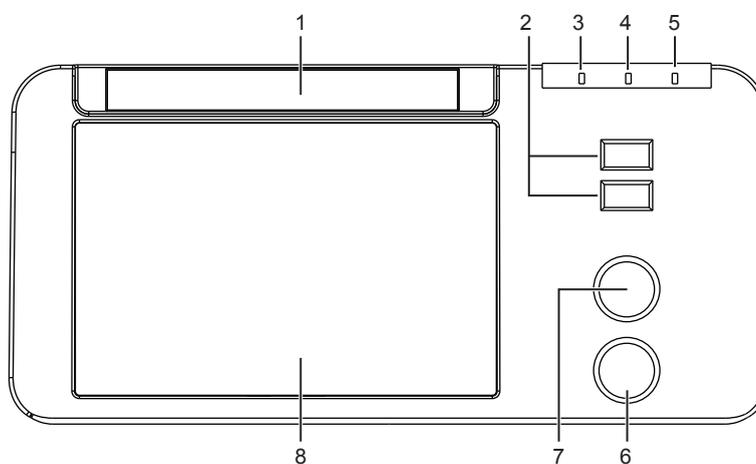
Figure 2-4 Front Panel

No.	Name	Description
1	DVD drive	Backup data or images.
2	USB ports	Connect the USB drives.
3	Mains supply indicator	Indicate the mains supply status.
4	Battery charging indicator	Indicate the battery charging status.
5	Battery discharging indicator	Indicate the battery power status.
6	Pencil probe port	Connect the pencil probe.
7	ECG port	Connect the ECG cable.
8	Printer compartment	Place the video printer.

2.3.4   Control Panel
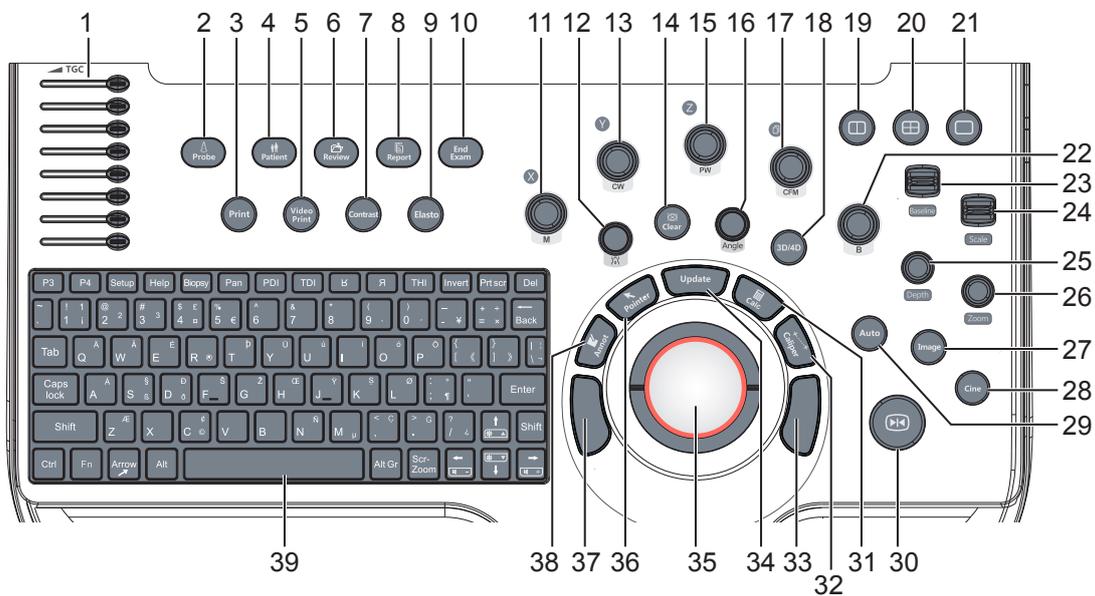
Figure 2-5 Control Panel

No.	Name	Description
1	**TGC** slider	Use these sliders to adjust the TGC settings at different scan depths.
2	**Probe** button	Press it to select a probe and an icon for the corresponding exam type.
3	**Print** button	Press it to trigger the network printer if a network printer is successfully connected.
4	**Patient** button	Press it to enter the **New Patient** screen.
5	**Video Print** button	Press it to print the current screenshot if the video printer is successfully connected.
6	**Review** button	Press it to display the **Patient Exam List** screen. Press it to enter the **Review Image** screen after creating a new patient exam.

No.	Name	Description
7	**Contrast** button	Press it to enter or exit the contrast imaging mode.
8	**Report** button	Press it to enter the **Report** screen.
9	**Elasto** button	Press it to enter or exit the elastography imaging mode.
10	**End Exam** button	Press it to end the exam for the current patient in the real-time mode.
11	**M** button	Press it to enter the inactivated M mode. Rotate it to adjust the gain value in the M mode.
12	(Body mark) button	Press it to add body marks on an image.
13	**CW** button	Press it to enter the inactivated CW mode. Rotate it to adjust the gain value in the CW mode.
14	**Clear** button	Press it to remove all measurement results, annotations and body marks from the display.
15	**PW** button	Press it to enter the inactivated PW mode. Rotate it to adjust the gain value in the PW mode.
16	**Angle** button	Rotate it to adjust the flow direction in the PW/CW mode. Rotate it to adjust the angle of M line in the M mode. Rotate it to adjust the arrow direction if the arrow annotation feature is activated. Rotate it to adjust the probe direction if the body mark feature is activated. Rotate it to adjust the angle of hip joint when performing a pediatrics measurement.
17	**CFM** button	Press it to enter or exit the CFM mode. Rotate it to adjust the gain value in the CFM mode, or to move the 3D image horizontally in 3D/4D mode.
18	**3D/4D** button	Press it to enter or exit the 3D/4D mode.
19	(Dual split display) button	Press it to enter the dual split display. Press it to activate the desired image in the dual split display.
20	(Quad split display) button	Press it to enter the quad split display. Press it to activate the desired image in the quad split display.
21	(Single display) button	Press it to enter the single display.
22	**B** button	Press it to enter the B mode. Rotate it to adjust the gain value in the B mode.
23	**Baseline** button	Flip it to adjust the baseline position in the CFM/TDI/PW/CW mode.
24	**Scale** button	Flip it to adjust the PRF value in the CFM/TDI/PW/CW mode.
25	**Depth** button	Rotate it to adjust the scan depth. Press it to restore to the default scan depth.

No.	Name	Description
26	**Zoom** button	Press it to activate the zoom feature.
27	**Image** button	In the real-time mode or frozen mode, press it to save an image.
		In the real-time contrast imaging mode, press it to set the start frame for a cine of blood flow, and press it again to set the end frame.
28	**Cine** button	Press it to save a cine in the frozen mode.
29	**Auto** button	Press it to optimize an image automatically.
30	**Freeze** button	Press it to freeze an image in the real-time mode.
		Press it again to restore the real-time scan.
31	**Calc** button	Press to activate the application-specific measurement and calculation features.
32	**Caliper** button	Press to activate the basic measurement and calculation features.
		Press it to perform the distance measurement in the 2D (B/CFM/PDI/TDI)/ M/3D/4D mode.
		Press it to activate a velocity measurement in the PW/CW mode.
33	Confirm button	Press it to confirm the current operation.
34	**Update** button	Press it to enter the M/PW/CW mode in an inactivated M/PW/CW mode.
		Press it to switch between measurement markers when performing a distance or an ellipse measurement.
		Press it to undo the trace when performing trace measurement.
35	Trackball	Use it to move the cursor and adjust ROI.
36	**Pointer** button	Press it to activate the clipboard in the 2D (B/CFM/PDI/TDI)/M mode.
		Press it to activate the cursor in the 3D/4D mode.
37	Confirm button	Press it to confirm the current operation.
38	**Annot** button	Press it to annotate an image with typed words.
39	Key panel	Use it to enter the patient information. For details, refer to Section 2.3.5 Key Panel.

2.3.5   Key Panel

Figure 2-6 Key Panel

No.	Name	Description
1	**P3** key	Press it to save images, cine or volume, or to enable the sonogram navigation feature.
2	**P4** key	For details, refer to Section 4.1.3 Multikey Settings.
3	**Setup** key	Press it to enter the **System Setting** menu.
4	**Help** key	Press it to open the built-in documents.
5	**Biopsy** key	Press it to activate the biopsy feature.
6	**Pan** key	Press it to enter or exit the real-time panoramic imaging mode.
7	**PDI** key	Press it to enter or exit the PDI mode.
8	**TDI** key	Press it to enter or exit the TDI mode.
9	Ƀ key	Press it to reverse the image up or down.
10	Я key	Press it to reverse the image left or right.
11	**THI** key	Press it to enter or exit the THI/PHI mode.
12	**Invert** key	• Press it to enable or disable reversing the flow in the CFM/PDI/TDI mode. • Press it to enable or disable reversing the spectrum in the PW/CW mode.
13	**Prtscr** key	Reserved
14	**Del** key	• Press it to delete the last annotation or body mark when annotating an image. • Press it to delete the last measurement marks and results (the results in the report will not be deleted) when performing the manual trace measurement.
15	Up/Down/ Left/Right Arrow key	• Press it to make options for an item when configuring the **System Setting** menu. • Press it and the **Fn** key simultaneously to adjust the audio volume and display brightness.
16	**Scr-Zoom** key	Press it to zoom in/out a selected zone.

No.	Name	Description
17	**Alt GR** key	Use it in combination with other keys.
18	**Arrow** key	Press it to add arrows on an image.
19	**Fn** key	• Press it and the Up/Down arrow key simultaneously to adjust the display brightness. • Press it and the Left/Right arrow key simultaneously to adjust the volume in PW mode.
20	**Ctrl** key	Use it in combination with other keys.

2.3.6 Basic Screen
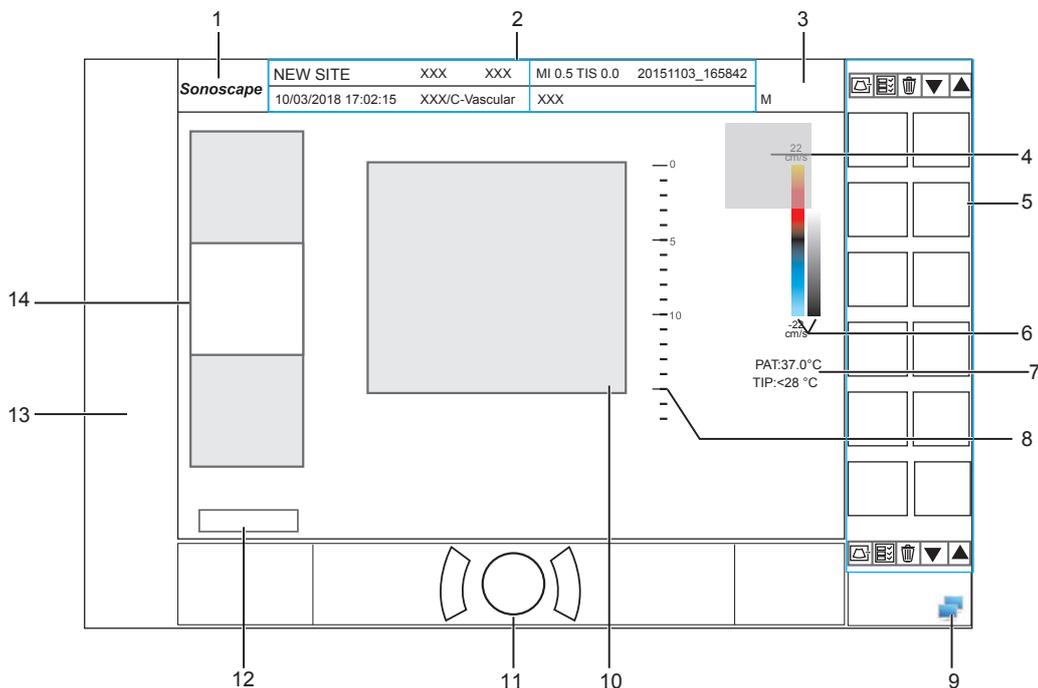
Figure 2-7 Basic Screen

1	Manufacturer logo	8	Depth Scale and Focus Position
2	Information Bar	9	Network Connection Status
3	Exam Type Icon	10	Imaging Area
4	Measured Result Box	11	Trackball Prompt Area
5	Clipboard	12	Cine Loop Status (in frozen mode)
6	Color Map/Grayscale Map	13	Measurement/Annotation Area
7	Temperature Display Area	14	General Parameters Area

NOTE:

If the temperature of intracavity probe or intraoperative probe is 6ºC higher than the patient initial temperature, a prompt pops up in the temperature display area.

2.3.7 Touch Screen

The touch screen above the control panel provides controls which can be used to select the probe model in accordance with the exam type, annotate the image or perform the measurement. The touch screen contains several types of controls, depending on the feature to be performed.

NOTE:

A same effort can be achieved by using controls on the touch screen or controls and knobs located on the control panel and the key panel if they are of the same name. In such condition, only the system operated with the touch screen is described in this manual.

⚠ **CAUTION** To avoid damaging the touch screen,

- Do not expose it in direct sunlight.
- Tap it gently with fingers.
- Do not operate it with a sharp or hard object.
- Do not locate it in environmental temperature of sudden changes.
- Do not locate it near static electricity or high voltage.
- Keep the screen clean without any adhesive tapes.

Controls located below the touch screen are displayed as follows:
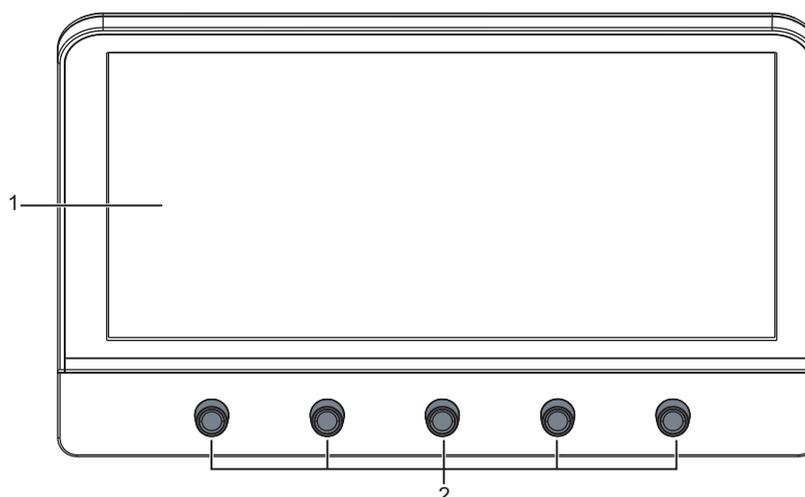
Figure 2-8 Touch Screen

No.	Name	Description
1	Touch Screen	The display varies with the feature to be performed: application mode screen, imaging mode menu, annotation/bodymark menu, measurement menu, and sonogram navigation menu.
2	Image Optimization Knob	Rotate the knob that is directly below the desired item to adjust the value when optimizing the image. Generally, rotate it clockwise to enable the feature or increase the value of the corresponding parameter; rotate it anticlockwise to disable the feature or decrease the value of the corresponding parameter.

■ **Application Mode Screen**

The application mode screen as shown below is used to select the probe model or exam type.

The system enters the following screen by default once it is started. Press the **Probe** button on the control panel to return to the following screen when you enter other screens.
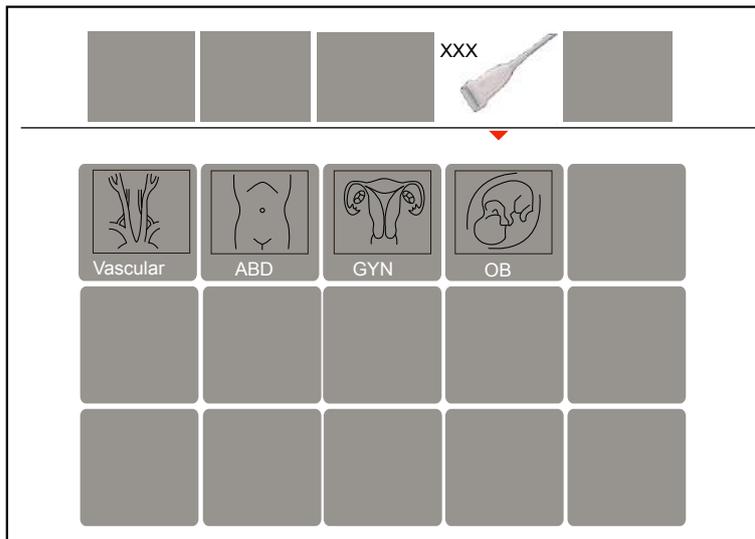
Figure 2-9 Application Mode Screen

■ **Imaging Mode Menu**

The imaging mode menu as shown below is used to select the imaging mode, optimize the image or adjust parameters. Select an exam type from the application mode screen to enter the following screen.
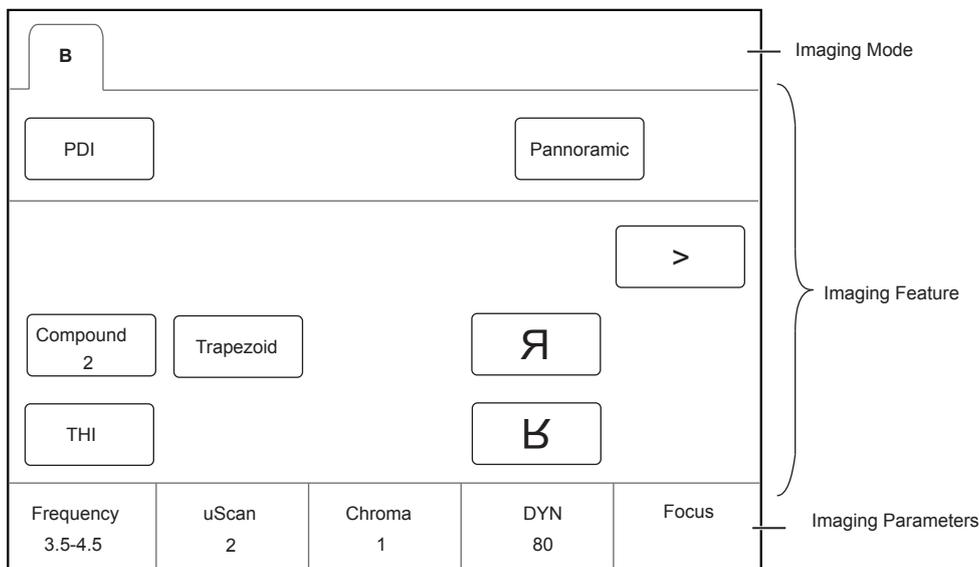
Figure 2-10 Imaging Mode Menu

■ **Annotation/Body Mark Menu**

The **Annotation/Body Mark** menu is used to select an annotation or body mark.

Press the **Annot** or **Body Mark** key on the control panel to enter the menu. For example, the following screen will be displayed on the touch screen if you press the **Body Mark** key.
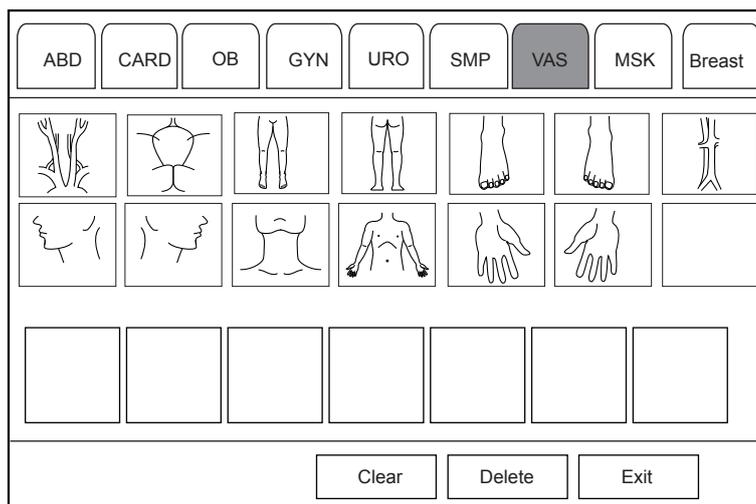
Figure 2-11 Annotation Menu of Body Mark

■ **Measurement Menu**

The measurement menu is used to select the measurement item to be performed.

Press the **Caliper** button on the control panel to enter the basic measurement menu. Or, press the **Calc** button on the control panel to the application-specific measurement menu.
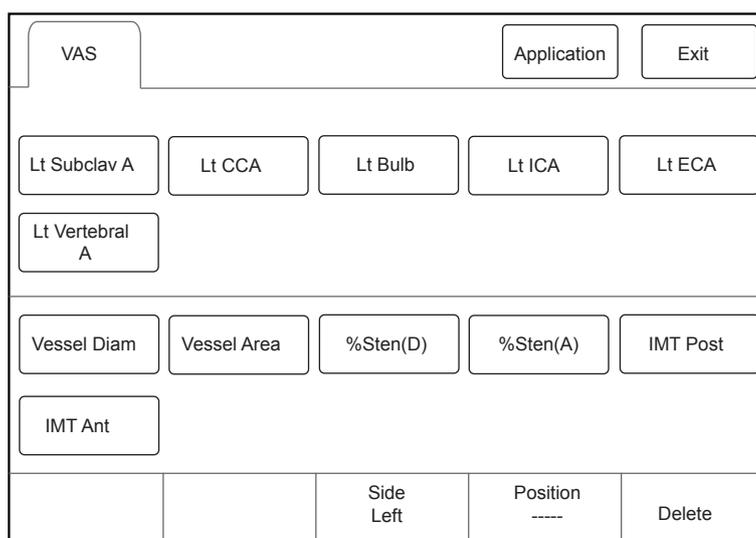
Figure 2-12 Measurement Menu

■ **Sonogram Navigation Menu**

In sonogram navigation menu, you can select a standard sonogram and modify its status, and perform the sonogram navigation feature in obstetric diagnosis mode. Press the P3 key on the key panel by default to enter the sonogram navigation menu, as shown in Figure 2-13.
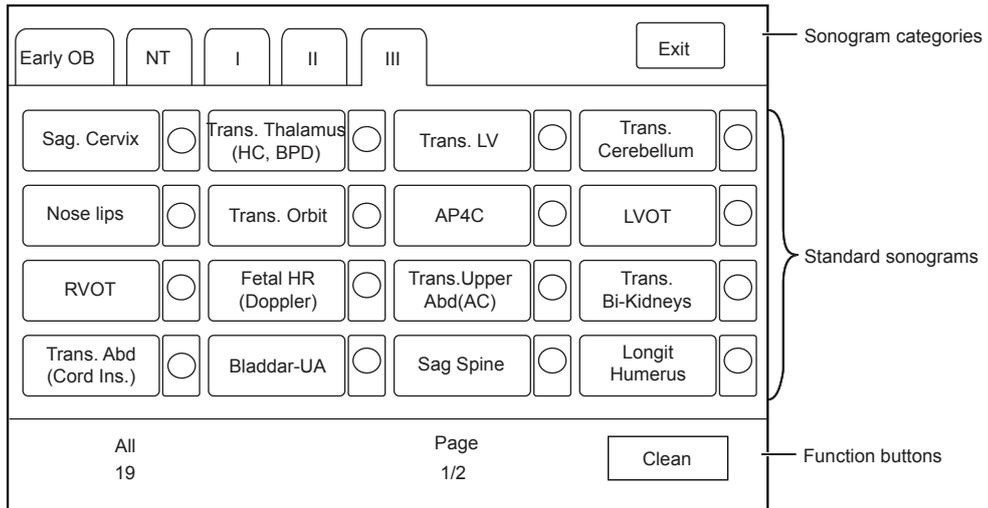
Figure 2-13 Sonogram Navigation Menu

3　Preparing the System

System preparation is necessary before using the system. The preparation includes but is not limit to moving, positioning or adjusting the system, connecting the probe and the peripheral devices.

NOTE:

You should connect and use the ultrasound system in accordance with EMC requirements provided in this manual.

3.1　System Moving/Positioning

⚠ CAUTION Leave at least 20 cm at the back and both sides of the ultrasound system for ventilation. Otherwise, the system could over heat and fail.
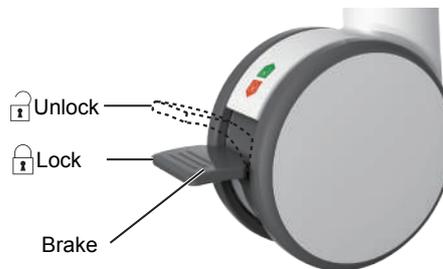
Perform the following steps to position the system.

1. Unlock the four foot brakes.

2. Move the system with the handle.

3. Lock the four foot brakes after placing it in the desired location.

3.2　Connecting and Powering the System

Two methods can be used to supply power for the system: mains supply and built-in rechargeable lithium battery.

When the adapter is connected to the mains supply, the battery is charged until it is full.

3.2.1　Using the Mains Supply

Two switches are provided for the system.

- The power switch located on the power supply panel is used to connect or disconnect the system with the mains supply.

- The ⏻ button on the side panel is used to start up or shut down the system.

⚠ WARNING
- Ensure the ultrasound system works with the required voltage before you connect it to the mains supply.

- If the system is connected to the mains supply through a power supply cable, the battery is automatically charged.

- If the system is disconnected from the mains supply, the system is automatically powered by the battery.

3.2.2 Using the Battery

⚠ **WARNING**
- Do not disassemble or alter the battery. Otherwise, there is a danger of explosion.
- Replace the battery with the same or the equivalent type.
- Do not short-circuit the battery by directly connecting the system with metal objects.
- If the battery emits an odor or heat, is deformed or discolored, or appears abnormal during use, charging or storage, remove it and stop using it immediately. If you have any questions about the battery, please contact the manufacturer.
- Do not use a battery if it leaks. If your skin or clothing is stained with the fluid from the battery, thoroughly wash the area immediately with clean water. If the fluid comes into contact with your eyes, immediately flush your eyes with water and seek an oculist for help.
- If the battery is found damaged, severely degraded or used for 3 years, dispose of it in accordance with the local laws or regulations.

The battery is automatically charged when the system is connected to the mains supply through a power supply cable.

If the system is disconnected from the mains supply, the system is automatically powered by the battery.

- A fully charged battery can work continuously for more than 1 hour.
- Two batteries are used for system power supply, they must satisfy the following specifications,

Nominal voltage: 14.8V

Battery capacity: 9.6Ah/142Wh

Limited charging voltage: 16.8V

Charging temperature range: 0°C to 45°C

Discharging temperature range: -20°C to 60°C

⚠ **WARNING** To avoid the battery damage causing the system damage, observe the following precautions:
- Do not immerse the battery in water or allow it to get wet
- Do not discard the battery it in fire.
- Do not leave the battery in direct sunlight or expose it to temperature over 60°C (140°F).
- Keep the battery away from fire and other heat sources during use and charge.
- Do not place the battery into a microwave oven or other pressure vessels.
- Do not pierce the battery with a sharp object, hit it, or step on it.

⚠ **CAUTION**
- Use only the battery when there is an emergency or no reliable mains supply is available. You are always recommended to use the AC supply instead of the battery to guarantee the battery life.
- Charge the battery in an area with a temperature range from 0°C to 45°C and discharge it an area with a temperature range from 0°C to 60°C to maintain the lifespan of the battery.
- Always charge the battery to full to maintain the lifespan of the battery.
- When the battery capacity is low and the battery cannot be charged in time, you need to save all unsaved data before the system automatically shuts down. Otherwise, you may lose useful information.

3.2.3 Indicators

The status of indicators is shown in Table 3-1.

Table 3-1 Indicator Descriptions

Indicator	Name	Mains Supply	Battery Supply
☼	Battery Charging Indicator	Yellow, charging	Off
		Green, fully charged	
⊐⊏	Mains Supply Indicator	Green	Off
⊞	Battery Discharging Indicator	Off	Green, full capacity
			Yellow, low capacity
			Extremely low capacity. The system will automatically shut down. The buzzer beeps.

3.3   Powering On/Off the System

⚠ **WARNING** ● Do not power off the system during a system upgrade or a data transmission.

● An extra 30-60 seconds are needed for powering on the system if it is powered off in an abnormal way previously.

● If the system is configured with the μScan feature, do not connect the USB drive to the system before system startup.

● Wait approximately 20 seconds before powering on the system again after powering it off. Otherwise, a failure may result.

● Do not unplug the system from the AC power outlet before the shutdown hint disappears. Otherwise, the data may be lost or corrupted.

● To maintain the safety and functionality of the system, maintenance must be performed at least once every year. For details, refer to Chapter 15 System Maintenance.

3.3.1   Powering On the System

1. Set the power switch on the power supply panel to the ❘ position.

2. Press the ⏻ button on the side panel to power on the system.

All operating indicators illuminates, the initial screen and the application mode screen appear after the system completes the initialization.

3.3.2   Powering Off the System

1. Press the ⏻ button on the side panel to power off the system.

2. Set the power switch on the power supply panel to the ○ position.

3.3.3   System Standby

If the ultrasound system is idle for a set period, the screen saver will be activated. For details, refer to Section 4.1.2 Display Settings.

3.4 Adjusting the System

3.4.1 Adjusting the Monitor Arm

NOTE:

- Be careful with your fingers when adjusting the monitor arm.
- Lock four casters before you adjust the monitor arm.
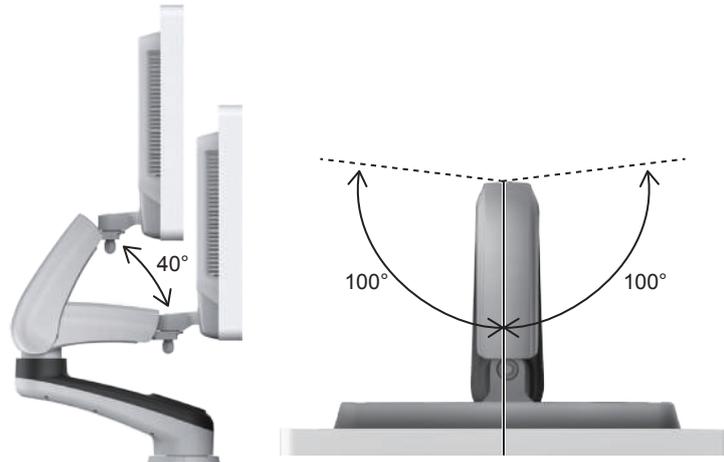
- To adjust the monitor vertically, move the upper arm towards to or backwards from the lower arm.
- To adjust the monitor horizontally, swivel the upper arm left or right.

3.4.2 Adjusting the Display Monitor

■ **To swivel the LCD monitor**

Grip the upper and lower sides of the monitor, tilt the monitor forward or backward.
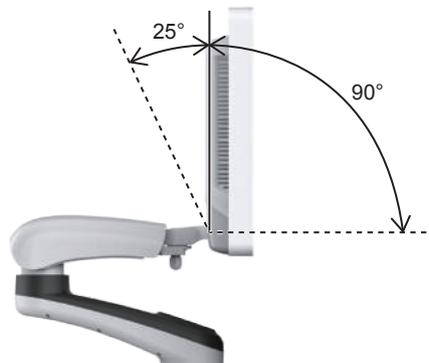
Grip the left and right sides of the monitor, and swivel the monitor left or right.

40°   40°
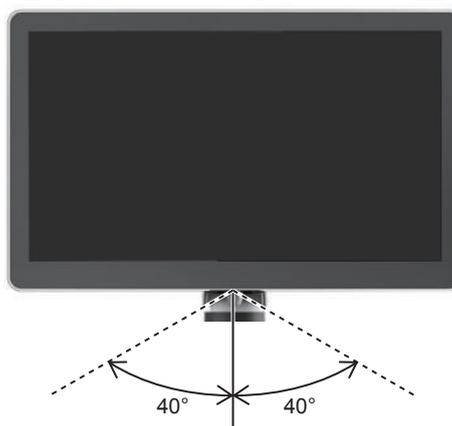
■   **To adjust the brightness and contrast**

Adjusting the LCD monitor's brightness and contrast is one of the most important factors for obtaining the optimum image.

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 right side of the monitor to adjust the brightness and contrast settings.

- Press ○ button **to** enter the monitor menu.
- Press **–** button to display the setting menu for **Contrast**. Pressing **+** can increase the value of the contrast; pressing **–** can decrease the value.
- Press **+** button to display the setting menu for **Brightness**. Pressing **+** can increase the value of the brightness; pressing **–** can decrease the value.
- Press the **Fn** key and the Up/Down arrow key simultaneously to adjust the display brightness.

3.4.3   Adjusting the Control Panel

Use the up/down control lever and the swivel button to adjust the control panel.

NOTE:

Lock four casters before you adjust the control panel.

Up/Down Control Lever

Swivel Button
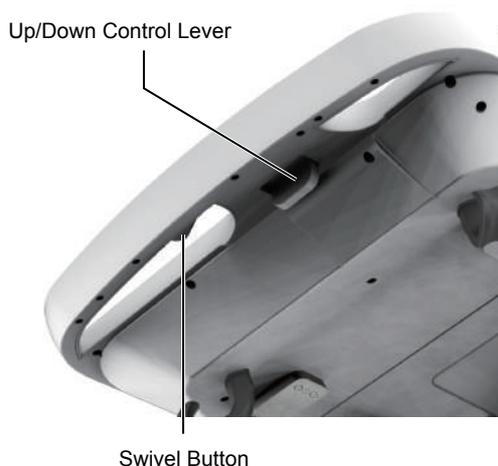
■   **To adjust the vertical position**

- Move and hold the up/down control lever towards the front handle to reach a desired height, then release.

- Move and hold the up/down control lever towards the front handle, and press down the control panel to reach a desired height, then release.

■ **To adjust the horizontal position**

Hold down the swivel button towards the front handle and use the front handle to adjust the control panel in any directions, then release.

3.5 Connecting the Probe

⚠ CAUTION
- Disconnect the probe from the system after freezing an image or powering the system off. Otherwise, the probe of the system could be damaged.
- Freeze the image at any time if you do not operate the ultrasound system for a long period.

3.5.1 Connecting the Probe

1. Rotate the locking lever 90° anticlockwise to the ⌐ position, and then insert the probe connector into the probe port firmly.
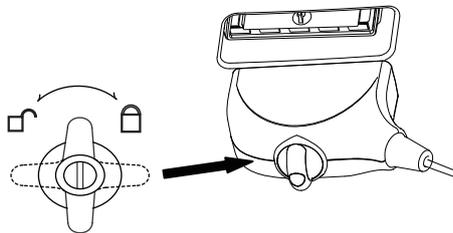
2. Rotate the locking lever 90° clockwise to lock it securely.

3.5.2 Connecting the Pencil Probe

Connect the pencil probe to the port located on the front panel of the system.

3.5.3 Disconnecting the Probe

Rotate the locking lever 90° anticlockwise to the horizontal position, and then pull the probe connector out directly.

3.6 Connecting the Peripheral Device

3.6.1 Connecting the Foot switch

⚠ CAUTION
- To avoid damaging the foot switch, do not place the foot switch on the ultrasound system.
- Use only the foot switch provided by the manufacturer. Otherwise, the ultrasound system or the foot switch may malfunction.

Connect the foot switch to the foot switch port of the ultrasound system as the figure shows below.
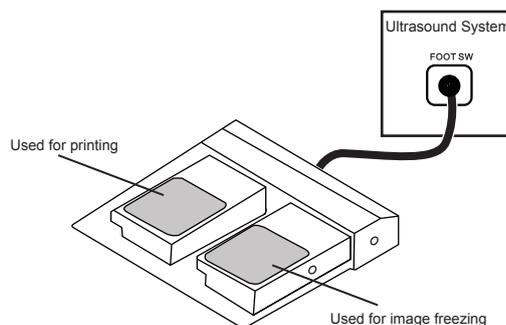
3.6.2   Connecting the Video Printer
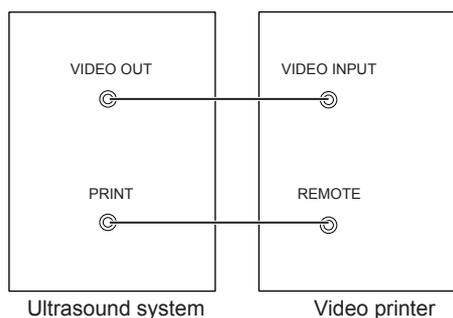
Connect the video printer to the system by BNC cable and Remote Control cable provided by the manufacturer. You can refer the installation method as the above figure shown. The video printer can work without any configurations after a successful connection.

3.6.3   Connecting the Network Printer

■   **Printer Setup**

1. Connect the printer to the ultrasound system, and turn on the printer. The printer settings are displayed as below.
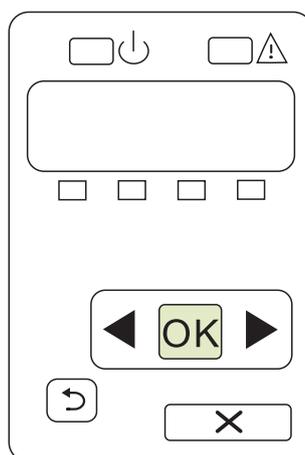
2. Press **OK** on the control panel menu of the printer.

3. Press ◀ or ▶ to select **Network Config**, and then press **OK** to confirm.

4. Press ◀ or ▶ to select **TCP IP Config,** and then press **OK** to confirm.

5. Press ◀ or ▶ to select **Manual**, and then press **OK** to confirm.

6. An IP address is displayed, change it to **192.168.254.103** by pressing ◀ or ▶ , and then press **OK**.

7. If the IP address is correct, use ◀ or ▶ to select **Yes**, and then press **OK**.

    If the IP address is incorrect, use ◀ or ▶ to select **No**, and then press **OK**. Repeat step 6 to enter a correct address.

8. After setting the IP address, set the subnet mask to **255.255.255.0** and the default gateway to **192.168.254.104** in the same way as described above.

■   **Connecting to a Printer**

1. Copy the driver file **deskjet.ppd** provided by the manufacturer into the directory of the USB drive.

2. Connect the drive to the ultrasound system, and then start up the ultrasound system.

3. Press the **Setup** button to enter the **System Setting** menu, and click **Peripheral**.

4. Tick **Static IP** and input the settings for **IP Address**, **Netmask**, **Default Gateway** and **DICOM AE Title**.

    NOTE:

    IP address and **Printer IP** should be set in the same network segment.

5. Set **Default Printer** to **Net Printer**, and set the IP address of the printer.

6. Click **Add Printer** and reboot the ultrasound system after the installation is complete.

3.6.4　　Connecting the USB Printer

1. Connect the USB printer to the system by using the USB cable.

2. Copy the driver file **deskjet.ppd** provided by the manufacturer into the directory of the USB drive.

3. Connect the USB drive to the ultrasound system, and then start up the ultrasound system.

4. Press the **Setup** button to enter the **System Setting** menu, and click **Peripheral**.

5. Set **Default Printer** to **USB Printer**, and Click **Add Printer**.

6. Reboot the ultrasound system after the installation is completed.

3.6.5　　Connecting the Endocavitary Probe Holder (Optional)

For details on the installation and operations of the endocavitary probe holder, refer to endocavitary probe holder user instructions.

3.6.6　　Connecting the Coupling Gel Heater (Optional)

For details on the installation and operations of the coupling gel heater, refer to coupling gel heater user instructions.

4   Customizing Your System

The **System Setting** menu allows you to specify general system settings, printing, measurement and calculation settings. You can also define the annotation library and shortcut keys. All your customized settings can remain even after rebooting the system.

After starting up the system, the monitor displays the system desktop and the touch screen displays the application mode screen. Press the **Setup** key on the key panel to enter the **System Settings** menu.

To make settings in the **System Settings** menu,

- Select one tab, and press Set key on the control panel to enter a setting menu.
- Move the cursor to an item by using the trackball and press Set Key on the control panel to select one item.
- Move the cursor to a text box beside an item and use the key panel to manually type the value.
- Select an option from each drop-down list for the item.
- Select **Apply** to save any changes and exit the **System Setting** menu.
- Select **Exit** to quit the **System Setting** menu.

4.1   General System Settings

You can make general system settings on the **General**, **Display**, **Multikey** and **Biopsy** tabs.

4.1.1   General Settings

Figure 4-1 General Settings Menu - General Tab

Item	Description
Hospital Name	Enter the institution's name.
Language	Choose a system language for the user interface, and reboot the system for it to take effect.
Time Zone	Set the local time zone.
Date Format	Set the date format for the system.
Date/Time Setting	Set the system date and time. Select this item to set the system date and time manually in the pop-up text box. **NOTE:** You should set the system date and time for your initial use of the system.
Time Format	Set the time format between 12 Hour and 24 Hour.
Freeze Response	Select the feature to be enabled after you press the ⏮ button.
Caps Lock	Enable or disable the capital letter feature. ● Set it to **ON** to enable the upper-case mode. ● Set it to **OFF** to disable the upper-case mode.
Trackball Sensitivity	Adjust the sensitivity for the trackball movement. A greater value brings about a higher sensitivity.
Depth Focal Auto	Enable or disable the auto-focus feature. ● Set it to **On**, the focal depth varies with the depth in the B mode and varies with the ROI position in the CFM/PDI/TDI mode. ● Set it to **Off**, the focal depth never change.
Color Spectra Auto Invert	Enable or disable the color spectra auto invert feature. ● Set it to **On**, when the color ROI is steered from one side to another, the auto invert feature is enabled. ● Set it to **Off**, the auto invert feature is disabled.

4.1.2   Display Settings

Figure 4-2 General Settings Menu - Display Tab

Item	Description
Color ROI	Set the color for the interest region box.
Display Format	Set the default display format for the M and PW/CW modes.
Screen Saver	Enable or disable the screen saver feature.
Screen Saver Delay (min)	After the screen saver feature is enabled, the waiting time can be set. If the system is idle for a set period, it automatically enters screen saver mode.
Exam Settings	Set the maximum time allowed to activate an exam. Tick ExamList Add Operator, the system will add the operator in the exam list.
Show Images In Gallery	View images and cines coming with the system or imported from external storage devices.

■   **Show Images in Gallery**

Perform the following steps to perform a demonstration.

1. Click **Show Gallery** to enter the **Show Gallery** screen, as shown in Figure 4-3.
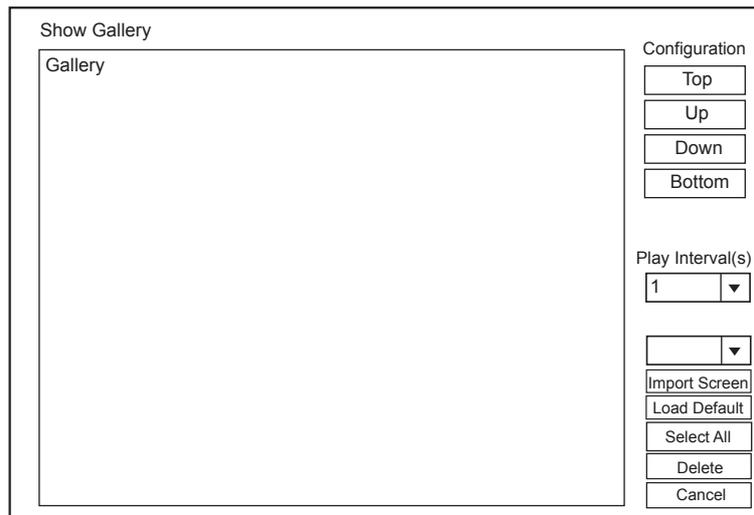
Figure 4-3 Show Gallery Screen

2. Load default demos or import demos from an external storage device.

    − Configuration: Select a demo and click **Top**, **Up**, **Down** or **Bottom** to arrange the order.

    − Play Intervals: Select the desired interval between cine play from the drop-down list.

    − Select All: Select all images and cines.

    − Delete: Tick a desired demo and click Delete to remove it from the gallery.

3. Select a demo and press Set Key twice on the control panel to start a demonstration.

    − Press the Up/Down/Left/Right arrow key to go to the previous or next demo.

    − Press Set Key to pause or resume the demonstration.

    − Press the ⏮ button to stop the demonstration.

4.1.3   Multikey Settings
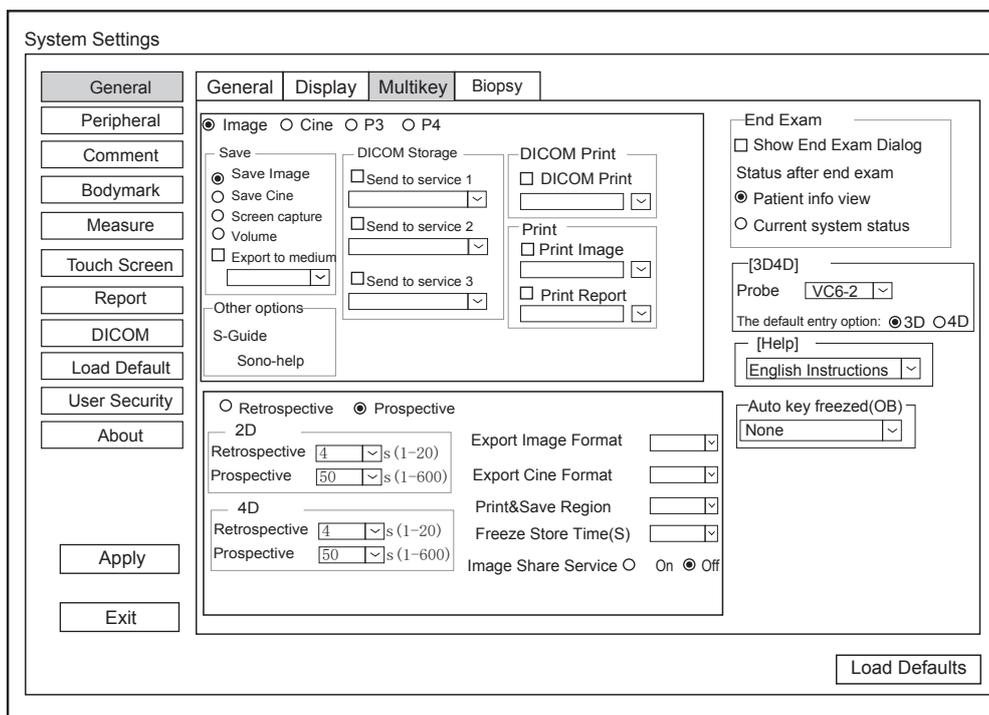
Figure 4-4 General Settings Menu - Multikey Tab

Item	Description
Image	**Save Image** is selected as the storage type for **Image** key by default.
Cine	**Save Cine** is selected as the storage type for **Cine** key by default.
P3/P4	Tick **P3/P4** and select the storage type (image, cine, screen capture or volume) or other functions (Sono-help), and then you can press **P3/P4** to save the desired data during exams.
Export to medium	When defining **Image**, **Cine**, **P3/P4** key, tick **Export to medium** and select the desired medium from the drop-down list, and then you can press **Image**, **Cine**, **P3/P4** key to save the desired data and export it to the selected medium.
DICOM Storage	When defining **Image**, **Cine**, **P3/P4** key, tick **Send to service1/2/3** and select the desired DICOM storage server from the drop-down list, and then you can press **Image**, **Cine**, **P3/P4** key to send the desired data to the DICOM storage server. **Send to Service 1**, **Send to service 2** and **Send to service 3** can be ticked at the same time.
DICOM Print	When defining **Image**, **Cine**, **P3/P4** key, tick **DICOM Print** and select the desired DICOM print server from the drop-down list, and then you can press **Image**, **Cine**, **P3/P4** key to send the desired data to the DICOM print server.
Print Image	When defining **Image**, **Cine**, **P3/P4** key, tick **Print Image** and select the desired print device from the drop-down list, and then you can press **Image**, **Cine**, **P3/P4** key to send the desired data to the DICOM print server.
Print Report	When defining **Image**, **Cine**, **P3/P4** key, tick **Print Report** and select the desired print device from the drop-down list, and then you can press **Image**, **Cine**, **P3/P4** key to print the report.
Retrospective	Tick it to enable retrospective storage for cine storage.
Prospective	Tick it to enable prospective storage for cine storage.
Export Image Format	Set the format for exported image.
Export Cine Format	Set the format for exported cine.
Print&Save Region	Set the print&save region.
Freeze Store Time(s)	Set the storage time for cine after pressing Freeze key.
Image Share Service	Enable or disable the image share feature. Set it to **On**, you can view the image and cine saved in the system through remote access with a computer.
Show End Exam Dialog	Tick it and the prompt text box will automatically appear after you press the **End Exam** key.
Patient info view	Tick it and the **Patient Information** will automatically appear after you press the **End Exam** key.
Current system status	Tick it and the system enters current system status after you press the **End Exam** key.
Probe	Select the desired volume probe.

Item	Description
The default entry option	Set the default inactivated mode. After pressing the **3D/4D** key, the system automatically enters the inactivated 3D or 4D mode when using the volume probe selected from the drop-down list beside **Probe**.
Help	Select the type of user manual from the drop-down list.
Auto key freeze (OB)	Set the feature of the **Auto** key.

4.1.4   Biopsy Settings
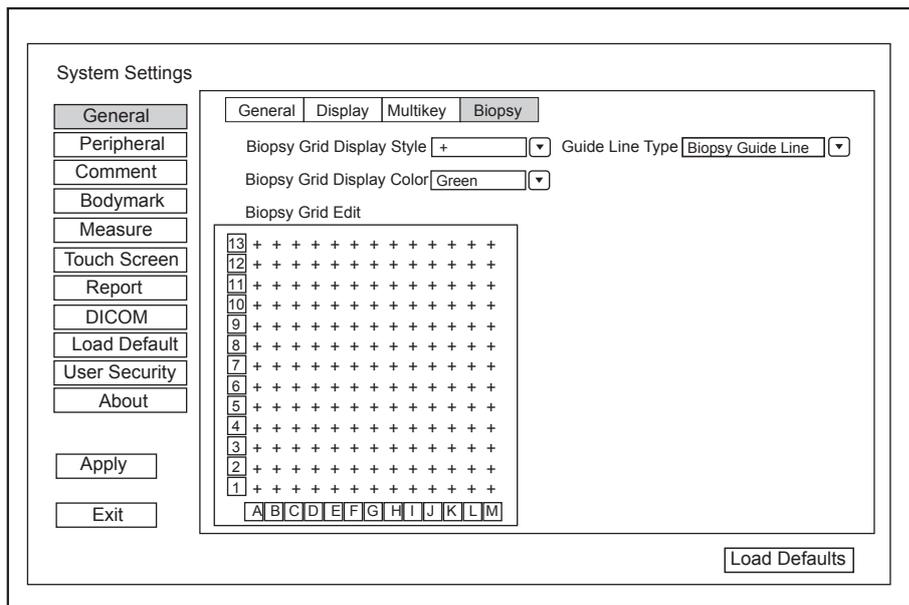
Figure 4-5 General Settings Menu - Biopsy Setting Tab

Item	Description
Biopsy Grid Display Style	Set the display style of the biopsy grid.
Biopsy Grid Display Color	Set the display color of the biopsy grid.
Biopsy Grid Edit	Set the code of the point on the horizontal axis and the vertical axis of the biopsy grid. **NOTE:** The code can be uppercase letters, lowercase letters and numbers. And the numbers include decimals.
Guide Line Type	Set the type of the guide line. ● **Biopsy Guide Line**: One guide line is displayed on the screen during the biopsy. ● **Biopsy Safe Range**: Two parallel guide lines are displayed on the screen during the biopsy. The area between the two parallel guide lines is the safety biopsy range.

4.2   Peripheral Settings

You can make basic and network settings on the Peripheral Settings menu. The wired network will take priority when wired network and wireless network are available at the same time.

Figure 4-6 Peripheral Device Settings Menu

Item	Description
VIDEO/S-VIDEO Output	Set the video output format.
DVI/HDMI Output	Set the DVI/HDMI output resolution.
VGA/RGB Output	Set the VGA/RGB output resolution.
Left Key/Right Key	Set the left key/right key function for foot switch.
Add Printer	Click **Add Printer** to add the desired printer to the printer service list.
Delete Printer	Select the desired printer and click **Delete Printer** to delete it.
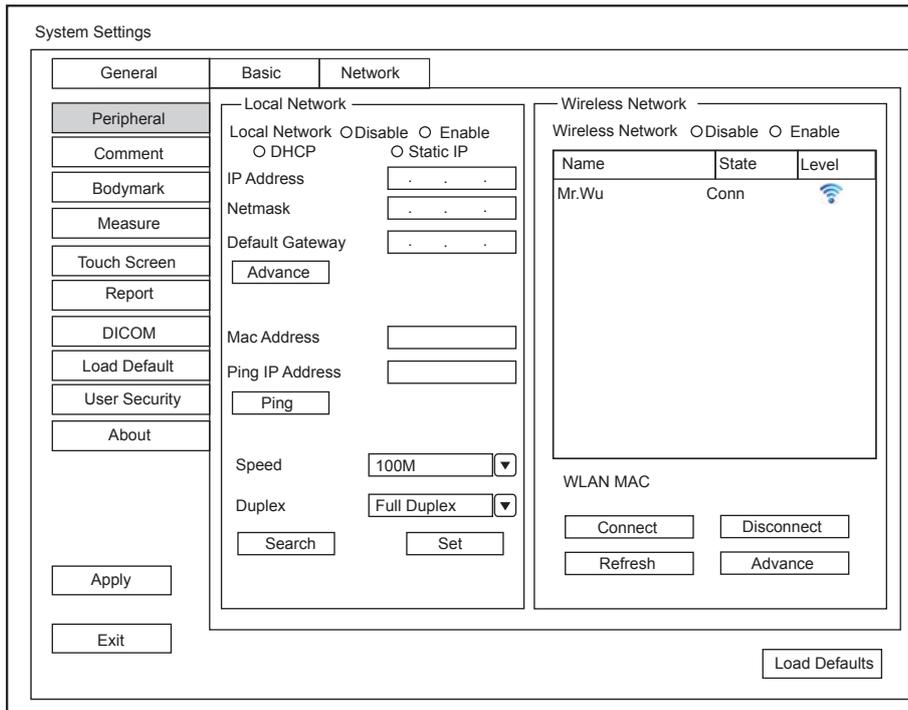
Figure 4-7 Network Settings

■   **Local Network Settings**

Item	Description
Local Network	Enable or disable local network.
DHCP/Static IP	Select an IP address mode.
IP Address	Set the IP address of the system.
Netmask	Set the netmask address of the system.
Default Gateway	Set the gateway address of the system.
Mac Address	View the MAC address of the system.
Ping IP Address	Type an IP address and click **Ping** to test the connection.
Speed/Duplex	Click **Advance**, **Speed** and **Duplex** text boxes are displayed on the menu. You can adjust the settings of these items to change the speed and communication mode of local network. Click **Set** to save the settings, and then you can click **Search** to view your settings.

■   **Wireless Settings**

Item	Description
Wireless Network	Enable or disable access to wireless network.
Name	Displays the name of the wireless network.
Status	Displays the connection status of the wireless network.
Level	Displays the signal strength of the wireless network.

Item	Description
Advance	Click **Advance** to view the information of your current network, and make settings of your local network.

Connect the wireless network as follows:

1. Click **Refresh** to display all wireless networks on the menu.

2. Select the desired wireless network and click **Connect**.

3. Input the password in the pop-up dialogue box if needed and click **OK**.

4.3 Comment Settings

You can add, modify, delete or arrange the predefined annotation on the Comment Settings menu.
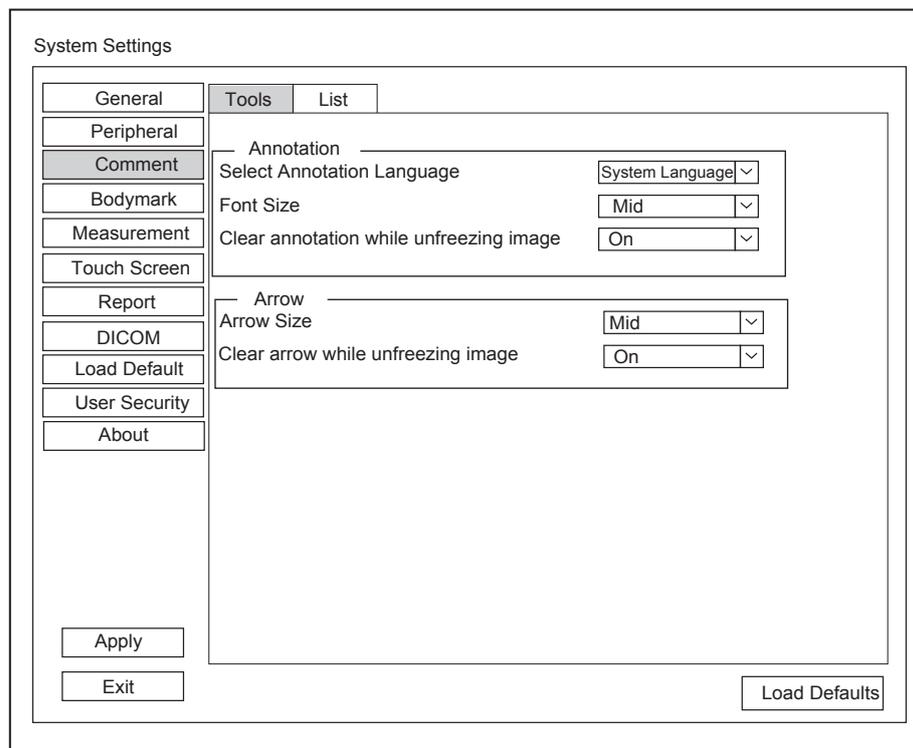
Figure 4-8 Comment Settings

■   **Annotation Settings**

Item	Description
Select Annotation Language	Set the language for text annotation.
Font Size	Set the font size of text annotation.
Clear annotation while unfreezing image	● Set it to **ON**, all annotations will be cleared after you press the ⏭ button while editing annotations. ● Set it to **OFF**, all annotations will not be cleared after you press the ⏭ button while editing annotations.

■   **Arrow Settings**

Item	Description
Arrow Size	Set the size of arrow.
Clear arrow while unfreezing image	● Set it to **ON**, all arrows will be cleared after you press the ⏯ button while editing annotations. ● Set it to **OFF**, all arrows are not cleared after you press the ⏯ button while editing annotations.
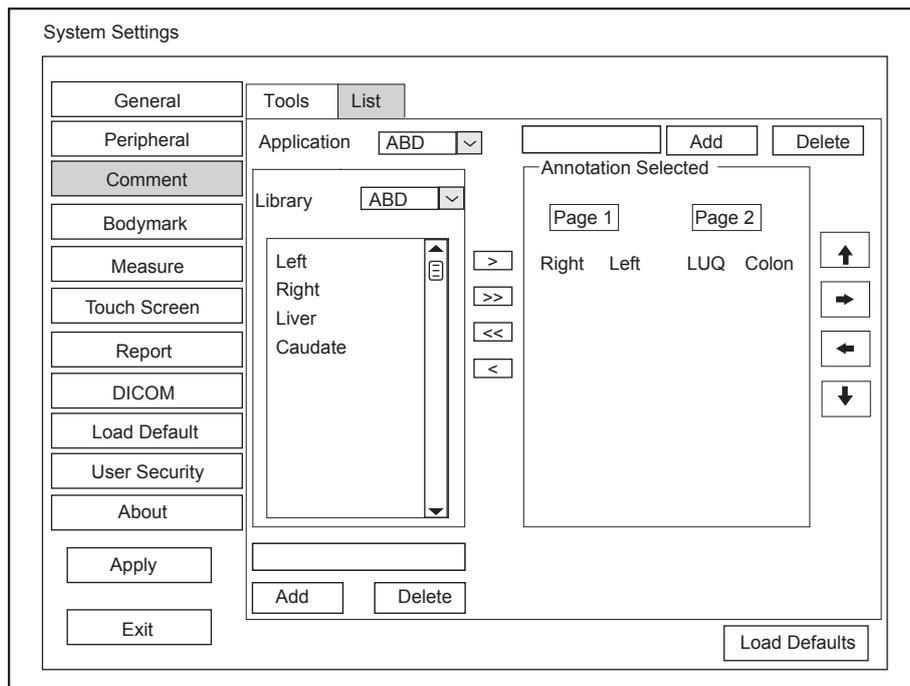
Figure 4-9 Annotation Settings Menu

1. Select an exam type from the drop-down list beside **Application**. Or you can type the name of a new exam type in the text box, and then click **Add** to create a new one, or click **Delete** to delete it.

2. Add desired annotations in the annotation library to the **Annotation Selected** list.

    – Select a body mark and then click > to add it to the **Annotation Selected** list.

    – Click >> to add all the annotations in the annotation library to the **Annotation Selected** list.

    – Select an annotation in the **Annotation Selected** list and click < to remove it from the list.

    – Click << to remove all the annotations from the **Annotation Selected** list.

3. Add or delete annotations created by user.

    – Type a new annotation in the text box, and then click **Add** to the **Annotation Selected** list.

    – Click on a user-defined annotation in the library, and then click **Delete** to delete it from the **Annotation Selected** list.

4. Click on an annotation in the **Annotation Selected** list, and then click ⬆, ⬇, ➡ or ⬅ to arrange its display.

4.4   Body Mark Settings
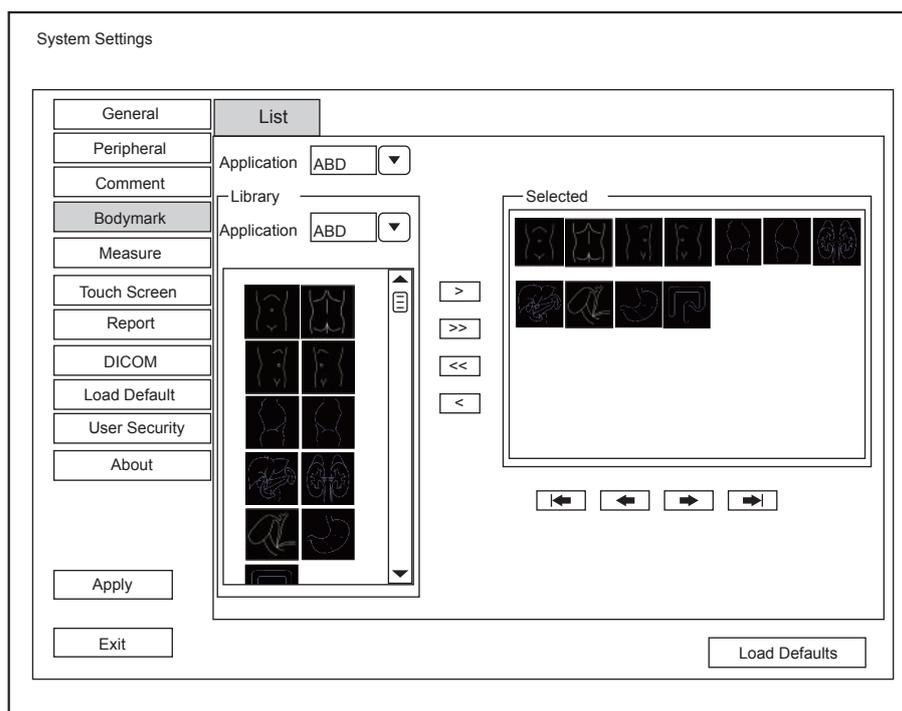
Figure 4-10 Body mark Settings Menu

1. Select an exam type from the drop-down list beside **Application**.

2. Select a body mark library from the drop-down list beside **Application** of **Library**.

3. Add desired body marks in the body mark library to the **Selected** list.
    − Select a body mark and then click > to add it to the **Selected** list.
    − Click >> to add all the body marks in the selected body mark library to the **Selected** list.
    − Select a body mark in the **Selected** list and click < to remove it from the **Selected** list.
    − Click << to remove all the body marks from the **Selected** list.

4. Select a body mark in the **Selected** list and then click |◀, ◀, ▶ or ▶| to arrange its display.

4.5   Measurement Settings

You can adjust measurement settings on the **General**, **Application, List** and **Calculation** tabs.

4.5.1   General Measurement Settings
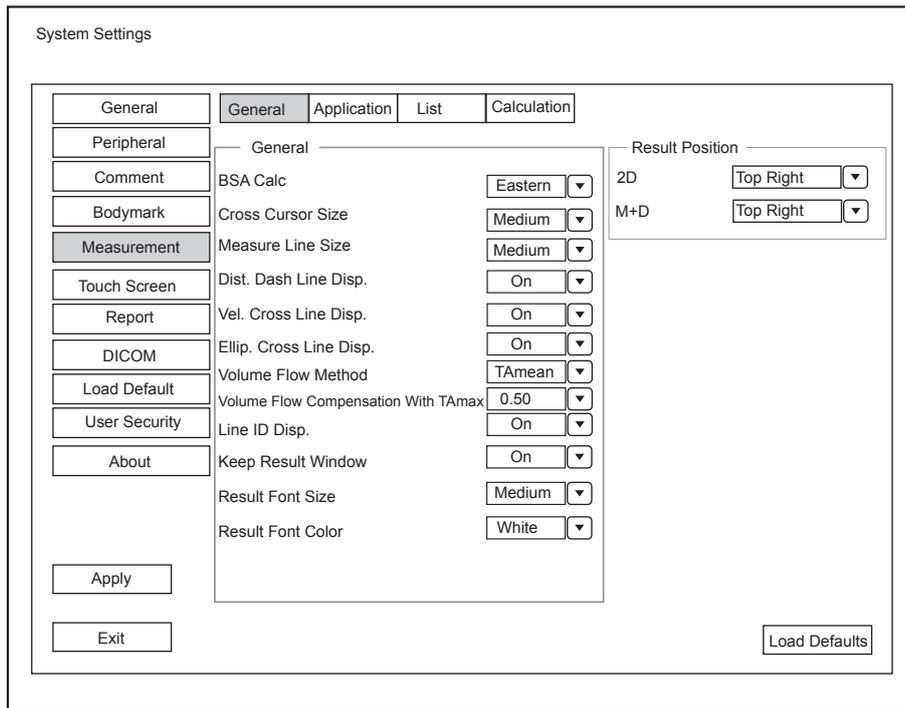
Figure 4-11 Measurement Settings Menu - General Tab

■   **General Measurement Items**

Item	Description
BSA Calc	In accordance with the setting of this item, the system calculates BSA value automatically after you enter the height and weight of the patient on the **Patient Information** screen.
Cross Cursor Size	Set the size of the cross cursor.
Measure Line Size	Set the thickness of the measurement line.
Dist. Dash Line Disp.	Enable or disable the display of a dash line between two points when performing a distance measurement.
Vel. Cross Line Disp.	Enable or disable the display of a reticle between two points when performing a velocity measurement.
Ellip. Cross Line Disp.	Enable or disable the display of dash lines for long and short axes when performing an ellipse measurement.
Volume Flow Method	Set the calculation method of volume flow.
Volume Flow Compensation With TAmax	Set the coefficient for calculation method TAmax.
Line ID Disp.	Enable or disable the display of line number when performing a measurement.
Keep Result Window	Enable or disable the display of the current result box when unfreezing the image.
Result Font Size	Set the font size of the result box.

Item	Description
Result Font Color	Set the font color of the result box.

■   **Result Position**

Item	Description
2D	Set the position of the result box.
M+D	

4.5.2   Application Settings
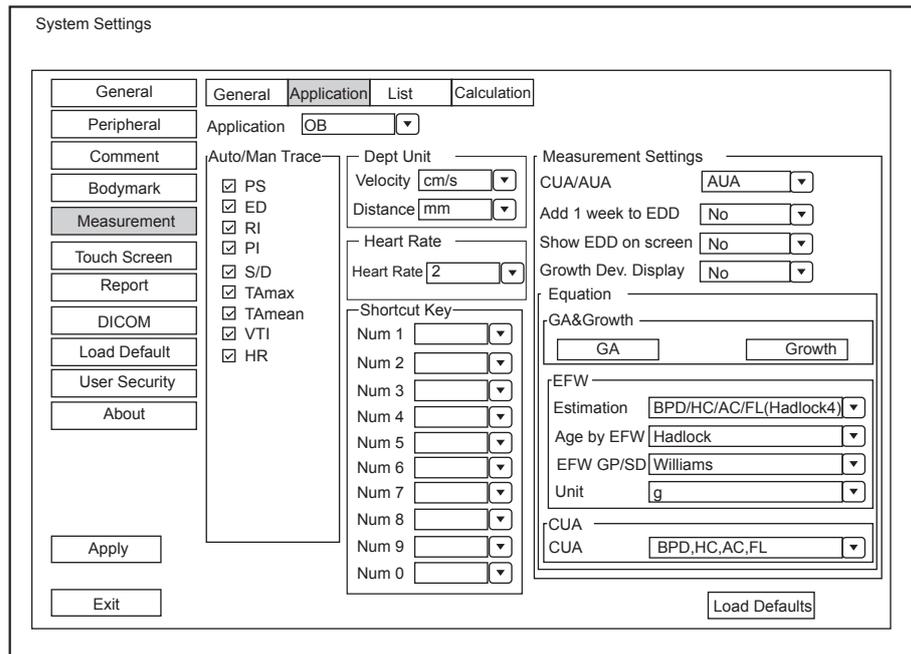
Figure 4-12 Measurement Settings Menu - Application Tab

■   **Auto/Man Trace**

After selecting an exam type from the application drop-down list, set the measurement items of Auto/manual trace in the spectral Doppler mode.

■   **Dept Unit**

Set the unit for velocity and distance.

■   **Heart Rate**

Set the cardiac cycle to calculate the heart rate.

■   **Shortcut Key**

Select **OB, GYN** or **Cardiac** from the drop-down list beside **Application**, and then select a measurement item from the drop-down list beside **Num 0** to **Num 9**. After adjusting these settings, you can perform the Obstetrics, Gynecology or Cardiology measurement by using the defined shortcut key.

■   **Small Parts Measurement Settings**

Select **SMP** from the drop-down list beside **Application** and set the calculation coefficient of the thyroid volume formula.

■   **Obstetrics Measurement Settings**

Set the formula for obstetrics measurement.

Item	Description
CUA/AUA	Set to display CUA or AUA on the measurement report. **CUA** stands for Composite Ultrasound Age, and **AUA** stands for Average Ultrasound Age.
Add 1 week to EDD	Enable to add one week to EDD.
Show EDD on screen	Enable to display EDD in the measured result box.
Growth Dev. Display	Set the display format of GA deviation in the measurement report and growth graph.
Estimation	Set the formula to estimate EFW. If it is set to **None**, the system will not estimate fetal weight and no corresponding value displays on the measurement report.
Age by EFW	Set the formula to estimate GA by EFW. If it is set to **None**, the system will not estimate GA by EFW and no corresponding values are displayed on the measurement report.
EFW GP/SD	Set the formula of the fetal growth curve. If it is set to None, no values of the fetal growth curve are displayed on the measurement report.
Unit	Set the unit of weight.
CUA	Set the CUA formula. If it is set to **None**, the system will not estimate CUA and no corresponding values are displayed on the measurement report.

■   **Equation Settings**

You can customize the formula for gestational age and growth curve.

Perform the following steps as follows:

1. Click **GA** or **Growth** and then the screen shown in Figure 4-13 or Figure 4-14 pops up.

Figure 4-13 GA Table

Figure 4-14 Growth Table

2. Select or fill in the **Measurement**, **Author**, **Deviation** and the corresponding **Unit**.

3. Enter the gestational weeks and the values of measurement items in the table.

4. Click **Save** to save the modification.

5. Click **Add Line** to add a new line to the table. You can also select a line and click **Delete Line** to delete it.

6. Click **Clear All** to clear all the customized settings.

7. Click **Cancel** to cancel the customized formula.

8. Select a storage device from the drop-down list beside **USB**, and then you can click **Import** to import a table from the storage medium, or click **Export** to export the table to the storage device.

9. Click **New** to create a new table.

10. Click **Exit** to exit the screen.

4.5.3   List Settings


```
System Settings

  ┌─────────────────┐    General   Application   List   Calculation
  │    General      │
  ├─────────────────┤    Application  ABD    ▼
  │   Peripheral    │
  ├─────────────────┤         ○ Caliper        ◉ Calc
  │    Comment      │    ┌─List────────────────────────────────────┐
  ├─────────────────┤    │  ◉ B     ○ Color    ○ M    ○ Doppler    │
  │    Bodymark     │    │                                          │
  ├─────────────────┤    │  Category   Collection    Measurement    │
  │   Measurement   │    │  Default    Liver         Length         │
  ├─────────────────┤    │             Port.V.       Height         │
  │  Touch Screen   │    │             Gallbladder   Width          │
  ├─────────────────┤    │             Pancreas                     │
  │     Report      │    │             Spleen                       │
  ├─────────────────┤    │             Kidney                       │
  │     DICOM       │    │             Renal A                      │
  ├─────────────────┤    │             Aorta                        │
  │  Load Default   │    │             Bladder                      │
  ├─────────────────┤    └──────────────────────────────────────────┘
  │  User Security  │
  ├─────────────────┤    ┌─Measurement──────────────────────────────┐
  │     About       │    │  ┌─────┐    ┌──────┐    ┌───────┐         │
  └─────────────────┘    │  │ Add │    │Delete│    │Reorder│         │
                         │  └─────┘    └──────┘    └───────┘         │
  ┌─────────────────┐    └──────────────────────────────────────────┘
  │     Apply       │                              ┌──────────────┐
  └─────────────────┘                              │ Load Defaults│
  ┌─────────────────┐                              └──────────────┘
  │     Exit        │
  └─────────────────┘
```

Figure 4-15 Measurement Settings Menu - List Tab

You can add, delete or reorder the measurement collections and items in each imaging mode of the selected application.

■   **To add a collection or measurement**

Perform the following steps as follows:

1.   Select an exam type from the drop-down list beside **Application**.

2.   Select **Caliper** or **Calc**.

3.   Select the measurement category in the List frame and click the Collection or Measurement.

4.   Click **Add** to add the desired collection or measurement on the pop-up screen.

5.   Click **Close** to complete.

■   **To delete a collection or measurement**

Perform the following steps as follows:

1.   Select an exam type from the drop-down list beside **Application**.

2.   Select **Caliper** or **Calc**.

3.   Select an imaging mode in the **List** frame and select the collection item or measurement item that you wish to delete.

4.   Click **Delete**.

■   **To reorder the list of collections or measurements**

Perform the following steps:

1.   Select an exam type from the drop-down list beside **Application**.

2. Select **Caliper** or **Calc**.

3. Select an imaging mode in the **List** frame and click **Collection** or **Measurement**.

4. Click **Reorder** and adjust the sequence of the collection or measurement on the pop-up screen.

4.5.4   Calculation Settings

Figure 4-16 Calculation Settings

You can set the calculation formula in the calculation screen by performing the following steps.

1. Select an exam type from the drop-down list, and the corresponding calculation items appear in the **Calc List**.

2. Click **New**, and you can enter the calculation formula in the pop-up edit text boxes and add it in the **Calc List**.

3. Select a calculation item from the **Calc List** and click **Copy**, and then you can click **Done** in the pop-up dialogue box to copy the calculation item.

4. Select a calculation item from the **Calc List** and click **Edit**, and then you can edit the calculation item.

5. Select a calculation item from the **Calc List** and click **Delete**, and then you can delete the calculation item.

6. Tick **Show calc in the Result box**, and then the calculation item will be displayed in the result box.

4.6   Touch Screen Settings
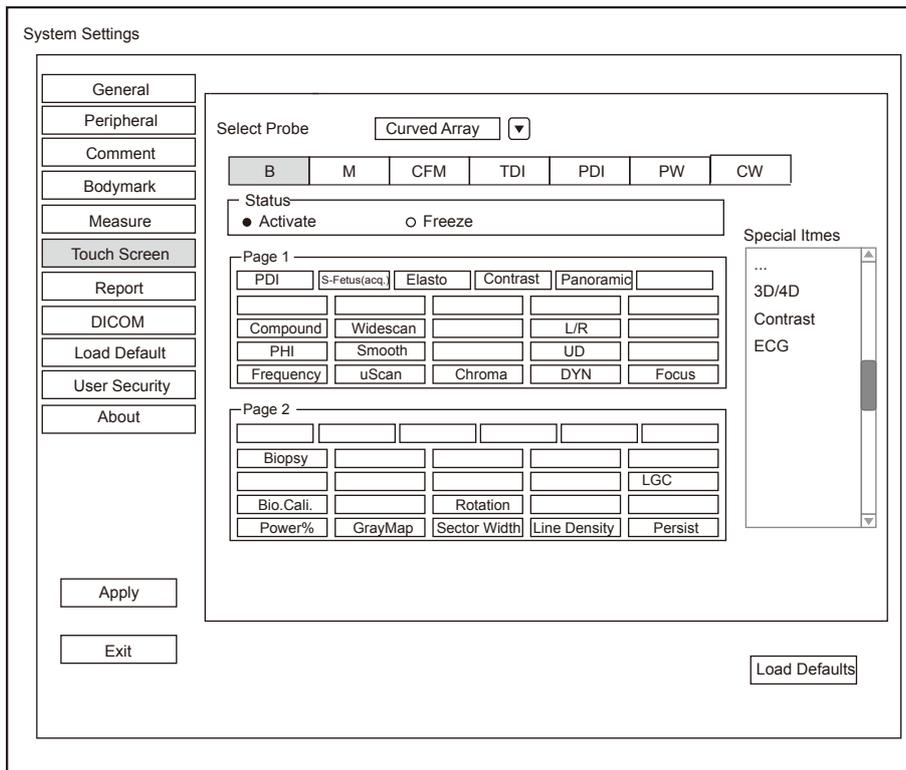
Figure 4-17 Touch Screen Menu

You can add, modify, delete the parameter displayed on the first or second page of the touch screen after selecting probe type, exam type and imaging mode.

■   **Add a Parameter**

Click a blank box, and then click the desired parameter in the **Special Items** list to add it.

■   **Modify a Parameter**

Click a parameter, and then click the desired parameter in the **Special Items** list to replace it.

■   **Delete a Parameter**

Click a parameter, and then click **...** in the **Special Items** list to delete the desired parameter.

4.7 Report Settings

```
┌─────────────────────────────────────────────────────────────────────┐
│ System Setting                                                        │
│  ┌────────────────┐   ┌─ Logo ─────────────────────────────────────┐ │
│  │   General      │   │                                            │ │
│  ├────────────────┤   │  ┌──────────────┐      ┌──────────────┐    │ │
│  │   Peripheral   │   │  │              │      │ Import/Export│    │ │
│  ├────────────────┤   │  │              │      └──────────────┘    │ │
│  │   Comment      │   │  └──────────────┘                          │ │
│  ├────────────────┤   │      bmp: 170×60                           │ │
│  │   Bodymark     │   │  ┌────┐   1×1   ┌────┐                     │ │
│  ├────────────────┤   │  │ << │        │ >> │                     │ │
│  │   Measure      │   └──└────┘────────└────┘────────────────────┘ │
│  ├────────────────┤   ┌─ Title/Font/Color ─────────────────────────┐ │
│  │  Touch Screen  │   │ Title 1 [_____][24▼] Title    [24▼] │ │
│  ├────────────────┤   │ Title 2 [_____][20▼] Subtitle [20▼] │ │
│  │   Report       │   │ Title 3 [_____][20▼] Background Color [__] │ │
│  ├────────────────┤   │ Content            [12▼] Text Color  [■■] │ │
│  │   DICOM        │   └────────────────────────────────────────────┘ │
│  ├────────────────┤   ┌─ Display Items For Report ─────────────────┐ │
│  │  Load Default  │   │ ☑ Patient Information   [Patient information] │ │
│  ├────────────────┤   │ ☑ Exam Information      [Exam information]  │ │
│  │  User Security │   │ ☑ Measurement           [Measurements]     │ │
│  ├────────────────┤   │ ☑ Images                [Images]    [2x2 ▼]│ │
│  │   About        │   │ ☑ Graphs                [Graphs]    [2x2 ▼]│ │
│  └────────────────┘   │ ☑ Comment               [Conclusion]       │ │
│                       └────────────────────────────────────────────┘ │
│  ┌────────────────┐   ┌──────────┐              ┌──────────────┐      │
│  │   Apply        │   │ Preview  │              │ Load Defaults│      │
│  ├────────────────┤   └──────────┘              └──────────────┘      │
│  │   Exit         │                                                   │
│  └────────────────┘                                                   │
└─────────────────────────────────────────────────────────────────────┘
```

Figure 4-18 Report Settings Menu

Item	Description
Import/Export	Connect the USB drive containing the report logo (170×60 pixels, bmp format) to the system. Operation Logo is highlighted after the USB drive is successfully detected by the system. Click **Import/Export**, and then click the desired logo in the pop-up dialogue box to add the logo. If there is more than one logo, you can click ⬅ or ➡ to select the desired logo.
Title 1 Title 2 Title 3	Input the title name in the textbox and then set the font size using the drop-down list.
Title	Set the font size of the headline.
Subtitle	Set the font size of the subtitle.
Context	Set the text font size.
Background Color	Set the background color of the measurement report.
Text Color	Set the text color.
Display Items for Report	Select items to be displayed on the measurement report. Patient and exam information is displayed on the report by default. Other information can also be displayed on the report after you tick **Measurements**, **Image**, **Graphs** or **Comment**.

After settings, you can click **Preview** to preview the report. Press the **Freeze** button on the control panel to exit.

4.8   Configuring DICOM

4.8.1   Server Settings

You can add, edit or delete DICOM servers and test connectivity on the **Services** tab.

- Click **Add**, and select a DICOM server type and input server information in the pop-up dialog box. Click **Confirm** to add a new DICOM server. The created DICOM server will be listed on the **Service List**.

- Select the desired DICOM sever in the **Service List**, click **Edit**, and edit server information in the pop-up dialog box.

- Select the desired DICOM sever in the **Service List** and click **Delete** to delete the server.

- Select the desired DICOM sever in the **Service List**, and click **Ping** to test network connection. Or, click **Verify** to test the connection between the system and the DICOM server.
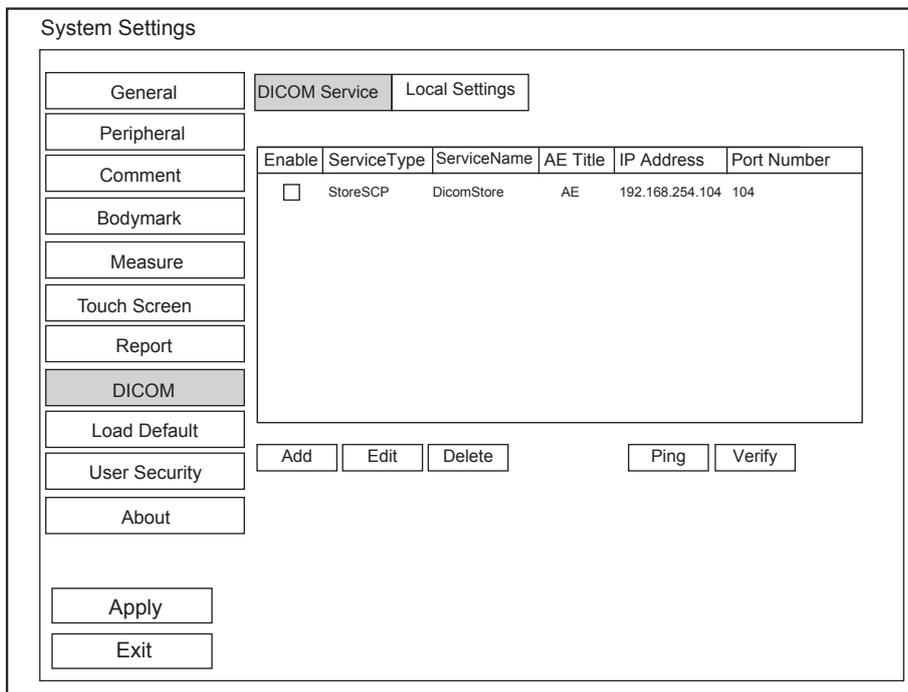
Figure 4-19 DICOM Services Settings Screen

■   **Storage Server Settings**
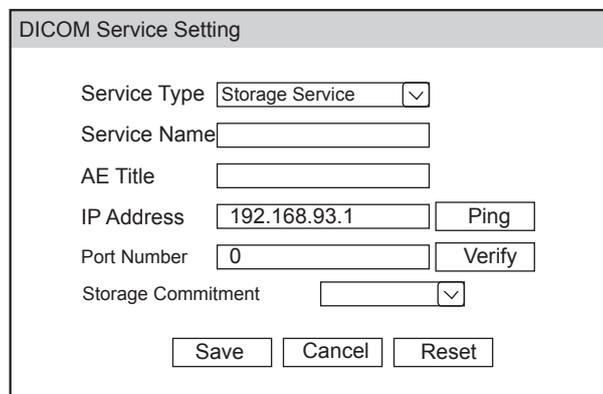
Item	Description
Service Name	Enter the name of the DICOM storage server.
AE Title	Set the Application Entity (AE) title of the DICOM storage server.
IP Address	Set the IP address of the DICOM storage server. Click **Ping** to test the connection.
Port Number	Set the port number of the DICOM storage server.
Storage commitment	Set the DICOM commitment storage server.

After finishing the settings, click **Verify** to verify the connection between the system and the DICOM storage server. And a dialog box pops up if it is successfully connected.

■   **Structured Report Server Settings**

DICOM Service Setting

Service Type   Structure report ▽
Service Name   [   ]
AE Title   [   ]
IP Address   192.168.93.1   Ping
Port Number   0   Verify
Storage Commitment   ▽

Save   Cancel   Reset

Item	Description
Service Name	Enter the name of the DICOM structured report server.
AE Title	Set the Application Entity (AE) title of the DICOM structured report server.
IP Address	Set the IP address of the DICOM structured report server. Click **Ping** to test the connection.
Port Number	Set the port number of the DICOM structured report server.
Storage commitment	Set the DICOM commitment storage server.

After finishing the settings, click **Verify** to verify the connection between the system and the DICOM structured report server. And a dialog box pops up if it is successfully connected.

■ **Storage Commitment Server Settings**

```
┌─────────────────────────────────────────────────┐
│ DICOM Service Setting                            │
│                                                  │
│     Service Type    [Storage Committment ∨]      │
│     Service Name    [                  ]         │
│     AE Title        [                  ]         │
│     IP Address      [192.168.93.1  ]  [ Ping ]   │
│     Port Number     [0             ]  [ Verify ] │
│                                                  │
│          [ Save ]  [ Cancel ]  [ Reset ]         │
│                                                  │
└─────────────────────────────────────────────────┘
```

Item	Description
Service Name	Enter the name of the DICOM commitment storage server.
AE Title	Set the Application Entity (AE) title of the DICOM commitment storage server.
IP Address	Set the IP address of the DICOM commitment storage server. Click **Ping** to test the connection.
Port Number	Set the port number of the DICOM commitment storage server.

After finishing the settings, click **Verify** to verify the connection between the system and the DICOM storage commitment server. And a dialog box pops up if it is successfully connected.

■ **Worklist Server Settings**

```
┌─────────────────────────────────────────────────┐
│ DICOM Service Setting                            │
│                                                  │
│     Service Type    [Worklist          ∨]        │
│     Service Name    [                  ]         │
│     AE Title        [                  ]         │
│     IP Address      [192.168.93.1  ]  [ Ping ]   │
│     Port Number     [0             ]  [ Verify ] │
│     Exam Type       [Only Ultrasound  ∨]         │
│     Query Date      [This Week    ∨]             │
│     Max Results     [100           ]             │
│          [ Save ]  [ Cancel ]  [ Reset ]         │
│                                                  │
└─────────────────────────────────────────────────┘
```

Item	Description
Service Name	Enter the name of the DICOM worklist server.
AE Title	Set the Application Entity (AE) title of the DICOM worklist server.
IP Address	Set the IP address of the DICOM worklist server. Click **Ping** to test the connection.
Port Number	Set the port number of the DICOM worklist server.

Item	Description
Exam Type	Set the type of worklist that can be searched automatically for information.
Query Date	Set the time range of worklist that can be searched automatically for information.
Max Results	Set the maximum number of patient records that can be sent to the system.

After finishing the settings, click **Verify** to verify the connection between the system and the DICOM worklist server. And a dialog box pops up if it is successfully connected.

■　　**MPPS (Modality Performed Procedure Step) Server Settings**

Item	Description
Service Name	Enter the name of the DICOM worklist server.
AE Title	Set the Application Entity (AE) title of the DICOM worklist server.
IP Address	Set the IP address of the DICOM worklist server. Click **Ping** to test the connection.
Port Number	Set the port number of the DICOM worklist server.
Storage service	Set the related DICOM storage server.
SR server	Set the related DICOM structured report server.

After finishing the settings, click **Verify** to verify the connection between the system and the DICOM MPPS server. And a dialog box pops up if it is successfully connected.

■   **Query Retrieve Settings**

```
┌──────────────────────────────────────────┐
│ DICOM Service Setting                      │
│                                            │
│  Service Type    [Query Retrieve    ▽]     │
│  Service Name    [            ]             │
│  AE Title        [            ]             │
│  IP  Address     [            ]  [ Ping ]   │
│  Port Number     [            ]  [Verify]   │
│  Max Results         [        ]            │
│                                            │
│           [ Save ] [ Cancel ] [ Reset ]    │
└──────────────────────────────────────────┘
```

Item	Description
Service Name	Set the server name of target ultrasound system that retrieve patient information of the DICOM query retrieve server.
AE Title	Input the Application Entity (AE) title of target ultrasound system that retrieve patient information of the DICOM query retrieve server.
IP Address	Input the IP address of target ultrasound system that retrieve patient information of the DICOM query retrieve server. Click Ping to test the connection.
Port Number	Input the port number of target ultrasound system that retrieve patient information of the DICOM query retrieve server.
Max Results	Set the maximum number of patient records that can be sent to the system.

After finishing the settings, click **Verify** to verify the connection between the system and the DICOM query retrieve server. And a dialog box pops up if it is successfully connected.

■   **Print Server Settings**

```
┌────────────────────────────────────────────────────────────┐
│ DICOM Service Setting                                        │
│                                                              │
│  Services        [ Print              ▽]                     │
│  Service Name    [                  ]                        │
│  AE Title        [ undefine         ]                        │
│  IP Address      [ 192.168.93.1     ]   [ Ping ]             │
│  Port Number     [ 0                ]   [ Verify ]           │
│  ┌─ Print Advance Config ──────────────────────────────────┐│
│  │ Format        [1x1       ▽]  Trim          [Yes     ▽]   ││
│  │ Prority       [LOW       ▽]  Border        [Black   ▽]   ││
│  │ medium        [Clear Film▽]  Empty image   [Black   ▽]   ││
│  │ orientation   [Portrait  ▽]  Color         [Color   ▽]   ││
│  │ film size     [8INx10IN  ▽]  Min density   [20      ▽]   ││
│  │ Film destination[Magazine▽]  Max density   [320     ▽]   ││
│  │ Mangnification[Replicate ▽]  Configure information[   ]  ││
│  │ Copies        [1         ]   Film session label  [    ] ││
│  │ Smoothing type[1         ]                               ││
│  └──────────────────────────────────────────────────────────┘│
│           [ Save ]   [ Cancel ]   [ Reset ]                  │
└────────────────────────────────────────────────────────────┘
```

Item	Description
Service Name	Enter the name of the DICOM printer server.
AE Title	Set the Application Entity (AE) title of the DICOM printer server.
IP Address	Set the IP address of the DICOM printer server. Click **Ping** to test the connection.
Port Number	Set the port number of the DICOM printer server.
Format	Set the print format.
Trim	Set print or not print a crop box around each image.
Priority	Set the print job priority.
Border	Set the color of the border to fill in the gap between the images.
Medium	Select the print medium.
Empty image	Set the color of the empty images.
Orientation	Set the print orientation.
Color	Set the color of the image.
Film size	Set the film size.
Min density	Set the minimum density level of the film.
Film destination	Set the film destination. ● Set it to **MAGAZINE**, the image will be stored in a film magazine. ● Set it to **PROCESSOR**, the image will be processed in a film processor.
Max density	Set the maximum density level of the film.
Magnification	Set the method used for magnifying images during printing.
Configure information	Make special image quality settings.
Copies	Set the number of copies to print.
Film session label	Enter a name to be applied on a group of the film labels.
Smoothing type	Set the value of magnification interpolation for the printer.

After finishing the settings, click **Verify** to verify the connection between the system and the DICOM print server. And a dialog box pops up if it is successfully connected.

4.8.2   Local Settings
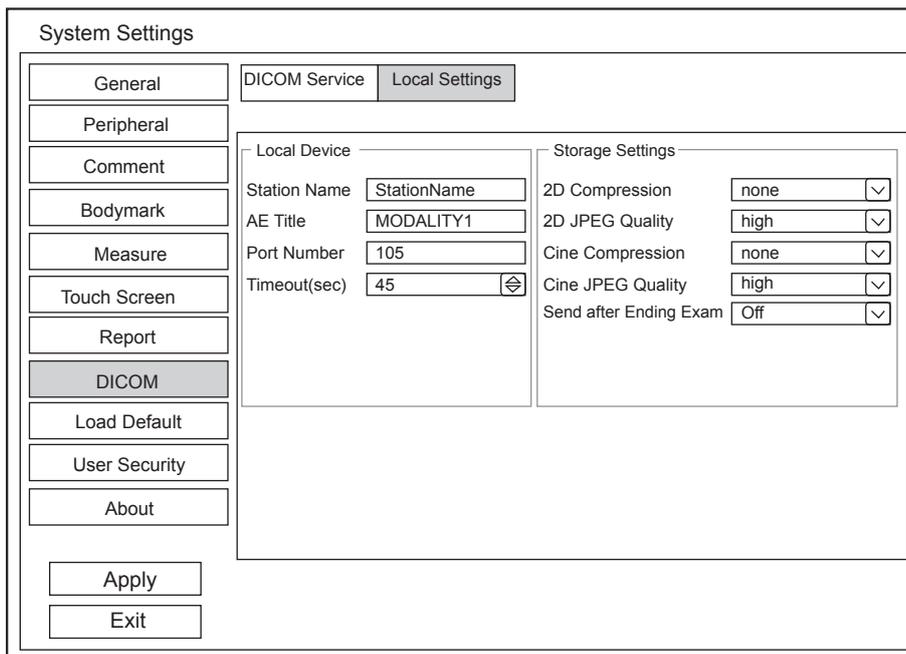
Figure 4-20 DICOM Local Settings Screen

■   **Local Device Settings**

Item	Description
Station Name	Enter the name of the system.
AE Title	Set the Application Entity (AE) title of the system.
Port Number	Set the port number of the system.
Timeout(sec)	Set the time limit for connecting to the system.

■   **Storage Settings**

Item	Description
2D Compression	Set the compression format for images.
2D JPEG Quality	Set the compression quality for images.
Cine Compression	Set the compression format for cines.
Cine JPEG Quality	Set the compression quality for cines.
Send after Ending Exam	Set this item to **On** and the system sends all saved images to the DICOM storage server after the exam is completed.

4.9   Defining System Defaults

You can define your system defaults on the Loading Defaults menu.
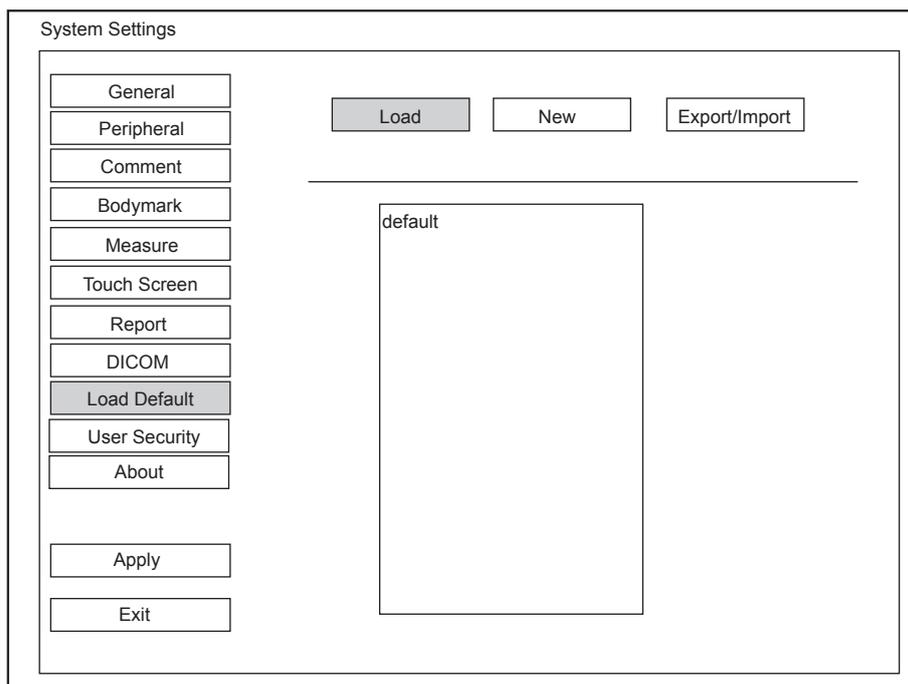
Figure 4-21 Loading Defaults Menu

■　**Loading System Defaults**

1. Click **Load**, select a setting name and then a dialogue box appears.

2. Click **Load** to confirm and begin loading;

   Or, click **Cancel** to cancel loading;

3. Select **OK** to confirm it.

■　**Creating System Defaults**

Click **New**, enter a setting name in the text box, then click the **New** button below the textbox. The created setting name will be listed on the Load Defaults menu.

■　**Exporting or Importing System Defaults**

Click **Export/Import** to enter the following menu.
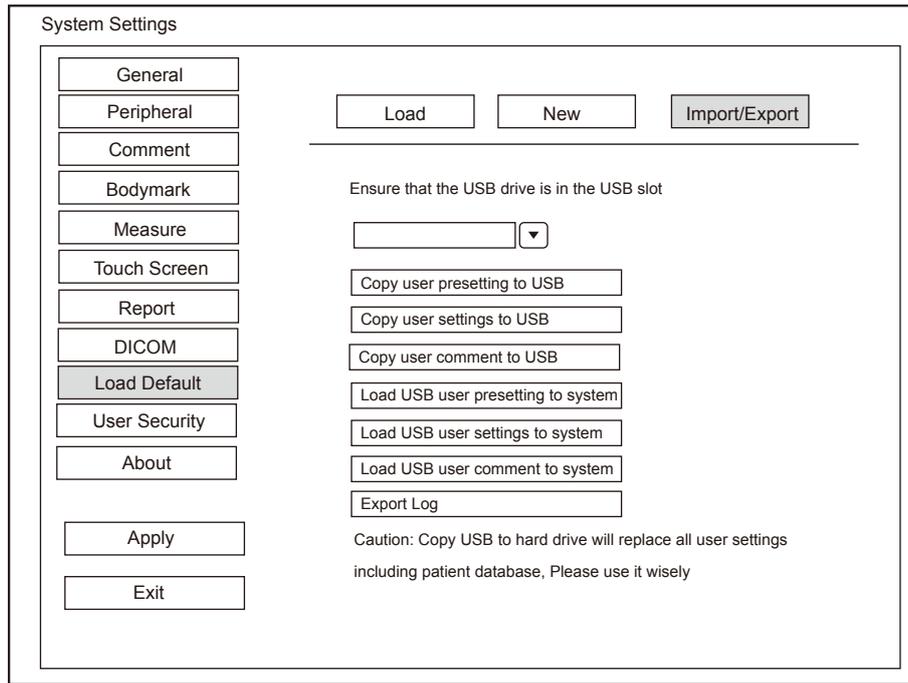
Figure 4-22 Export/Import System Defaults Screen

Ensure the USB drive is connected to the system before exporting or importing the system defaults.

- Click **Copy user setting to USB** to back up the system defaults to the USB drive.
- Click **Copy user preset to USB** to back up the customized system defaults to the USB drive.
- Click **Load USB user setting to system** to copy the system settings to the system.
- Click **Load USB user preset to system** to copy the customized system to the system.
- Click **Export Log** to export the log to the USB drive.

4.10   User Security

The user security settings can be used to protect patient data and the feature is disabled by default. If the feature is enabled, user can log in the system by the following two ways.

- Account Login

  Account login contains administrator account login and ordinary user account login. User can log in the system by inputting user name and password. When you enter the system, the 🔒 icon pops up on the main screen. Click the 🔒 icon to lock the current user or switch to other users.

- Emergency Login

  User can log in the system through emergency mode without inputting user name or password. But user can not access previous patient data in the system.

4.10.1   User Settings
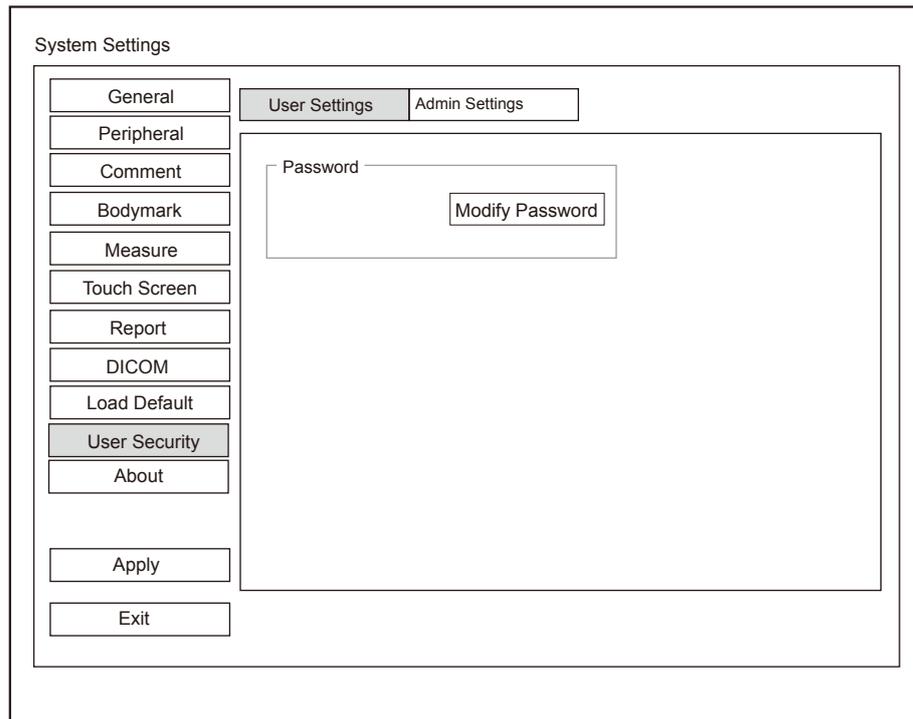
Figure 4-23 User Settings Screen

Ordinary user can modify password on **User Settings** tab.

4.10.2   Administrator Settings

Only administrator account can enter **Admin Settings** tab. The default administrator name is Admin, and the password is Sonoscape123.

NOTE:

It's recommended to modify the password after the administrator logs in the system for the first time.

Figure 4-24 Administrator Settings Screen

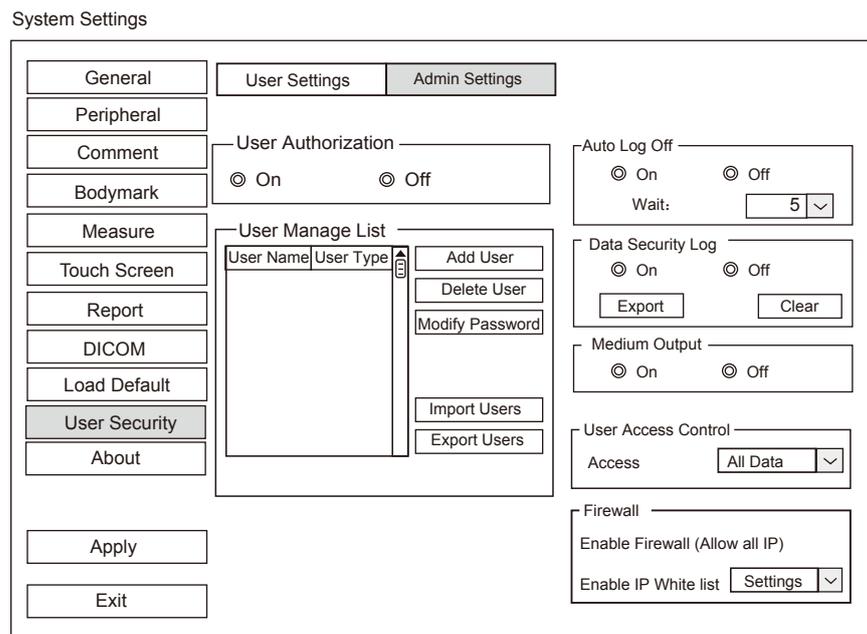| Item	Description
User authorization	User can enable or disable the user authorization function on Admin Settings tab. When user authorization function is enabled, user should input the user name and password on login screen.
Account management list	Add user: Click **Add User,** input the user name and set the password in the pop-up dialog box. **NOTE:** • Only ordinary user account can be added. • Password must contain 8 -16 characters, at least including two combinations of number, letter or special character. Letters are case-sensitive. Delete user: Click **Delete User** and delete the selected user according to the system prompt. Modify password: Click **Modify Password** and modify the selected password according to the system prompt. Import users: Click **Import Users**> **Import to Medium** on the pop-up dialog box, and click **Import**. **NOTE:** Only account data exported from the system in the same series models produced by the manufacturer can be imported. Export users: Click **Export Users** > **Export to Medium** on the pop-up dialog box, and click **Export**.
Auto lock off	User can enable or disable the auto logout function. Set the wait time before the system log out automatically when the system is idle. If the system is idle for a set period of wait time, the system will automatically lock the current user and return to the login screen.
Data security log	Data security log is used to record the operation performed by user, including login, logout, patient data viewing, modification, export, and operation time, date and user name, but no patient information will be recorded. Only administrator can export data security log to an external storage device or delete the data security log.
Medium export	When user authorization function is enabled, administrator can enable or disable the medium output feature. **NOTE:** When the user authorization function is disabled, the medium output is enabled by default.
User access control	User access control is used to set the access authorization for patient data. ● If **All Data** is selected, both administrator and ordinary user can access all patient data. ● If **Private Data** is selected, administrator can access all patient data and ordinary user can only access the patient data collected by the user itself.

Item	Description
Firewall	Firewall is used to set the access authorization for IP address when user authority feature is enabled. - Tick **Enable Firewall (Allow all IP)**, and then all IP address can access the system. - Tick **Allow IP white list**, and then click **Settings** to set the IP address allowed to access the system in the pop-up dialogue box.

4.11   Viewing System Information

You can view the system information, acoustic output data and function configuration on the **system information** menu.

4.11.1   General Information

You can view the current hardware version, the software version and the control number on the **General** tab. The control number is a unique identification code for the system.

4.11.2   Acoustic Output

You can view the acoustic output data of probes in different modes on the **Acoustic Output** tab.

4.11.3   Function Configuration

You can view the function configuration of the system on the **FunctionConfig** tab.

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5   Preparing for an Exam

You can start an exam without entering any patient information. To avoid patient identification errors, you should always verify the identification information with the patient.

5.1   Acquiring Patient Information

You can acquire the patient information in the following instructions:

- Create new patient information
- Retrieve archived patient information
- Receive patient information using the DICOM worklist

5.1.1   Beginning a New Patient

Press the **Patient** key on the control panel to display the **Patient Information** screen.

Figure 5-1 New Patient Screen

NOTE:

You can move the cursor by using the trackball, and then press Set Key on the control panel to select the desired item.

Perform the following steps to begin a new patient.

1. Enter relevant patient information

| Patient ID | Enter the patient ID. The system will generate the patient ID automatically according to the current system time if this item is left blank. |

NOTE:

The patient ID is an important identification. Once it is saved, you cannot modify it.

Name	Enter first name, middle name or last name of the patient.
DOB	Enter the date of birth for the current patient. You can set **Date Format** on the **General Settings** menu.
Age	The patient's age will be automatically calculated if you enter the information in the **DOB** textbox.
Sex	Enter the gender for the current patient.
Accession#	Enter the exam ID for the current patient, special characters are prohibited to be entered.
Weight and Height	Enter the weight and height for the current patient.
BSA	The system will automatically calculate the body surface area after you enter the weight and height. You can select the calculation formula from the corresponding drop-down list.
BP	Enter the blood pressure for the current patient.
Comments	Make comments for the current patient.

2. Select the exam type

Exam type	Select an exam type for the current patient, including Abdomen, Obstetrics, Gynecology, Cardiology, Vascular, Urology, Small Parts, Pediatrics, Musculoskeletal, Neurology, Orthopedics and others.
Description	Enter the information related to the exam type.
Primary Indications	Enter the related information manually.
Secondary Indications	Enter the related information manually.

NOTE:

- You must enter the height and weight for the current patient when you select Cardiology as the exam type. **BSA** will be automatically calculated in accordance with the **BSA** setting on the **General Settings** menu.
- You must enter LMP or EDD for the current patient when you select Obstetrics as the exam type. **AUA** will be automatically calculated.

3. Enter the related operating information

| Refering.M.D/Performing.M.D/Sonographer | Enter the name. |
| Comment | Enter the notice or necessary information. |

4. Click **OK** to save the modifications.
    - Click **Hide Patient Info**, the patient ID and patient name will not be displayed on the screen.
    - Click **Clear Data** to delete the patient information and exam information of current application.

- Click **Cancel** to abort editing the patient information and exit the **Patient Information** screen.

If the last exam is not ended, you can select the end status for the last patient in the pop-up dialogue box. For details, refer to 5.3.2 Discontinuing an Exam.

5.1.2   Retrieving Archived Information

You can retrieve the archived information by choosing the **Patient** button >the **Patient List**.

Figure 5-2 Exam Review Screen

Perform the following steps to retrieve information.

1. Search for the archived information

    Select the search requirements from the drop-down list beside **Item**, such as Patient ID, Patient Name, Age, Gender, Before, After, Interval and Exam type, enter the desired requirement in the pop-up text box, and then the desired information will be displayed in the list.

2. Select the desired information

    Move the cursor to the desired information, and press Set Key on the control panel to select it.

3. Exam the desired patient

    Click **New Exam** to start a new exam.

5.1.3   Using DICOM Worklist

You can acquire the patient information using the DICOM worklist if the system is configured with the DICOM module. For details, refer to Section 13.4 DICOM Worklist.

5.2   Pausing/Resuming/Activating an Exam

5.2.1   Pausing an Exam

Press the **Patient** button on the control panel to enter the **Patient Information** screen, and click **Suspend Exam** to pause the exam of the current patient.

5.2.2   Resuming an Exam

1. Press the **Patient** button on the control panel to enter the **Patient Information** screen, and click **Patient List** to enter the **Exam List** screen.

2. Select the desired exam type, and then click **Resume Exam** to resume the exam.

   Click **New Exam** to continue the current exam.

5.2.3   Activating an Exam

1. Press the **Patient** button on the control panel to enter the **Patient Information** screen, and click **Patient List** to enter the **Exam List** screen.

2. Select the desired exam type, and then click **Activate Exam** to activate the exam.

   NOTE:

   You can set the maximum time allowed to activate an exam in the **Display** tab in General settings.

5.3   Completing/Discontinuing an Exam

5.3.1   Completing an Exam

Perform the following steps.

1. Press the **End Exam** button on the control panel.

2. Click **OK** to end the exam.

5.3.2   Discontinuing an Exam

Perform the following steps.

1. Press the **Patient** button on the control panel to enter the **Patient Information** screen and then click **Patient List** to enter the **Exam List** screen.

2. Click **PPS Screen**, and click **Discontinued** in the pop-up PPS screen to end the exam.

6   Acquiring Images

You can acquire images by optimizing the relevant parameters for clinical diagnosis.

6.1   Selecting a Probe and an Exam Type

Once the system is started up, the monitor displays the background desktop, and the touch screen displays the available probes and the exam types (as shown in Figure 6-1). You can press the **Probe** button on the control panel to return to the following mode when you enter other screens. The system automatically enters the basic screen after you select the desired probe and exam type by tapping the touch screen.

NOTE:

Ensure the probe model and icon displayed on the application mode screen are consistent with the connected probe. If a problem is found, check that the probe is connected to the system firmly. If the problem still exists, please stop using the system immediately and contact the manufacturer.
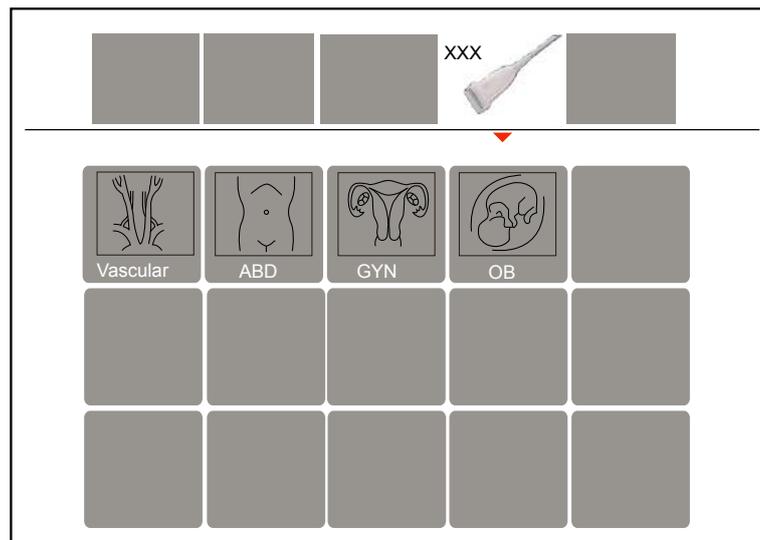
Figure 6-1 Application Mode Screen

■   **To save the application mode**

You can also make modifications in an exam type and save them as an application preset for future use. Moreover, the layout of the application mode screen can be modified and factory defaults can be restored.

■   **To use the teaching software**

The teaching software is used to view the operation diagram and other information of the exam. The user-defined key can be set as **Sono-help** on the **System Settings** > **General** menu > **Multikey** tab and press the key to enter the Sono-help menu. Click **Exit** or press the key again to exit the menu.

Real-time Ultrasound Image

Exam Type Selection

Liver
By subxiphoid
By right intercostal space
By below right costal margin
By right chest wall

Study Section
> Sagittal view
By abdominal aorta long axis
> Inferior vena cava view
Trans
Second liver portal view
Transverse pancreas views

Section Selection

Exit

Operating Technique Figure

Lt-Lobe

Anatomical Position Drawing

Demonstration

Figure 6-2 Sono-help Screen

6.1.1   Customizing a Preset

1. Select the desired probe and exam type.

2. Select an imaging mode and optimize the image.

    NOTE:

    Parameter optimizing is only available for the current imaging mode.

3. Press the **S** key on the key panel and then a dialogue box pops up.

4. Click **Yes** to enter the **User Presetting Menu** screen.

User Presetting Menu

Create presetting

Exam Display

Probe   XXX

Exam Name

Exam Type   Vascular   ▼

Exam Icon   C-Vascular ▼

Create Exam   Replace Exam

Exit
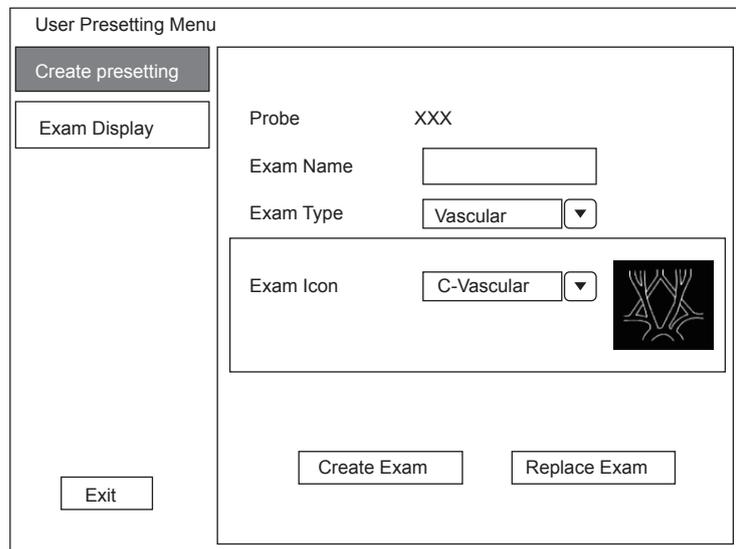
Figure 6-3 User Presetting Menu

5. Enter the name of the application preset in the **Exam Name** text box.

6. Select the application and exam type from the **Exam Type** and **Exam Icon** lists.

7. Click **Create Exam** to create application preset.

    If the name of the application preset exists, you can click **Replace Exam** to replace it.

6.1.2 Arranging the Presets Display

Click **Exam Display** to arrange presets display. The customized application presets, not the system application presets, can be also deleted.

NOTE:

An exam type suffixed with (s) is a system application preset, suffixed with (u) is a customized application preset.
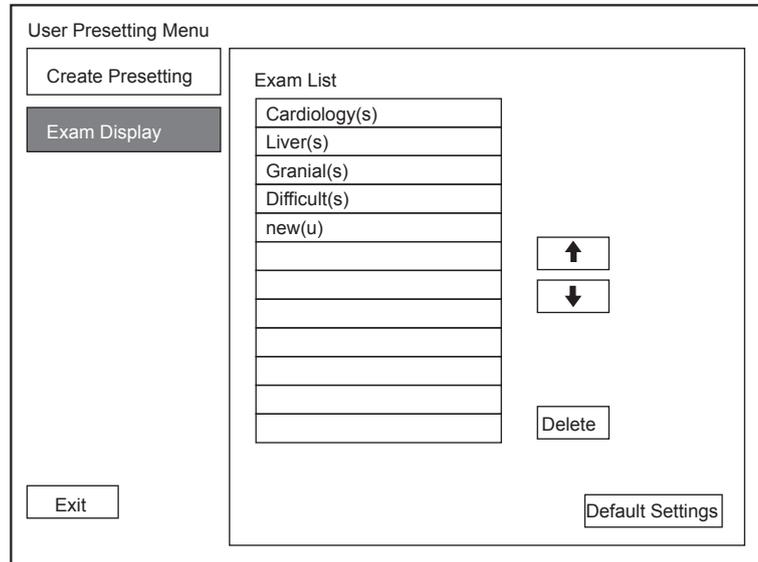
Figure 6-4 Preset Display Menu

- Click one desired application preset, click ⬆ or ⬇ to arrange the preset on the application mode screen.
- Click one desired application, click **Delete** > **Yes** to delete the application preset.
- Click **Default Settings** > **Yes** in the pop-up dialogue box to restore factory defaults.

6.2 Acquiring B-Mode Images

B-mode imaging is intended to provide information of anatomical structure of soft tissue.

6.2.1 Entering B Mode

The system enters B mode by default after you select a probe model and an exam type.

You can press the **B** button on the control panel to enter the B mode from other imaging modes.

The basic screen in the B mode is displayed as follows:
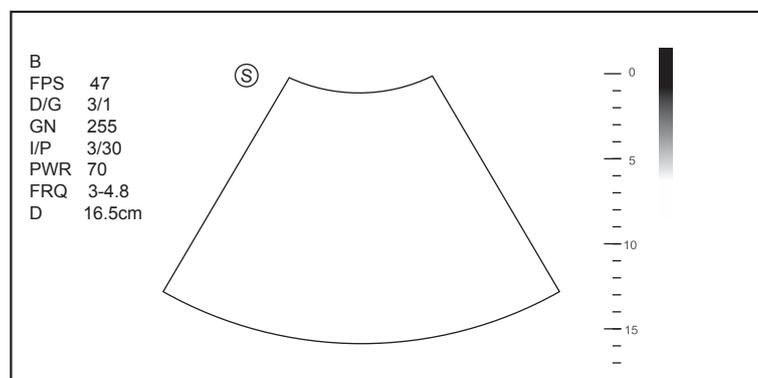
Figure 6-5 B-Mode Imaging Screen

For details on operating the basic screen, refer to Section 2.3.6 Basic Screen.

6.2.2   Optimizing B-Mode Images

The touch screen displays all controls related to the B-mode imaging (as shown in the figure), you can use them to optimize B-mode images.
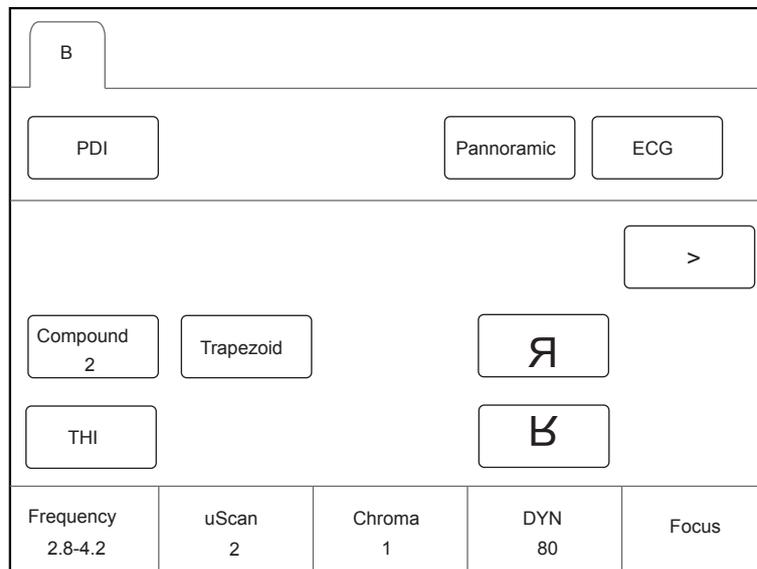
Figure 6-6   B-Mode Imaging Parameters Menu

You can tap > on the touch screen to turn the current menu to the previous or the next page if it displays over one page.

To optimize the image, rotate the knobs on the control panel that are directly below the selected item.

■   **Gain**

The B mode gain (2D gain) determines the amplifying factors for the received echoes and the brightness of the ultrasound image. The echoes are amplified with the same gain value regardless of depth.

To adjust the gain, rotate the **B** knob on the control panel to increase or decrease the value.

■   **TGC**

Time Gain Compensation (TGC) is used to adjust the gain that allows compensation for attenuation of the echoes over time (depth). It is adjustable during the real-time scan regardless of the imaging mode and display format.

TGC balances the image so that the density of echoes is the same throughout the image.

To adjust TGC, move the desired slider to the left or right to decrease or increase the value.

NOTE:
· Modifications of TGC values cannot be saved if you shift to use another imaging mode.
· The TGC curve is displayed in the top right corner of the imaging area when you adjust TGC values, and the curve disappears if TGC values are not adjusted for more than 3 seconds.

■   **LGC**

LGC is used to adjust the gain on the left or right part of the ultrasound image.

To adjust LGC:

● Tap **LGC** on the touch screen to enter the 8-band gain adjustment screen.

● Move the sliders upwards or downwards to adjust the gain.

■   **Focal Position/Number/Span**

The focal position/number/span is used to tighten up the beam for a specific area and the focus identified by a red triangle displays on the right side of the image.

Focus optimizes the image by increasing the resolution for a specific area.

To adjust the focal position/number/span:

- Rotate the knob located directly below **Focus** to increase or decrease the depth of focal zone.
- Rotate the knob located directly below **Foc. Num** to increase or decrease the number.
- Rotate the knob located directly below **Foc. Span** to increase or decrease the value.

■   **Frequency**

The probe is capable of generating a broadband signal with a certain start frequency and a certain bandwidth. A higher frequency brings about higher resolution and lower penetration.

To adjust the frequency, rotate the knob located directly below **Frequency** to increase or decrease the value.

■   **Chroma**

Chroma is used to colorize the gray scale image to enhance the discrimination capability.

To adjust the chroma, rotate the knob located directly below **Chroma** on the control panel to choose a chroma type.

■   **Compound Imaging**

Compound imaging is used to acquire a series of overlapping image frames from substantially differing spatial directions and combining these images to reduce speckle and improve contrast resolution.

To use compound imaging, tap **Compound** on the touch screen to enable or disable the compound imaging function.

■   **Line Density**

Line density refers to the amount of ultrasound beam that makes up the image. Increasing the value of line density improves the resolution and decreases frame rate. Therefore, you have to balance the frame rate and the image quality when adjusting the line density.

A higher line density is useful in obtaining a very high resolution, such as the thyroid or testicles. A lower line density is useful when scanning fetal heart beat and adult cardiac applications.

To adjust the line density, rotate the knob located directly below **Line Density** to increase or decrease the value.

■   **Persistence**

Persistence is used to average consecutive frames to provide a smoother appearance with less noise. Use lower persistence values for fast-moving organs or tissues and higher persistence values for a smoother appearance.

To adjust the persistence, rotate the knob located directly below **Persist** to increase or decrease the value.

■   **Dynamic Range**

Dynamic range increases the adjustable range of contrast by enhancing the intensities of parts in the grayscale. It optimizes the ultrasound image texture.

To adjust the dynamic range, rotate the knob located directly below **DYN** to increase or decrease the value.

■   **Grayscale Curve**

Grayscale curve optimizes the brightness of each pixel in accordance with the corresponding echo.

To adjust the grayscale curve, rotate the knob located directly below **Gray Map** to increase or decrease the value.

■   **Adaptive Image Fusion**

Adaptive image fusion provides choices of optimization methods to improve image quality through boundary enhancement, image smoothing and system optimization.

To adjust the adaptive image fusion, rotate the knob located directly below **AdaptFusion** to increase or decrease the value.

■   **Sector Width/Angle**

Sector width (for linear probes) or sector angle (for curved and phased array probes) is used to adjust the frame rate. You can adjust the sector width or angle to get more information without moving the probe.

The region of interest of the object can be adjusted after you adjust the sector width or sector.

To adjust the sector width/angle, rotate the knob located directly below **Sector Width** or **Sector Angle** to change the sector width or sector angle.

■   **Power**

Power is used to select the amount of ultrasound acoustic power produced by the probe. The adjustment range of the power is 1-100%, and ±1% can be adjusted each time. The real-time value of the power is displayed in the imaging information area on the basic screen.

To adjust the power, rotate the knob located directly below **Power%** to increase or decrease the value.

NOTE:
Expose the patient to the lowest practical transmit power level for the shortest possible period of time to achieve a satisfactory diagnosis.

■   **Tissue Acoustic Index**

Tissue acoustic characteristics refers to the speed of ultrasound passing through the tissue. Tissue acoustic characteristics optimize the image used for measurements and calculations. The greater tissue acoustic characteristics the faster the ultrasound passes through the tissues.

To adjust tissue acoustic characteristics, rotate the knob located directly below **Tissue Acou** to increase or decrease the value.

■   **Image Rotation**

You can rotate the image to get more information. Only transvaginal and transrectal exams are available for this feature.

To rotate the image, tap the left or right part of **Rotation** to rotate the image.

NOTE:
Take notice of the depth calibration displayed at the bottom of the basic screen when the image is rotated by 90º or 270º.

■   **μScan**

μScan is used to improve the image quality.

To use μScan, rotate the knob located directly below **μScan** to increase, decrease the value or disable the feature.

■   **Trapezoidal Imaging**

Trapezoidal imaging is used to enlarge the imaging area when performing a real-time scan by using the linear probes.

To use trapezoidal imaging, tap **Trapezoid** on the touch screen to enable or disable the feature.

NOTE:

Only the linear probes are available for trapezoidal imaging.

- ■ **Steer**

  Steer can be adjusted to change the direction of the acoustic beam when performing a real-time scan by using the linear probes.

  To adjust the steer, rotate the knob located directly below **Steer** to change the direction of the acoustic beam.

  NOTE:

  Only the linear probes are capable of using steer.

- ■ **Smooth**

  Smooth is used to adjust the smoothness of the image.

  To adjust smoothness, tap **Smooth** on the touch screen to enable, adjust or disable the feature.

- ■ **S-Fetus(Meas)**

  In frozen mode for OB application, S-Fetus(Meas) is used to measure the standard slice automatically.

  To use S-Fetus(Meas.), tap S-Fetus(Meas.) on the touch screen to enable the feature, and then the measurement result will be displayed on the result box on the screen.

  NOTE:

  Only when you add S-Fetus(Meas.) into the items displayed on the touch screen in Touch Screen setting, the item will be displayed on the touch screen.

6.3   Acquiring Color Flow Images

Color Flow Mapping (CFM) adds the color-coded qualitative information in the B-Mode image. Color Flow imaging is helpful to see the flow, the relevant qualitative information and the flow velocity.

6.3.1   CFM Mode

CFM is a color flow imaging technology which adds the color-coded qualitative information concerning the relative velocity and direction of fluid motion in the B-Mode image.

Perform the following steps to acquire CFM-mode images.

1. Optimize a B-mode image.

2. Press the **CFM** button on the control panel to enter the CFM mode.

Figure 6-7 CFM-Mode Imaging Screen

3. Adjust color flow ROI.

    - Move the trackball to position color flow ROI.
    - Press Set Key on the control panel to adjust the size of color flow ROI.
    - Press Set Key again to reposition color flow ROI.

4. Optimize the CFM-mode image. For details, refer to Section 6.3.4 Optimizing CFM/PDI/TDI Mode Images.

5. Press the **CFM** button again to exit the screen.

6.3.2   PDI Mode

PDI (Power Doppler Imaging) is a color flow imaging technology which adds the flow signal in the CFM-mode image. PDI uses the number and amplitude of red blood cells going through in the flow to create the color-coded imaging. A flow with slow velocity and small rate can be displayed in PDI. Therefore, a flow with a higher sensitivity can be detected without overlaying any flows with high velocity.

The direction of flow, the flow velocity and flow properties cannot be reflected in the PDI-Mode image.

Perform the following steps to acquire PDI-mode images:

1. Optimize a B-mode image.

2. Press the **CFM** button on the control panel, and then tap **PDI** on the touch screen to enter the PDI mode.
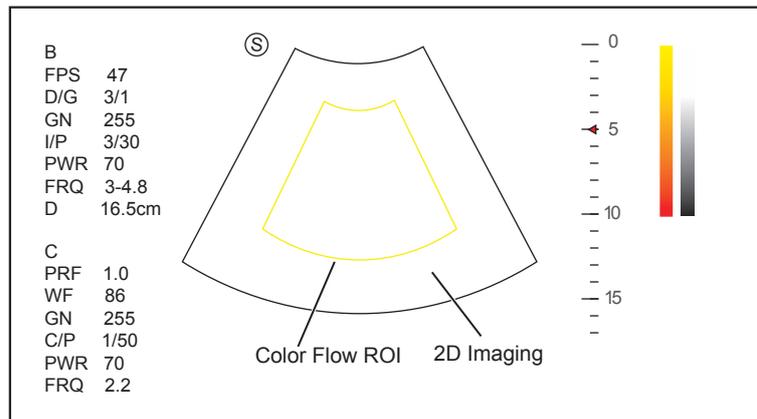
Figure 6-8 PDI-Mode Imaging Screen

3. Adjust color flow ROI.

    - Move the trackball to position color flow ROI.
    - Press Set Key on the control panel to adjust the size of color flow ROI.
    - Press Set Key again to reposition color flow ROI.

4. Optimize the PDI-mode image. For details, refer to Section 6.3.4 Optimizing CFM/PDI/TDI Mode Images.

5. Press the **PDI** button on the key panel or tap **PDI** on the touch screen to exit the screen.

6.3.3   TDI Mode

NOTE:

TDI imaging is only applied to cardiac applications by using the phased array probes.

TDI (Tissue Doppler Imaging) is a color flow imaging technique which detects the low frequency signal reflected from the cardiac muscle. TDI provides the flow information of velocity and direction for cardiac movement.

TDI uses the low velocity and the high amplitude adjusted from the wall filter to create a color-coded tissue imaging.

Perform the following steps to acquire TDI-mode images.

1. Press the **CFM** button on the control panel, and then tap **TDI** on the touch screen or press the **TDI** button on the key panel to enter the TDI mode.
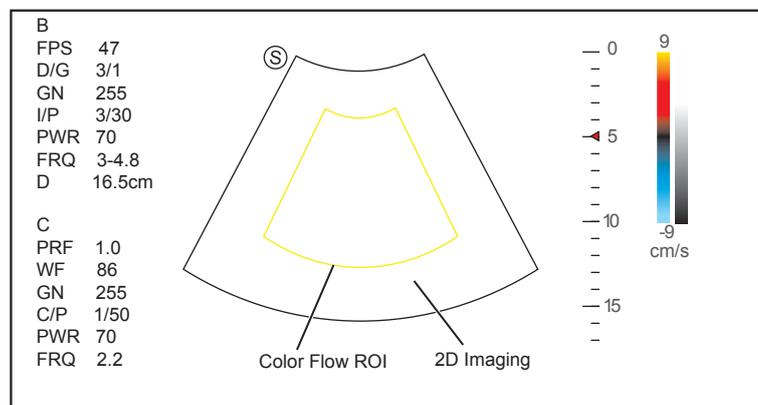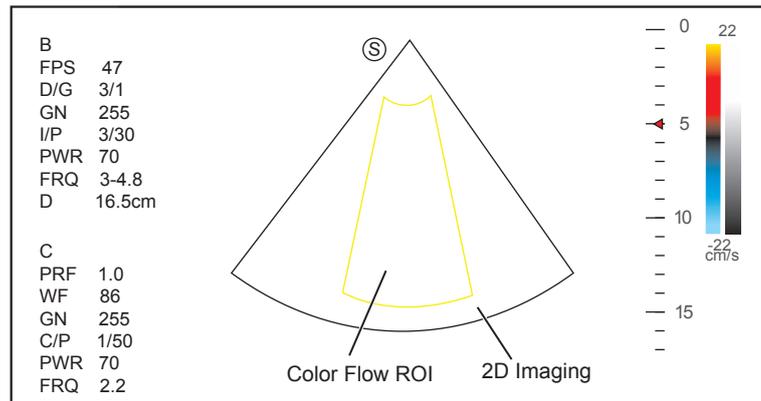

Figure 6-9 TDI-Mode Imaging Screen

2. Adjust color flow ROI.

    −   Move the trackball to position color flow ROI.

    −   Press Set Key on the control panel to adjust the size of color flow ROI.

    −   Press Set Key again to reposition color flow ROI.

3. Optimize the TDI-mode image. For details, refer to Section 6.3.4 Optimizing CFM/PDI/TDI Mode Images.

4. Press the **TDI** button on the key panel or tap **TDI** on the touch screen to exit the screen.

6.3.4   Optimizing CFM/PDI/TDI Mode Images

The touch screen displays all controls related to the CFM/PDI/TDI-mode imaging (as shown in the figure), you can use them to optimize CFM/PDI/TDI-mode images.
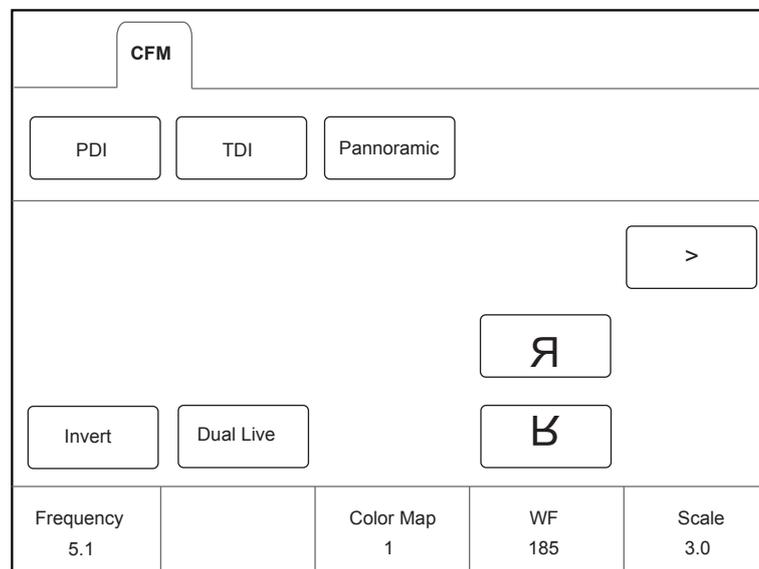
Figure 6-10 CFM/PDI/TDI Mode Imaging Parameters Menu

You can tap > on the touch screen to turn the current menu to the previous or the next page if it displays over one page.

To optimize an image, you can rotate the knob on the control panel that is directly below the selected item to adjust the value.

NOTE:

You can adjust all parameters in a real-time CFM/PDI/TDI mode, but can only adjust **Baseline**, **Chroma** and **B Reject** in the frozen CFM/PDI/TDI mode.

■   **Gain**

Color flow gain optimizes the color flow continuity with less noise interference.

To adjust the gain, rotate the **CFM** knob on the control panel to increase or decrease the value.

■   **Frequency**

Frequency optimizes the penetrability and the sensitivity of the color flow.

To adjust the frequency, rotate the knob located directly below **Frequency** to increase or decrease the value.

■   **Wall Filter**

Wall filter is used to filter the low frequency noise from tissues, such as the vascular wall.

To adjust the frequency, rotate the knob located directly below **WF** to increase or decrease the value.

■   **Pulse Repetition Frequency**

Pulse repetition frequency is used to adjust the velocity scale.

To adjust the pulse repetition frequency:

- Rotate the knob located directly below **Scale** to increase or decrease the value.
- Flip the **Scale** switch downwards or upwards to decrease or increase the value.

■   **Line Density**

Line density refers to the amount of ultrasound beam that makes up the image. Increasing the value of line density improves the resolution and decreases frame rate. Therefore, you have to balance the frame rate and the image quality when adjusting the line density.

A lower line density is useful in fetal heart beat, adult cardiac applications and in clinical radiology applications. A higher line density is useful in obtaining a very high resolution, such as for the thyroid or testicles.

To adjust the frequency, rotate the knob located directly below **Line Density** to increase or decrease the value.

■   **Baseline**

Baseline represents the position of zero velocity or frequency. The velocity range in one direction can be increased or decreased by adjusting the baseline.

Baseline is used to eliminate the alias in the color flow imaging, and display higher velocities without reversal of colors.

To adjust the baseline:

- Rotate the knob located directly below **Baseline** to move the baseline.
- Flip the **Baseline** switch upwards or downwards to move the baseline towards the positive or negative direction.

■   **Color Map**

Color map is used to select the method for the color-coding of blood flows.

To adjust the color map in the CFM/TDI mode, rotate the knob located directly below **Color Map** to change the image color.

NOTE:

When **C Map/DPDI** is set to **4** or above in the PDI mode, the system automatically enters the DPDI mode and **DPDI** appears. At this time, you can view the flow direction and velocity.

■ **Persistence**

Persistence is used to average consecutive frames to provide a smoother appearance with less noise. Use lower persistence values for fast-moving organs or tissues and higher persistence values for a smoother appearance.

To adjust the persistence, rotate the knob located directly below **Persistent** to increase or decrease the value.

■ **Sector Width/Angle**

Sector width (for linear probes) or sector angle (for curved and phased array probes) is used to adjust the frame rate. You can adjust the sector width or angle to get more information without moving the probe.

The region of interest of the object can be adjusted after you adjust the sector width or sector angle.

To adjust the sector width/angle, rotate the knob located directly below **Sector Width** to change the sector width or angle.

■ **Power**

Power is used to select the amount of ultrasound acoustic power produced by the probe. The adjustment range of the power is 0-100%, and ±10% can be adjusted each time. The real-time value of the power is displayed in the imaging information area of the basic screen.

To adjust the power, rotate the knob located directly below **Power% to** increase or decrease the value.

NOTE:

Expose the patient to the lowest practical transmit power level for the shortest possible time to achieve a satisfactory diagnosis.

■ **B Reject**

B Reject is used to set the display priorities of the color and 2D grayscale pixels. A larger B Reject value suppresses more grayscale pixels.

To adjust B Reject, rotate the knob located directly below **B Reject** to increase or decrease the value.

■ **Steer**

Steer is used to adjust the angle of CF ROI when performing a real-time scan by using the linear probes.

To adjust the steer,the knob located directly below **Steer** to rotate the angle clockwise or anticlockwise.

NOTE:

Only the linear probes are available when adjusting steer.

■ **Flow Invert**

Flow invert is used to view blood flow from a different perspective.

When **Invert** is set to **OFF**, red pixels represent flow to the probe; blue pixels represent flow away from the probe.

When **Invert** is set to **ON**, blue pixels represent flow to the probe; red pixels represent flow away from the probe.

To enable or disable the flow invert:

● Tap **Invert** on the touch screen to enable flow invert.

● Or, tap **Invert** again on the touch screen to disable flow invert.

NOTE:

The color flow and the color map are also inverted when reversing the flow.

■ **Smooth**

Smooth is used to adjust the smoothness of the image.

To adjust the smoothness, tap **Smooth** on the touch screen to enable, adjust or disable the feature.

6.4   Acquiring M-Mode Images

M mode is generally used with 2D imaging, and is helpful for cardiac applications. In the M mode, you can position the M-line in the 2D image on the anatomy of interest, and then learn about the tissue motion along that line in M-mode trace. In M-mode, y-axis is used to display the position or depth of the tissue, and x-axis is the time scale.

6.4.1   M Mode

The M-line can be only positioned 90° within the ultrasound beam. Therefore, the M mode is used to view motion patterns for regular objects.

Perform the following steps to acquire M-mode images.

1.   Optimize a B-mode image.

2.   Press the **M** button on the control panel to enter the inactivated B+M mode.

     The basic screen displays B mode image and M-line as the following figure shows.
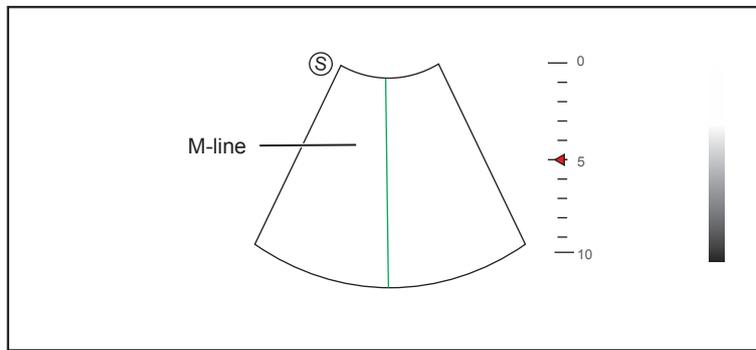
Figure 6-11 Inactivated B+M-Mode Imaging Screen

3.   Adjust the M line by using the trackball.

4.   Press the **Update** button on the control panel to activate the M mode.

     The B-mode image with a M line is displayed at the upper part of the screen and the M-mode image is displayed at the lower part of the screen after being activated, as shown in Figure 6-12.
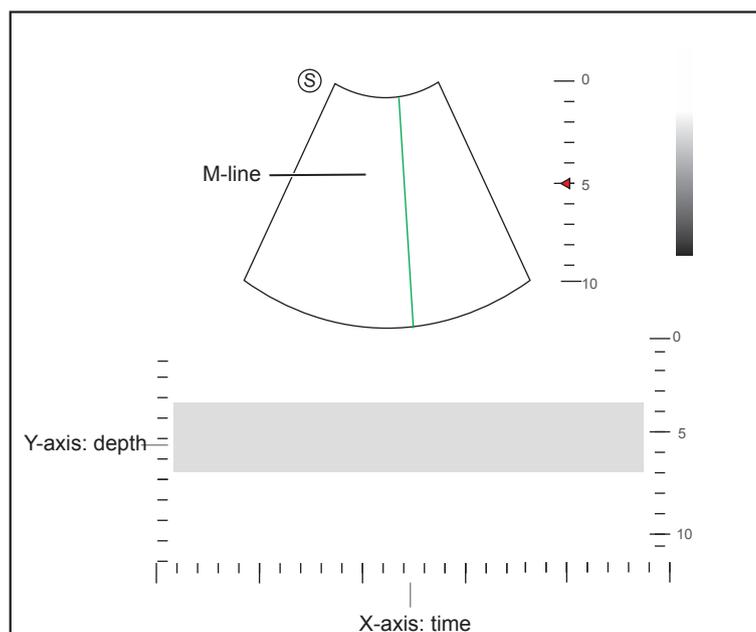
Figure 6-12 M-Mode Imaging Screen

- X-axis is the time scale.
- Y-axis is the depth scale.

NOTE:

Once the M mode is activated, you can move the trackball to stop the M trace and adjust the M line. The system continues tracing if the trackball is idle for more than 0.5s.

5. Optimize M-mode image. For details, refer to Section 6.4.3 Optimizing M-Mode Images.

6. Press the **M** button again to exit the screen.

6.4.2   Anatomical M-Mode

Anatomical M-mode is used for fetal cardiac applications. Anatomical M-mode can be used with phased array probes when performing cardiac exams or convex probes when performing abdominal exams. In the anatomical M-mode, the M-mode cursor can be positioned perpendicular to the anatomical structure and be adjusted 360° even when viewing motion patterns for irregular objects. It is used to study the ventricular function of the heart.

Perform the following steps to acquire anatomical M-mode images.

1. Press **M** knob to enter the inactivated B+M mode, and Press the **Update** button on the control panel to activate the M mode.

2. Tap **AMM** on the touch screen to enter the anatomical M-mode.

NOTE:

Once the anatomical M-mode is activated, you can move the trackball to stop the M trace and adjust the M line. The system continues tracing if the trackball is idle for more than 0.5s.

3. Rotate the **AMM Number** knob on the control panel to set the number of M lines.

Multiple M lines display after selecting the desired number as the following figure shows.
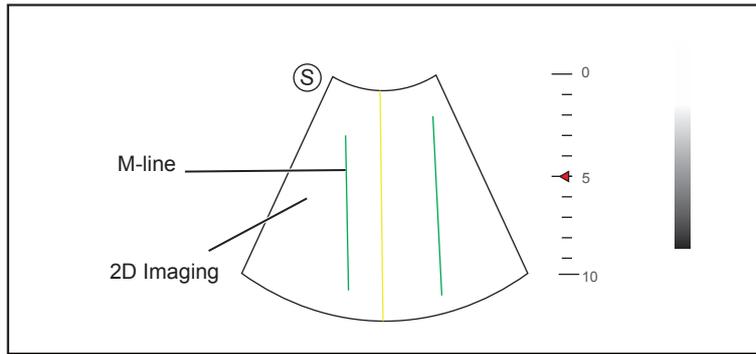
Figure 6-13 Inactivated Anatomical M-Mode Imaging Screen

4. Adjust the position and the angle of M line.

  − Position the desired M-line by using the trackball.

  − Press Set Key on the control panel to select the desired M line.

  − Rotate the **AMM Angle** knob on the control panel to adjust the angle of M line.

5. Press the **Update** button on the control panel to activate the anatomical M-mode.

6. Optimize anatomical M-mode images. For details, refer to Section 6.4.3 Optimizing M-Mode Images.

7. Press the **M** button again to exit the screen.

6.4.3   Optimizing M-Mode Images

The touch screen displays all controls related to the M-mode imaging (as shown in the figure), you can use them to optimize M-mode images.
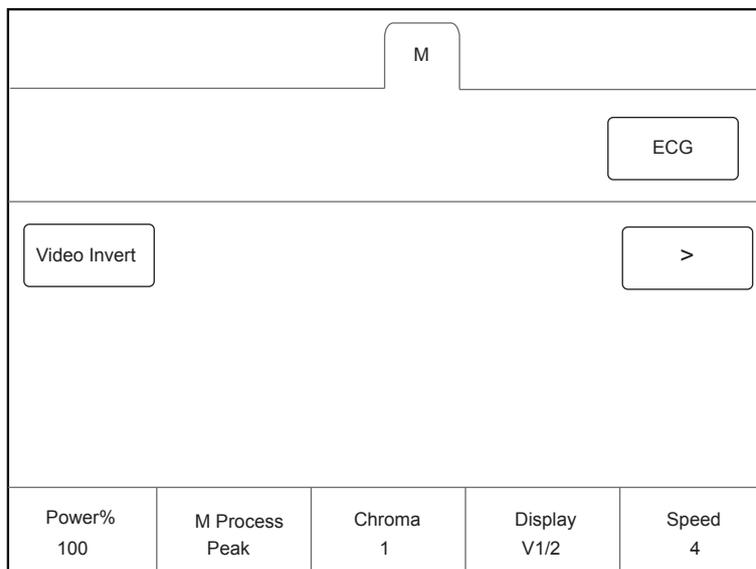
Figure 6-14 M-Mode Imaging Parameters Menu

You can tap > on the touch screen to turn the current menu to the previous or the next page if it displays over one page.

To optimize an image, you can rotate the knob on the control panel that is directly below the selected item to adjust the value.

NOTE:

All parameters can be adjusted in a real-time B mode, **Chroma** and **Display Format** can also be adjusted in the frozen mode.

■ **Gain**

M gain controls the overall brightness of the M trace.

To adjust the gain, rotate the **M** knob on the control panel to increase or decrease the value.

■ **M Process**

M process is used to set the processing method for the M trace display.

To set M process, rotate the knob located directly below **M Process Peak** to adjust the setting.

■ **Sweep Speed**

Sweep speed is used to set the sweep speed of the M trace. A faster speed is more suitable to view the motion.

To adjust the sweep speed, rotate the knob located directly below **Speed** to increase or decrease the value.

■ **Chroma**

Chroma is used to colorize the gray scale image to enhance the discrimination capability.

To adjust the chroma, rotate the knob located directly below **Chroma** to choose a chroma type.

■ **Display Format**

Display format is used to view the image better.

To set the display format, rotate the knob located directly below **Display Format** on the control panel to adjust the setting.

■ **Power**

Power is used to select the amount of ultrasound acoustic power produced by the probe. The adjustment range of the power is 30%-100%, and ±10% can be adjusted each time. The real-time value of the power is displayed in the imaging information area on the basic screen.

To adjust the power, rotate the knob located directly below **Power%** to increase or decrease the value.

NOTE:

Expose the patient to the lowest practical transmit power level for the shortest possible time to achieve a satisfactory diagnosis.

■ **Video Invert**

Video invert is used to invert the M trace display related to brightness.

To enable or disable the video invert:

- Tap **Video Invert** on the touch screen to enable flow invert.
- Or, tap **Video Invert** again on the touch screen to disable flow invert.

■ **Smooth**

Smooth is used to adjust the smoothness of the image.

To adjust the smoothness, tap **Smooth** on the touch screen to enable, adjust or disable the feature.

■ **Gray Map**

Gray map optimizes the brightness of each pixel in accordance with the corresponding echo.

To adjust the gray map, rotate the knob located directly below Gray Map to increase or decrease the value.

6.5   Acquiring Spectral Doppler Images

Spectral Doppler imaging is intended to provide measurement data concerning the velocity, the direction, and the category of the arterial or vein flow. It contributes a more accurate qualitative analysis than the color flow imaging.

Spectral Doppler includes Pulsed Wave Doppler (PW) mode and Continuous Wave Doppler (CW) mode.

6.5.1   PW Mode

Pulsed Wave Doppler (PW) is a Doppler mode that measures velocity in a PW sample volume and displays that information in a spectral trace with audio output. PW includes conventional PW and High Pulse Repetition Frequency (HPRF). PW Doppler can be combined with the B mode for rapidly selecting the anatomical site for PW Doppler examination. The site where PW Doppler data is derived appears graphically on the B-Mode image.

Perform the following steps to acquire PW-mode images

1. Optimize a B-mode image.

2. Press the **PW** button on the control panel to enter the inactivated B+PW mode 1.

Figure 6-15 Inactivated B+PW Mode 1 Imaging Screen

- − The spectral Doppler line and the sample volume gate are used to locate the qualitative analysis on the image.
- − The flow cursor needs to be adjusted parallel to the flow when measuring the velocity.

3. Adjust the position and angle of the spectral Doppler line.
    - − Position the sample volume gate on the spectral Doppler line by moving the trackball upwards or downwards.
    - − Adjust the angle of the spectral Doppler line by moving the trackball to the left or the right.

4. Adjust the sample volume gate.
    - − Adjust the size of the sample volume gate by using the trackball.
    - − Rotate the **Angle** knob on the control panel to adjust the angle of the flow cursor.

5. Press the **Update** button on the control panel to activate the PW mode.

    The PW spectrum is displayed at the lower part of the screen after being activated, as shown in Figure 6-16.

Figure 6-16 PW-Mode Imaging Screen

- X-axis is the time scale.
- Y-axis is Doppler frequency scale, including positive and negative indicators.

Press the **Fn** button and the Left/Right arrow key on the key panel simultaneously or rotate the knob located directly below the **Volume** on the touch screen to adjust the audio volume.

NOTE:

Once the PW-mode is activated, you can move the trackball to stop the Doppler trace and adjust the sample volume gate. The system continues tracing if the trackball is idle for more than 0.5s.

6. Optimize the PW-mode image. For details, refer to Section 6.5.3 Optimizing Spectral Doppler Images.

   If needed, press the **Update** button on the control panel to enter the inactivated B+PW mode 2, the following screen appears.
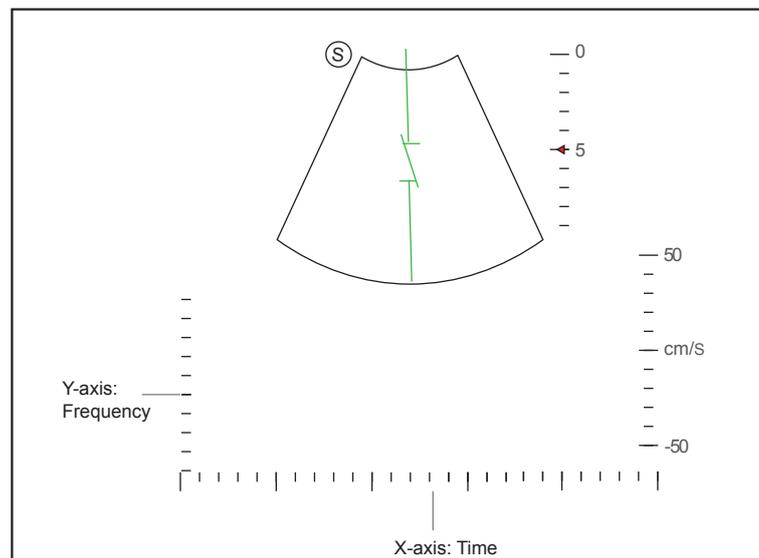
Figure 6-17 Inactivated B+PW Mode 2 Imaging Screen

You can also adjust the position and angle of spectral Doppler line, the size of sample volume gate, and the direction of the flow cursor.

7. Press the **PW** button again to exit the screen.

6.5.2   CW Mode

Continuous Wave Doppler (CW) uses continuously transmitted and received ultrasound energy to generate a spectral display. CW Doppler is used to measure a high velocity, the highest velocity at a specific site, but no aliasing is created.

Perform the following steps to acquire CW-mode images.

1. Optimize a B-mode image.

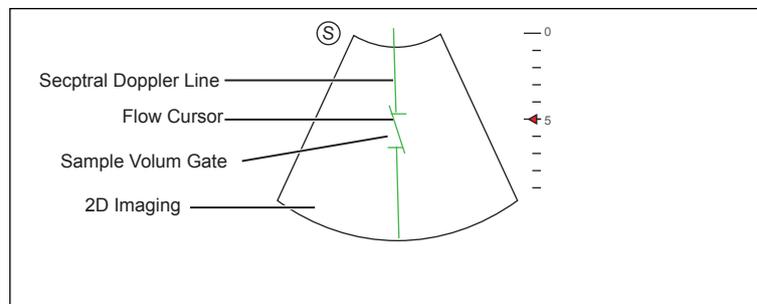2. Press the **CW** button on the control panel to enter the inactivated B+CW mode 1.
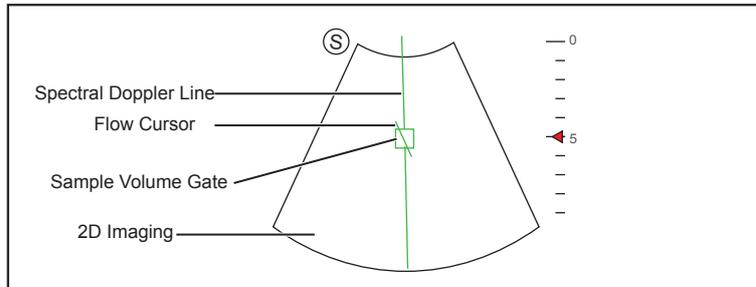
Figure 6-18 Inactivated B+CW-Mode 1 Imaging Screen

- − The spectral Doppler line and the sample volume gate are used to locate the qualitative analysis on the image.
- − The flow cursor needs to be adjusted parallel to the flow when measuring the velocity.

3. Adjust the position and angle of the spectral Doppler line.
   - − Position the sample volume gate on the spectral Doppler line by moving the trackball upwards or downwards.
   - − Adjust the angle of the spectral Doppler line by moving the trackball to the left or the right.
   - − Press Set Key on the control panel to confirm.

4. Rotate the **Angle** knob on the control panel to adjust the angle of the flow cursor.

5. Press the **Update** button on the control panel to activate the CW mode.

   The CW spectrum is displayed at the lower part of the screen after being activated, as shown in Figure 6-19.
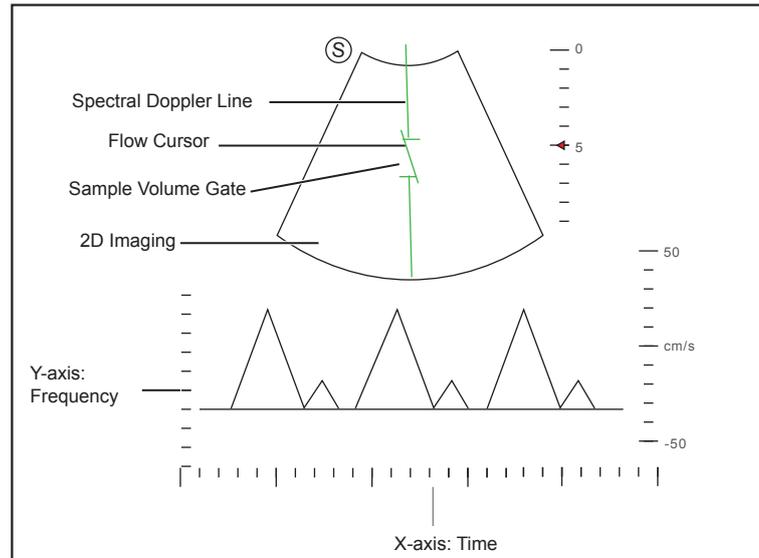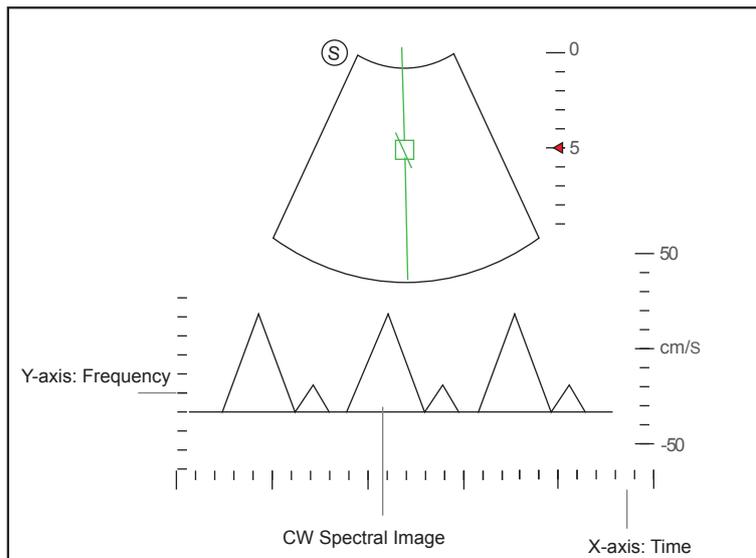

Figure 6-19 CW-Mode Imaging Screen

- − X-axis is the time scale.

- Y-axis is Doppler frequency scale, including positive and negative indicators.

Press the **Fn** key and the Left/Right arrow key on the key panel simultaneously or rotate the knob located directly below the **Volume** on the touch screen to adjust the audio volume.

NOTE:

Once the PW-mode is activated, you can move the trackball to stop the Doppler trace and adjust the sample volume gate. The system continues tracing if the trackball is idle for more than 0.5s.

6. Optimize the CW-mode image. For details, refer to Section 6.5.3 Optimizing Spectral Doppler Images.

If needed, press the **Update** button on the control panel to enter the inactivated B+CW mode 2, the following screen appears.
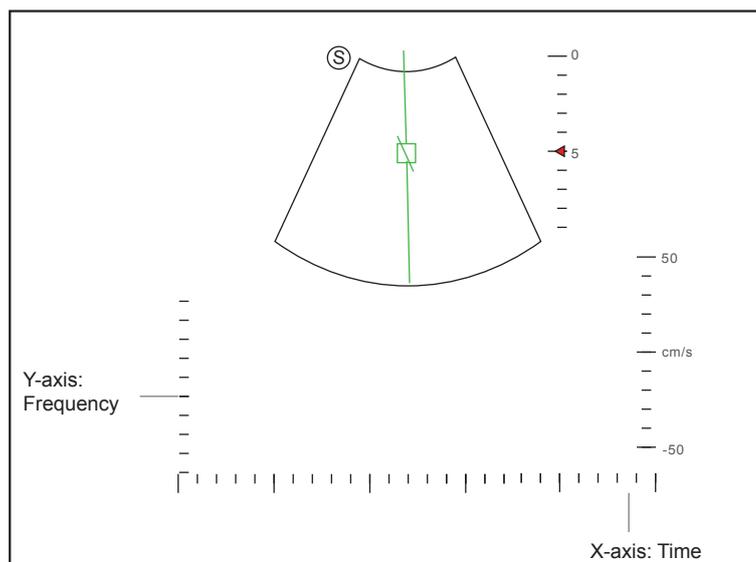
Figure 6-20 Inactivated B+CW Mode 2 Imaging Screen

You can also adjust the position and angle of spectral Doppler line, and the direction of the flow cursor.

7. Press the **CW** button again to exit the screen.

6.5.3   Optimizing Spectral Doppler Images

The touch screen displays all controls related to the PW/CW-mode imaging (as shown in the figure), you can use them to optimize PW/CW-mode images.
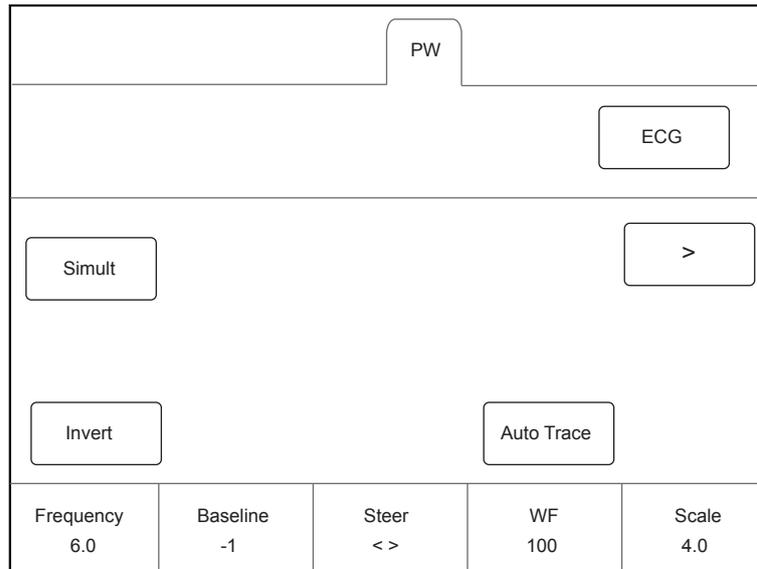
Figure 6-21 Spectral Doppler Mode Imaging Parameters Menu

You can tap > on the touch screen to turn the current menu to the previous or the next page if it displays over one page.

To optimize an image, you can rotate the knob on the control panel that is directly below the selected item to adjust the value.

NOTE:

You can adjust all parameters in the real-time PW/CW mode, but can only adjust **Baseline**, **Chroma** and **Display Format** in the frozen PW/CW mode.

■   **Gain**

PW/CW gain is used to adjust the gain of the spectrum map. Increasing the gain will brighten the image allowing you to see more received signals with less noise.

To adjust the gain, rotate the **PW** or **CW** knob on the control panel to increase or decrease the value.

■   **Pulse Repetition Frequency**

Pulse repetition frequency is used to adjust the velocity scale, filter the unnecessary low frequency signal or the disturbance made by non-flow movements, such as breath, heart beat or sweeps of the probe.

The range of PRF value varies with the probe model and the exam type.

To adjust the pulse repetition frequency:

●   Rotate the knob located directly below **Scale** to increase or decrease the value.

●   Flip the **Scale** switch downwards or upwards to decrease or increase the value.

NOTE:

The value of wall filter is also changed when adjusting PRF.

■   **High Pulse Repetition Frequency**

Once HPRF is enabled, besides the original sample volume gate, one or more sample volume gates appear at shallower positions on the 2D image. The unnecessary low frequency signal or the disturbances made by non-flow movements, such as breath, heart beat or sweeps of the probe will be filtered.

To enable the High Pulse Repetition Frequency, tap **HPRF** on the touch screen or flip the **Scale** switch upwards to increase the value continuously, HPRF is automatically enabled when a certain value is reached.

■ **Baseline**

Baseline represents the position of zero velocity or frequency. The velocity range in one direction can be increased or decreased by adjusting the baseline.

Baseline is used to eliminate the alias during color flow imaging, and display higher velocities without reversal of colors.

To adjust the baseline:

● Rotate the knob located directly below **Baseline** to move the baseline.

● Flip the **Baseline** switch downwards or upwards to move the baseline towards the negative or positive direction.

■ **Wall Filter**

Wall filter is used to filter the low frequency noise from tissues, such as the vascular wall.

To adjust the wall filter, rotate the knob located directly below **WF** to increase or decrease the value.

■ **Frequency**

The probe is capable of generating a broadband signal with a certain frequency and bandwidth. The frequency optimizes the edges when scanning deeper locations with Doppler imaging

To adjust the frequency, rotate the knob located directly below **Frequency** to increase or decrease the value.

■ **Sweep Speed**

Sweep speed is used to set the sweep speed of the Doppler trace. The refresh speeds of the time scale and the frequency scale vary with the sweep speed.

To adjust the sweep speed, rotate the knob located directly below **Sweep Speed** to increase or decrease the value.

■ **Power**

Power is used to select the amount of ultrasound acoustic power produced by the probe. The adjustment range of the power is 30%-100%, and ±10% can be adjusted each time. The real-time value of the power is displayed in the image parameter area on the basic screen.

To adjust the power, rotate the knob located directly below **Power%** to increase or decrease the value.

NOTE:

Expose the patient to the lowest practical transmit power level for the shortest possible time to achieve a satisfactory diagnosis.

■ **Chroma**

Chroma is used to colorize the gray scale image to enhance the discrimination capability. Five colors are available.

To adjust the chroma, rotate the knob located directly below **Chroma** to choose a color scheme.

■ **Dynamic Range**

Dynamic range increases the adjustable range of contrast by enhancing the intensities of parts in the grayscale. It is useful for optimizing the ultrasound image texture.

To adjust the dynamic range, rotate the knob located directly below **DYN** to decrease the value.

■ **Display Format**

Display format is used to view the image better.

To set the display format, rotate the knob located directly below **Display Format** to adjust the setting.

■   **Flow Invert**

Flow invert is used to view the flow velocity from a different perspective.

To enable or disable the flow invert:

● Tap **Invert** on the touch screen to enable the feature, and **Invert** appears on the top right corner of the image.

● Or, tap **Invert** again on the touch screen to disable the feature, and **Invert** disappears from the display.

■   **Video Invert**

Video invert is used to view the background of the spectral display from a different perspective.

To enable or disable the flow invert:

● Tap **Video Invert** on the touch screen to enable the feature, and a brighter background appears.

● Or, tap **Video Invert** again on the touch screen to disable the feature, and a darker background appears.

■   **Quick Angle Correction**

Quick Angle correction is used to adjust the angle of the flow cursor in the PW mode.

To enable the feature, tap **Quick Angle** on the touch screen to set the angle of the flow cursor to 60˚, -60˚, or 0˚.

NOTE:
You only need to set it when performing measurements related to velocity.

■   **Simult**

Simult is used to synchronously display two real-time scans in the 2D and the PW modes.

To enable or disable the feature:

Tap **Simult** in the activated PW mode or in the inactivated B+PW mode 2, the two real-time scans in the 2D and the PW modes are displayed.

NOTE:
Simult is only available in the PW mode.

■   **NSI**

NSI optimizes the image by suppressing the background noise.

To adjust the noise suppression image, rotate the knob located directly below **NSI** to increase or decrease the value.

■   **Smooth**

Smooth is used to adjust the smoothness of the image.

To adjust the smoothness, tap **Smooth** on the touch screen to enable, adjust or disable the feature.

6.6   Acquiring Triplex-Mode Images

The triplex mode is overlapped by three different imaging modes, and can be applied to view the image. The triplex mode includes B+CFM/TDI+M, B+CFM/PDI/TDI+PW and B+CFM/PDI+CW.

6.6.1   B+CFM/TDI +M

NOTE:
Only the phased array probes are available for B+CFM/TDI+M.

Perform the following steps to acquire the image.

1. Optimize a CFM/TDI mode image.

2. Press the **M** button on the control panel to enter the inactivated B+CFM/TDI+M mode.
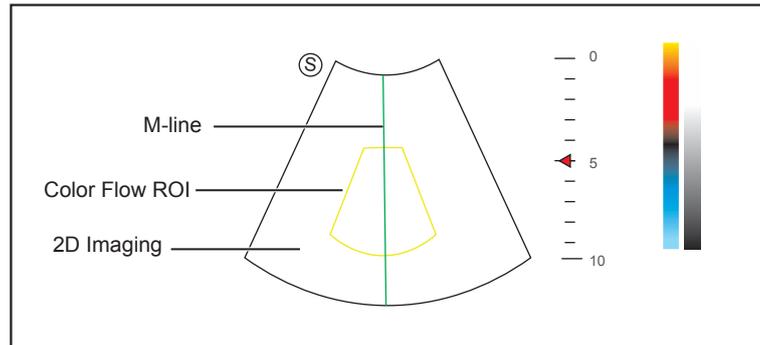
Figure 6-22 Inactivated B+CFM/TDI +M-Mode Imaging Screen

3. Adjust the position of M-line and color flow ROI by using the trackball.

4. Press the **Update** button on the control panel to activate the M mode.

    The basic screen displays the following after being activated.
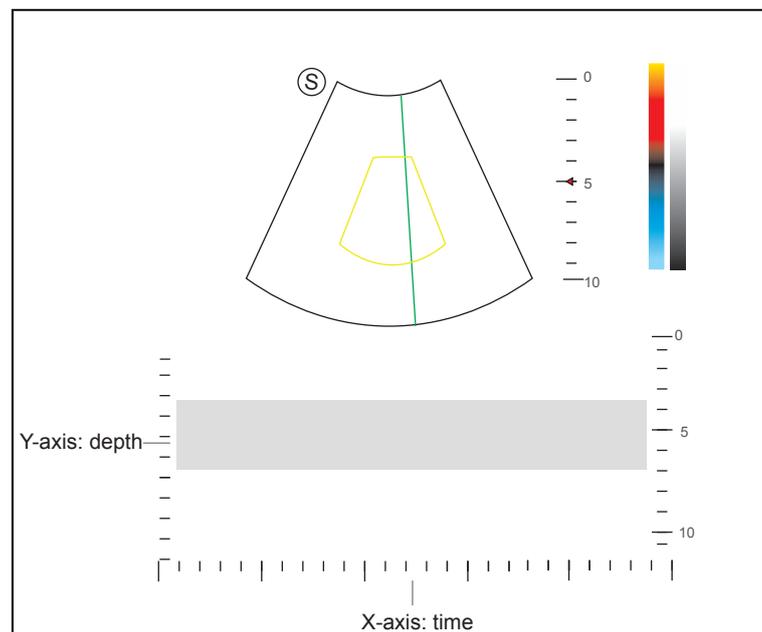
Figure 6-23 B+CFM/TDI +M-Mode Imaging Screen

5. Optimize the M-mode image. For details, refer to Section 6.4.3 Optimizing M-Mode Images.

6. Press the **M** button again to exit the screen.

6.6.2   B+CFM/PDI/TDI +PW

Perform the following steps to acquire the image.

1. Optimize a CFM/PDI/TDI-mode image.

2. Press the **PW** button on the control panel to enter the inactivated B+CFM/PDI/TDI+PW mode 1.
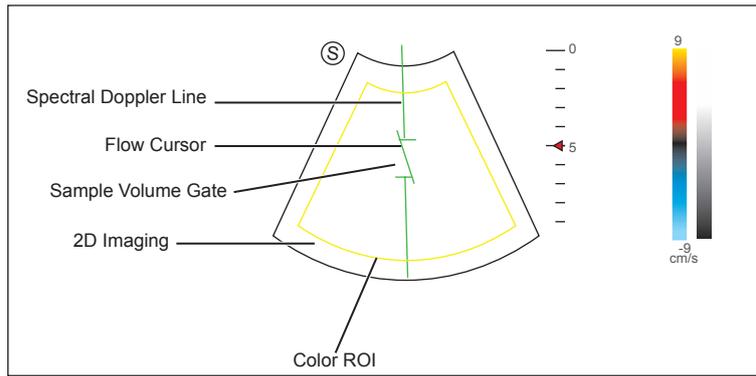
Figure 6-24 Inactivated B+CFM/PDI/TDI+PW-Mode 1 Imaging Screen

3. Adjust the position and angle of the spectral Doppler line.

    − Position the sample volume gate on the spectral Doppler line by moving the trackball upwards or downwards.

    − Adjust the angle of the spectral Doppler line by moving the trackball to the left or the right.

4. Adjust the sample volume gate.

    − Move the trackball to adjust the size of the sample volume gate.

    − Rotate the **Angle** knob on the control panel to adjust the angle of the flow cursor.

5. Press the **Update** button on the control panel to activate the PW mode.

    The PW spectrum is displayed at the lower part of the screen after being activated, as shown Figure 6-25 B+CFM/PDI/TDI+PW-Mode Imaging Screen.
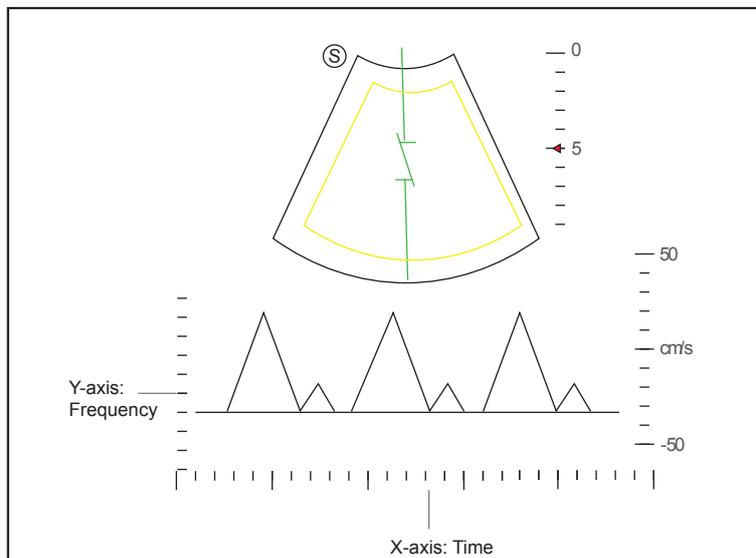
Figure 6-25 B+CFM/PDI/TDI+PW-Mode Imaging Screen

Press the **Fn** button and the Left/Right arrow key on the key panel simultaneously or rotate the knob located directly below the **Volume** on the touch screen to adjust the audio volume.

6. Optimize the PW-mode image. For details, refer to Section 6.5.3 Optimizing Spectral Doppler Images.

    If needed, press the **Update** button on the control panel to enter the inactivated CFM/PDI/TDI+PW mode 2, the following screen appears.
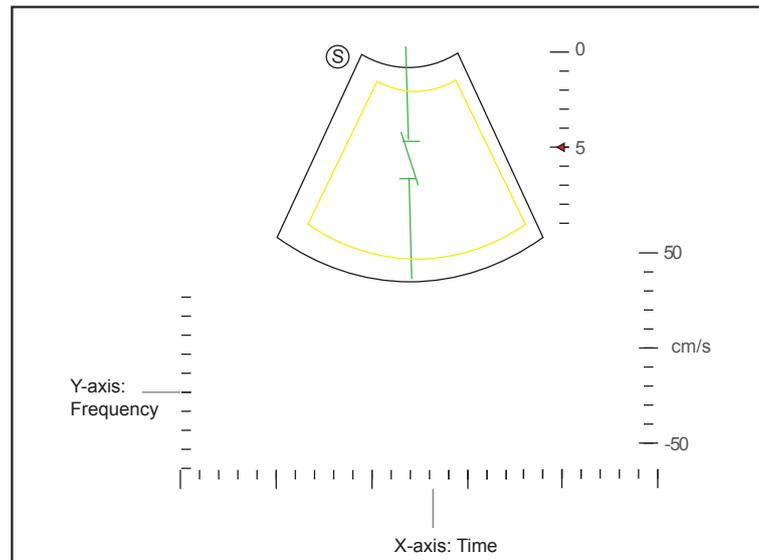
Figure 6-26 Inactivated CFM/PDI/TDI+PW Mode 2 Imaging Screen

You can also adjust the position and angle of spectral Doppler line, the size of the sample volume gate, and the direction of the flow cursor.

7. Press the **PW** button again to exit the screen.

6.6.3　B+CFM/PDI+CW

For details, refer to Section 6.6.2 B+CFM/PDI/TDI +PW.

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7 Elastography Imaging

As an adjunct technique for clinical practice, the elastography determines if an area of tissue is hard or soft when compared with its surroundings. The elastography image displays a range of map shades from the softest tissue in the image to the stiffest in a given field of view.

Elastography is used in ultrasound diagnosis for small parts applications, such as breast and thyroid examinations.

NOTE:

The following description uses small parts examination performed with the L752 probe as an example.

7.1 Acquiring Elastography Images

Perform the following steps to acquire the elastography image.

1. Select L752 and Small Parts as the desired probe and exam type, the system automatically enters the real-time B mode.

2. Acquire a high quality B-mode image.

3. Tap **Elasto** on the touch screen to enter the elastography imaging.

   As Figure 7-1 Elastography Imaging Screen shows, the elastography image is displayed on the left and a real-time B-mode image is displayed on the right.

   Press the ⬡ button or the ⬡ button on the control panel to enter the single or dual split screen.
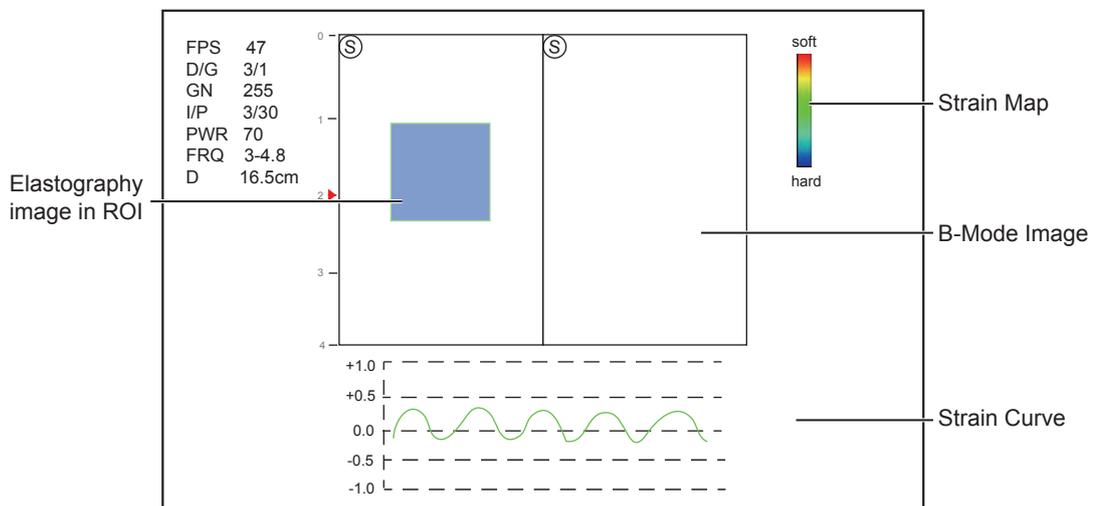
Figure 7-1 Elastography Imaging Screen

- Elastography map provides color information for tissue stiffness.
- B-mode image is compared with the elastography image for a real-time assessment.
- Strain curve displays the compressing frequency and its corresponding displacement. X axis is the frame number, Y axis is the displacement of the corresponding frame.
- The elastography image in the ROI is translucent and overlapped on the B-mode image.

4. Hold the probe perpendicular to the target lesion, and compress it regularly.

Operation Concerns:

- Ensure the compression is applied perpendicularly, and all parts of the target lesion are compressed uniformly.

- Ensure the compression is a dynamic intermittent force, i.e. alternate tension with relaxation, which could keep the distorted tissue back to normal status. If the distorted tissue is not relaxed, the tissue cannot be distorted and the elastography imaging cannot be performed.

- The compressing frequency is recommended to be 1.5-3 times per second. Lift the probe up after each pressure, and ensure the probe is not away from the target lesion.

- The absolute value of positive and negative maximums on strain curves should be 0.5-1. If the absolute value is below 0.5 or over 1, the compression is too hard or too low for correct elastography results.

5. Adjust the elastography ROI.

To acquire accurate tissue stiffness information, you are recommended to adjust the elastography ROI to two times of the target lesion

- Move the trackball to position elastography ROI.
- Press Set Key on the control panel to adjust the size of elastography ROI.
- Press Set Key to reposition elastography ROI.

6. Optimize the elastography image. For details, refer to Section 7.2 Optimizing Elastography Images.

7. Tap **Elasto** again to exit the screen.

7.2 Optimizing Elastography Images

The touch screen displays all controls related to the elastogrphy imaging (as shown in the figure), you can use them to optimize elastogrphy images.

Figure 7-2 Elastogrphy Imaging Parameters Menu

You can tap > on the touch screen to turn the current menu to the previous or the next page if it displays over one page.

To optimize the image, you can rotate the knob on the control panel that is directly below the selected item to adjust the value.

NOTE:

All parameters can only be adjusted in real-time elastography imaging.

■   **Strain Map**

Strains map allows you to select and apply a color map to the elastography or B-mode image on the left or right during the elastography imaging. The image will be displayed with the use of 256-color mapping for each pixel according to the degree of strain using a scale from red (highest strain, softest), green (average strain, intermediate), to blue (no strain, hardest).

To adjust the strain map:

● Rotate the knob located directly below **Strain Map L** to choose the color scheme for the elastography image.

● Rotate the knob located directly below **Strain Map R** to apply or choose the color scheme for the B-mode image.

■   **Strain Process**

Strain process is used to set relative parameters of the elastography algorithm, the elastography image varies with this setting.

To adjust the strain process, rotate the knob located directly below **Strain Process** to increase or decrease the value.

■   **Transparency**

Transparency allows you to bring out the tissue behind the color data.

To adjust the transparency, rotate the knob located directly below **Transparency** to increase or decrease the value.

■   **Contrast**

Contrast enhances the color contrast for more accurate tissue stiffness information.

To adjust the contrast, rotate the knob located directly below **Contrast** to increase or decrease the value.

■   **Persistence**

Persistence is used to average consecutive frames to provide a smoother appearance with less noise. Use lower persistence values for fast-moving organs or tissues and higher persistence values for a smoother appearance.

To adjust the persistence, rotate the knob located directly below **Persistence** to increase or decrease the value.

■   **Frequency**

The transducer is capable of generating a broadband signal with a certain start frequency and a certain bandwidth. A higher frequency brings about higher resolution and lower penetration.

To adjust the frequency, rotate the knob located directly below **Frequency** to increase or decrease the value.

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8 Contrast Imaging

Contrast imaging is used in conjunction with ultrasound contrast agents to increase the acoustic impedance difference between blood flow and tissue, improve 2D imaging resolution for myocardial, liver, kidney and cephalic applications and enhance Doppler signals for blood flow. Contrast imaging helps in observing normal and abnormal tissue and blood flow.

⚠ **WARNING** Contrast imaging is only used in conjunction with commercial contrast agents legally approved by laws and local regulations. Do not use the contrast agent not got any legal permits or official registrations. The manufacturer would not guarantee the safety and reliability for any contrast agents.

The following description uses a liver examination performed with the 3C-A probe as an example.

8.1 Entering Contrast Imaging

Perform the following steps to enter the contrast imaging.

1. Select 3C-A and Abdomen as the desired probe and exam type, the system automatically enters the real-time B mode.

2. Position the target tissue in the B+Color mode, and observe the blood flow.

3. Return to the B mode, tap **Contrast** on the touch screen or press **Contrast** on the control panel to enter the contrast imaging.

As Figure 8-1 Contrast Imaging Screen shows, a real-time contrast image is displayed on the left and a B-mode in real-time mode is displayed on the right.
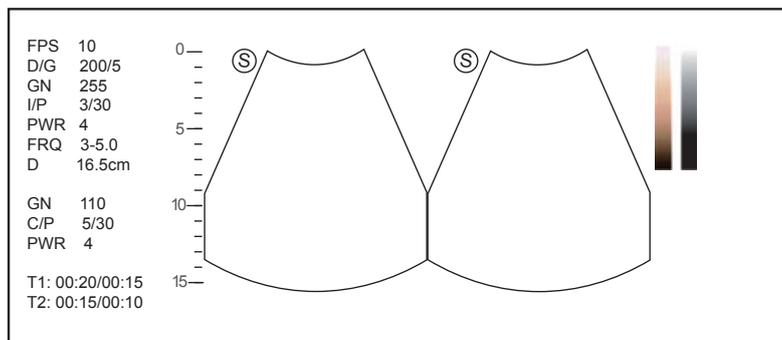
Figure 8-1 Contrast Imaging Screen

- − Press the ▭ button to enter the single display.
- − Press the ▱ button to enter the dual split display.
- − Tap **Exit** to exit the imaging screen.

8.2　　Optimizing Contrast Images

The touch screen displays all controls related to the contrast imaging as shown in the figure, you can use them to optimize contrast images.
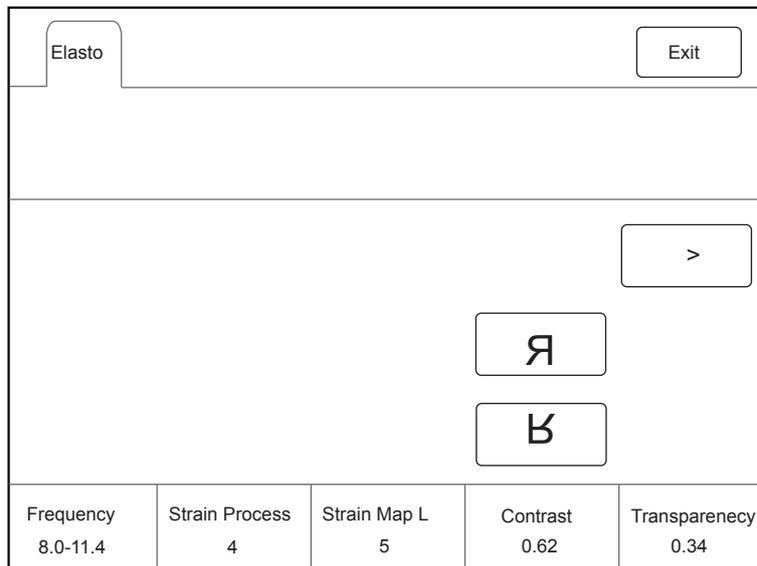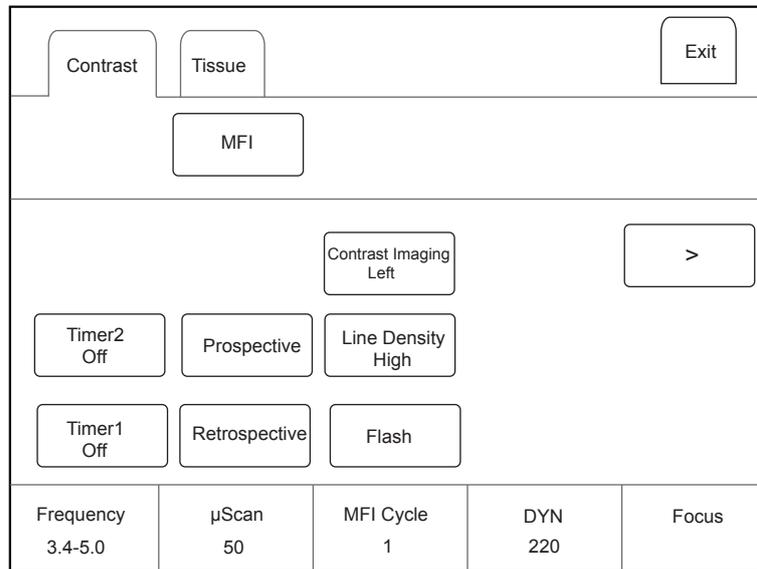

Figure 8-2   Contrast Imaging Parameters Menu

You can tap > on the touch screen to turn the current menu to the previous or the next page if it displays over one page.

You can also tap **Contrast** or **Tissue** to make settings of the relevant tab.

To optimize the image, rotate the knob on the control panel that is directly below the selected item to adjust the value.

NOTE:

All parameters can only be adjusted in a real-time contrast imaging, but **F By F**, **Cine Speed**, **Chroma, μScan** and **Gray Map** can also be adjusted in the frozen mode. For detailed settings of parameters, refer to 6.2.2 Optimizing B-Mode Images.

- ■　**Gain**

Contrast imaging gain determines the amplifying factors for the received echoes and the brightness of the ultrasound image. The echoes are amplified with the same gain value regardless of depth.

To adjust the gain:

- ● Rotate the **CFM** knob to adjust the gain of contrast image.
- ● Rotate the **B** knob to adjust the gain of THI image.

- ■　**Flash Power**

Flash power allows you to select the maximum transmit power level produced by the transducer in the contrast imaging.

To adjust the flash power, rotate the knob located directly below **Flash Power** on the touch screen to make the setting.

- ■　**Flash Time**

Flash time allows you to set the transmit duration of high-voltage pulse.

To adjust the time, rotate the knob located directly below **Flash Time** on the touch screen to make the setting.

■ **Retrospective**

Retrospective allows you to save a cine starting from the moment you tap **Retrospective**.

To use retrospective:

- Tap **Retrospective** on the touch screen to start cine storage.
- Tap **Retrospective** again on the touch screen to stop cine storage.

■ **Prospective**

Prospective allows you to save a cine starting from a time point in the past to the moment you tap **Prospective**.

To use prospective, tap **Prospective** on the touch screen to save the cine.

NOTE:
You can set the time length of the saved cine on the **System Settings > General** menu > **Multikey** tab.

■ **Contrast Image**

In dual display mode, the position of the contrast image and the tissue image can be switched. The contrast image is displayed on the left and the tissue image is displayed on the right by default.

To adjust the position of the image, tap the left or right part of **Contrast Image** to make the setting.

■ **MFI Cycle**

MFI cycle allows you to set the cycle of the microvascular flow imaging.

To adjust the MFI cycle, rotate the knob located directly under **MFI Cycle** to make the setting.

■ **Set First/Last**

Set First/Last allows you to set the first or last frame of the saved cine.

To adjust the first/last frame, rotate the knob located directly under **Set First/Last** to make the setting.

■ **To First/Last**

To first/last allows you to turn to the first or last frame of the saved cine.

To use this feature, tap **To First/Last** on the touch screen to turn to the first or last frame of the saved cine.

8.3   Acquiring Contrast Images

Perform the following steps to acquire contrast images.

1. Inject contrast agents, and select **Timer1** or **Timer2** on the touch screen to start timing.

    Once the timer is started, **Timer** displays on the screen and the system starts timing for contrast agent duration.
    - Press the **Cine** button on the control panel to set the start frame for cine review.

      Press the **Image** button to set the end frame of cine. The corresponding thumbnails for the stored cine appears in the clipboard.
    - Press the ⏮ button on the control panel to freeze the image. Freezing time is displayed on the screen, and the timer continues timing. Press the ⏮ button again to return to the real-time mode.
    - Tap **Timer1** or **Timer2** again to exit.

2. Observe and record circulation and perfusion of the target tissue.

    If the second perfusion is needed, tap **Flash** on the touch screen to enter the flash contrast imaging and destruct microbubbles. Tap **Flash** repeatedly to destruct the residual microbubbles. After the destruction, inject contrast agents and observe the perfusion of the target tissue.

3. Press the ⏮ button to freeze the image.

8.4   Working with Contrast Images

You can work with the contrast images by using the features in the frozen mode, such as cine review, annotations, data storage or measurement. For details, refer to Section 11.4 Using Cine, Section 11.5 Annotations and Body Marks, Chapter 12 Managing Images/Data and the relevant sections in the advanced user manual.

You can also get more information about blood flow characteristics through observing TIC curves. TIC curve indicates the contrast agent intensity variation with duration. To make a TIC analysis, you should position ROI (8 at most), and then make a detailed analysis of the contrast agent intensity variation with duration.

Perform the following steps to make a TIC analysis.

1. Tap **TIC** in the frozen mode to enter the TIC analysis screen.

2. Position one or more ROIs on the contrast image.

    - Tap **Ellipse** on the touch screen, position a ROI by performing an ellipse measurement.

    - Tap **Trace** on the touch screen, position a ROI by performing an auto-trace measurement.

    Once you position a ROI, the corresponding TIC curve is displayed on the bottom, colors of TIC curve and ROI are consistent.

    As Figure 8-3 TIC Analysis Screen shows, all relevant parameters are displayed on the top right part of the screen.
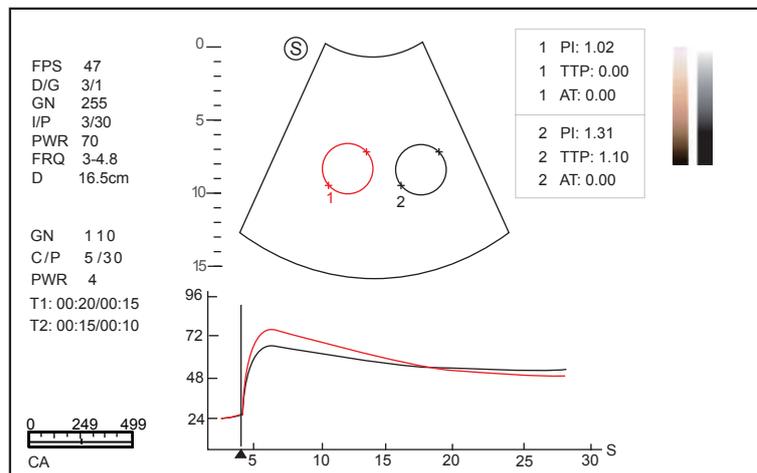
Figure 8-3 TIC Analysis Screen

    - X axis is the contrast agent duration, represents in s.

    - Y axis represents the contrast agent intensity, represents in dB.

    You can press the **Clear** button on the control panel to delete all ROIs and TIC curves.

3. Analyze TIC curves for more information about circulation and perfusion.

    Use the trackball to observe contrast images frame by frame, the indication line on the corresponding TIC varies with the frame.

4. Tap **Exit** on the touch screen to return to the frozen dual split display.

■   **MFI Time**

You can tap **MFI Time** on the touch screen to display the time imaging process.

■   **MFI**

You can tap **MFI** on the touch screen to display the microvascular flow imaging.

■   **MIX**

You can tap **MIX** on the touch screen to display a mixed image of the contrast image and the tissue image, which is helpful for determining the anatomical location of the contrast region of interest in the tissue.

■   **MIX**

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9   3D Imaging

3D imaging allows you to see width, height and depth of the anatomical structure. 3D imaging can be performed by all probes, but the quality of the images is closely related to 2D imaging.

3D imaging mainly applies to obstetric, gynecologic and abdominal exams.

3D imaging in CFM, PDI, Contrast and Stic mode is available for the system.

To enter CFM 3D imaging, press the **CFM** knob on the control panel and press the **3D/4D** button on the control panel to enter the inactivated CFM 3D mode.

To enter PDI 3D imaging, press **CFM** knob on the control panel and tap **PDI** on the touch screen, and then press the **3D/4D** button on the control panel to enter the inactivated PDI 3D mode.

To enter Contrast 3D imaging, press **Contrast** button on the control panel, and press the **3D/4D** button on the control panel to enter the inactivated Contrast 3D mode.

To enter STIC 3D imaging, press **3D/4D** button the control panel, and tap **STIC** on the touch screen to enter the inactivated STIC 3D mode.

9.1   Acquiring 3D Images

The following description uses 3D imaging performed with the VC6-2 probe as an example.

Perform the following steps to acquire 3D images.

1.   Enter the patient information, select the VC6-2 probe and an exam type (such as the obstetric exam used throughout this chapter) to enter the real-time B mode.

2.   Optimize imaging parameters in the B mode, ensure the image has high contrast, high gain and low noise.

3.   Apply adequate gel on the patient.

4.   Acquire a 2D-mode image of high quality.

5.   Press the **3D/4D** button on the control panel to enter the inactivated 4D mode.

   NOTE:
   - When using a volume probe, you can set the default inactivated mode. For details, refer to 4.1.3 Multikey Settings.
   - When using a non-volume probe, you should press the ⏮ button in the B mode and then press the **3D/4D** button on the control panel to enter the 3D imaging mode.

6.   Tap the **3D** tab to enter the inactivated 3D mode.

The 2D imaging with a ROI and a sample line is displayed in the inactivated 3D mode. Only the data in the ROI is acquired for 3D imaging, as shown in Figure 9-1.
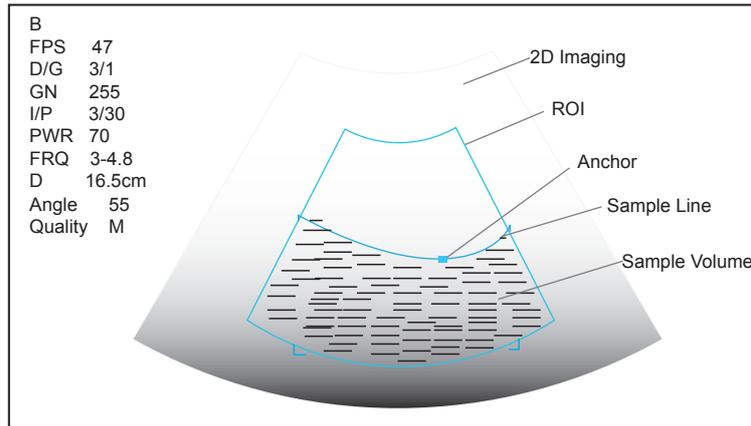
Figure 9-1 Inactivated 3D Imaging Screen

7. Adjust the ROI and the sample line.

    − Use the trackball to position the ROI.

    − Press Set Key on the control panel, then use the trackball to resize the ROI.

    − Press Set Key on the control panel again, use the trackball to position the anchor to change the shape of sample line.

    − If needed, press Set Key on the control panel to position the ROI by using the trackball.

8. Set the user mode, sweep angle, focus position and image quality.

    − Tap an item under **User Mode** to select a user mode.

    − Rotate the knob located directly below **Sweep Angle** to adjust the sweep angle of probe.

    − Rotate the knob located directly below **Focus** to decrease or increase the depth of focal zone.

    − Rotate the knob located directly below Image Quality to adjust quality of images.

9. Tap ⬚, ⬚, or ⬚, then tap **Start** or press the ⏮ button to display the 3D imaging in a full, dual or quad display. The system automatically enters the 3D imaging in a quad display by default.

    Take 3-dimensional gray-scale image in quad display as an example, the imaging area of the screen is divided into 3 reference images and a 3D image by default.
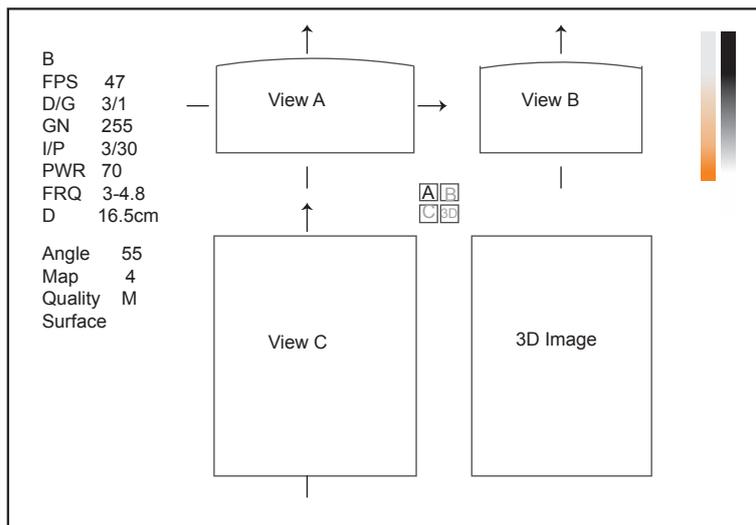
Figure 9-2 3D Imaging Screen

As the above figure shows,

- View A on the top left shows the image on the X-axis.

- View B on the top right shows the image on the Y-axis.

- View C on the bottom left shows the image on the Z-axis.
- The image on the bottom right shows the 3D image.

As Figure 9-3 shows, the touch screen displays all controls related to the 3D imaging.
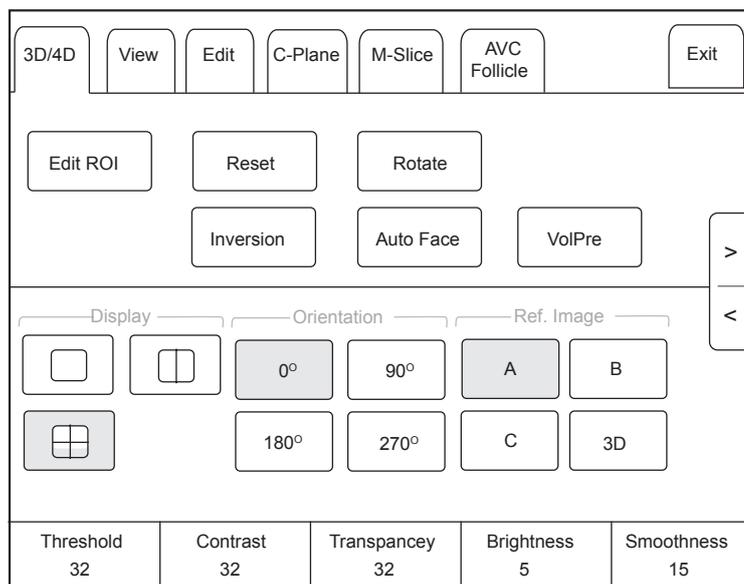
Figure 9-3 3D Imaging Parameters Menu

- Tap < or > to turn the current menu to the previous or the next page.
- Tap **VolPre** or press the ▶◀ button to return to the inactivated 3D mode.
- Tap **Exit** on the **3D/4D** tab to return to the real-time B mode. Tap **Exit** on other tabs to switch to the **3D/4D** tab.

9.2 Working with 3D Images

You can review, optimize or save 3D images.

You can also tap **Edit ROI** on the touch screen to freeze three reference images, and then use the trackball to view the 3D image for better observation; tap **Edit ROI** again to unfreeze three reference images.

9.2.1 Adjusting the ROI

You can crop the 3D image by adjusting the ROI on the reference images.

Perform the following steps to adjust the ROI.

1. Tap **3D/4D** > **A**, **B** or **C** to select the desired reference image.

2. Adjust images inside the ROI on the reference image.
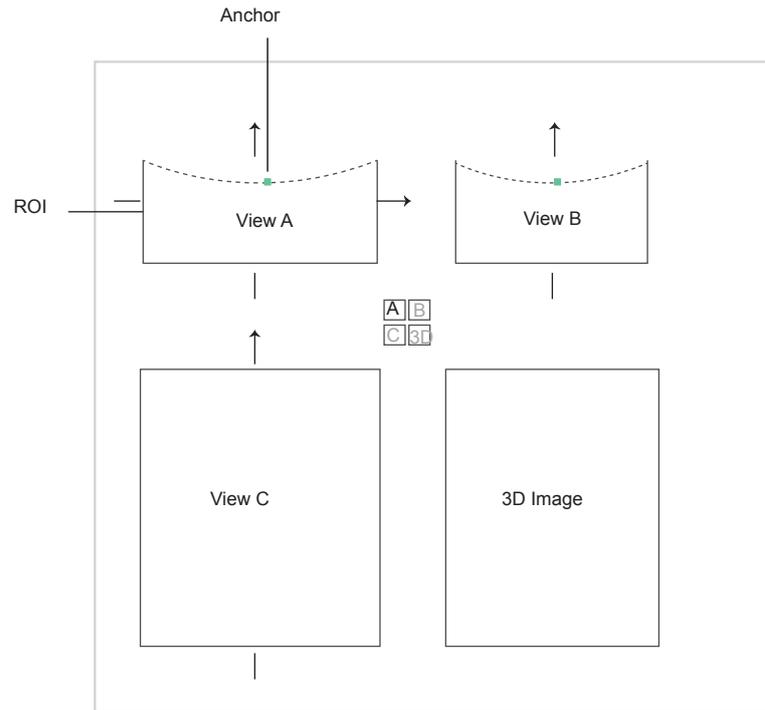
Figure 9-4 Cropping Review Screen

- Use the trackball to position the ROI.
- Press Set Key on the control panel, then use the trackball to resize the ROI.
- Press Set Key on the control panel again, use the trackball to position the anchor to change the shape of sample line.
- If needed, press Set Key on the control panel to position the image by using the trackball.

Only images inside the ROI are generated to a 3D image, and the real-time 3D image is also displayed when cropping reviews.

9.2.2   Setting Display Format

To set the display format, tap **3D/4D**, and tap ⬜, ⬚, or ⊞ to enter the full, dual or quad split screen display mode.

9.2.3   Setting Render Mode

Tap **3D/4D >** an item under **Render Mode** to select a render mode.

- **Surface** displays gray values of the surface structures. It is suitable for observing the contour (eyes, ears, nose, lip) of fetus.
- **Grad. Light** displays the surface structures in a strengthen light intensity. It is suitable for observing the contour (eyes, ears, nose, lip) of fetus.
- **Skeleton** displays the highest intensity of echo along the ultrasound beam. It is suitable for observing the spinal column and skeleton of the fetus. You can choose **Skeleton** or **Skeleton Depth**.
- **X-Ray** displays all gray values within ROI. It is suitable for observing tissue or tissue mass.
- **S-Depth** displays color signals of the echoes along the ultrasound beam. It is suitable for observing the contour (eyes, ears, nose, lip) of fetus.
- **Transp. Min** displays the minimum gray value within ROI. It is suitable for observing dark areas (vessels, cysts).
- **S-Live** displays sides of the surface structures in a strengthen light intensity. The icon 🌑 appears at the lower-right corner of the screen when **S-Live** mode is selected. It is suitable for observing 3D surface. You can choose **S-live** or **S-Live Silhouette**.

In CFM 3D and PDI 3D mode, there are three types of render mode, including Color, Glass and Gray.

- In Color render mode, only the flow in 3D image is rendered. Surface, X-ray, MIP and Grad.Light are available.
- In Glass render mode, both the grayscale and the flow in 3D image are rendered. Surface + Surface and Surface+MIP are available.
- In Gray render mode, only the grayscale in 3D image is rendered. Surface and Grad.Light are available.

9.2.4   Cropping Reviews

You can crop the 3D image by tracing its border, adjusting a box or using the eraser.

■   **Cropping Reviews with Trace**

You can crop 3D image by tracing its border to remove areas outside the area of interest. This feature is suitable for cropping irregular reviews.

Perform the following steps to crop a review.

1. Tap **Edit** > [icon] or [icon] to enable the feature.
   - Tap [icon] to remove all data inside the traced area from the image.
   - Tap [icon] to remove all data outside the traced area from the image.
2. Move the cursor on the image by using the trackball, press Set Key on the control panel, and then trace the border of the object.

3. Press Set Key to acquire the desired image.

   In the following figure, [icon] is enabled.

NOTE:
- Tapping [⤺All] can restore the review.
- Taping [⤺Last] can undo the last cut.
- Taping [↻] can redo the last cut.

■   **Cropping Reviews by the Box**

You can crop 3D image by adjusting a box on the 3D image to remove irrelevant areas from interest area. This feature is suitable for cropping regular reviews.

Perform the following steps to crop a review.

1. Tap **Edit** > ![icon] or ![icon] to enable the feature.
    - Tap ![icon] to remove all data inside from the image.
    - Tap ![icon] to remove all data outside from the image.

2. Move the cursor to the image by using the trackball, press Set Key on the control panel, and then trace the border of the object.

3. Press Set Key to acquire the desired image.

NOTE:
- Tapping ![icon]All can restore the review.
- Taping ![icon]Last can undo the last cut.
- Taping ![icon] can redo the last cut.

■ **Cropping Reviews by the Eraser**

You can crop 3D image by using the eraser to remove irrelevant areas from interest area. This feature is suitable for cropping irregular reviews.

Perform the following steps to crop a review.

1. Tap **Edit** > ![icon] big eraser or ![icon] small eraser to enable the feature.

2. Move the cursor on the image by using the trackball, press Set Key on the control panel, and then use the eraser to remove irrelevant areas.

3. Press Set Key to acquire the desired image.

NOTE:
- Tapping ![icon]All can restore the review.
- Taping ![icon]Last can undo the last cut.
- Taping ![icon] can redo the last cut.

■ **Cut Part**

In CFM 3D and PDI 3D mode, you can tap Edit on the touch screen to select the cut part, including Color, Gray+Color and Gray.

NOTE:

Only when the render mode is Glass, the Cut Part feature is enabled.

9.2.5 Moving/Rotating/Magnifying Images

■ **To select an image**

Tap **3D/4D** > **A**, **B**, C or **3D** to select the desired image.

■ **To move images**
- Tap View, and rotate the knob located directly below Move L/R to move images Left/Right.
- Tap View, and rotate the knob located directly below Move U/D to move images up/down.
- Rotate the **CFM** knob on the control panel to move images Left/Right.

■ **To rotate images**
- Tap **3D/4D or Edit** and then tap **Rotate** to rotate images by using the trackball.
- **Tap View** and then tap **0º/45º/90º/180º/270º/360º** to set the rotation angle. All images are automatically rotated from the original position to the position of 1/2 preset angle and then rotated in a reversed way in turns.
- Tap **View** > **Top**, **Bottom**, **Left**, **Right**, **Front** or **Back** to rotate all images.

- Tap **View**, and rotate the knob located directly below **Rotate X**, **Rotate Y** or **Rotate Z** to manually rotate all images along x, y or z axis.
- Rotate the **M/CW/PW** knob to manually rotate all images along x, y or z axis.
- Tap **3D/4D** > **0º/90º/180º/270º** to rotate all images in a preset angle.
- Tap **3D/4D** > **3D** to rotate the 3D image by using the trackball.

■ **To zoom out/in all images**

Rotate the **Zoom** button on the control panel to zoom in or zoom out the image. Meanwhile, a size multiplier is displayed in the information area of the basic screen. Press the **Zoom** button on the control panel to restore to the default size.

■ **To inverse images**

Tap **3D/4D** > **Inversion** to inverse the gray values of anechoic structures on 3D image.

9.2.6 Optimizing 3D Image

■ **To choose the color**
- Tap **3D/4D**, and rotate the knob located directly below **3D Chroma** to choose the color scheme for the 3D image.
- Tap **3D/4D**, and rotate the knob located directly below **B Chroma** to choose the color scheme for reference images.
- Tap **M-Slice**, and rotate the knob located directly below **B Chroma** to choose the color scheme for slices.

The grayscale or color map on the top right of the imaging area varies with this setting.

■ **To set the contrast and transparency**
- Tap **3D/4D**, and rotate the knob located directly below **Contrast** to set the contrast of the 3D image.
- Tap **3D/4D**, and rotate the knob located directly below **Transparency** to set the transparency of the 3D image.

■ **To set threshold, smoothness and brightness**
- Tap **3D/4D**, and rotate the knob located directly below **Threshold** to set the threshold value of the 3D image.
- Tap **3D/4D**, and rotate the knob located directly below **Smoothness** to set the smoothness of the 3D image.
- Tap **3D/4D**, and rotate the knob located directly below **Brightness** to set the brightness of the 3D image.

■ **To use μScan**
- Tap **3D/4D** and rotate the knob located directly below **2D μScan** to set the image quality of three reference images.
- Tap **3D/4D** and rotate the knob located directly below **3D μScan** to set the image quality of the 3D image.

■ **To adjust the light position**
- In S-Live mode, tap **Edit Light** on the touch screen, and locate the light position using the trackball, then press Set Key on the control panel.
- You can rotate the knob located directly below **Light Pos.** to set the light position. The light icon at the lower-right of the screen will change accordingly, and the shined area of 3D image will be brightened.

■ **Color Map**

In CFM 3D and PDI 3D mode, tap **3D/4D** on the touch screen and rotate the knob located directly below **Color Map** to adjust the chroma of the color flow.

■ **Color Off**

In CFM 3D and PDI 3D mode, tap **Color Off** on the touch screen to turn off the color flow and display grayscale image only.

■ **Gray/Color**

In CFM 3D and PDI 3D mode, tap **3D/4D** on the touch screen and rotate the knob located directly below **Gray/Color** to adjust the percentage of grayscale to color.

NOTE:

Only when the render mode is Glass, the Gray/Color feature is enabled.

■ **Color Thres.**

In CFM 3D and PDI 3D mode, tap **3D/4D** on the touch screen and rotate the knob located directly below **Color Thres.** to adjust the color threshold.

9.2.7 Observing Reference Image by the Plane

You can observe reviews by using the plane.

Perform the following steps to observe a review.

1. Tap **C-Plane** to enable this feature.
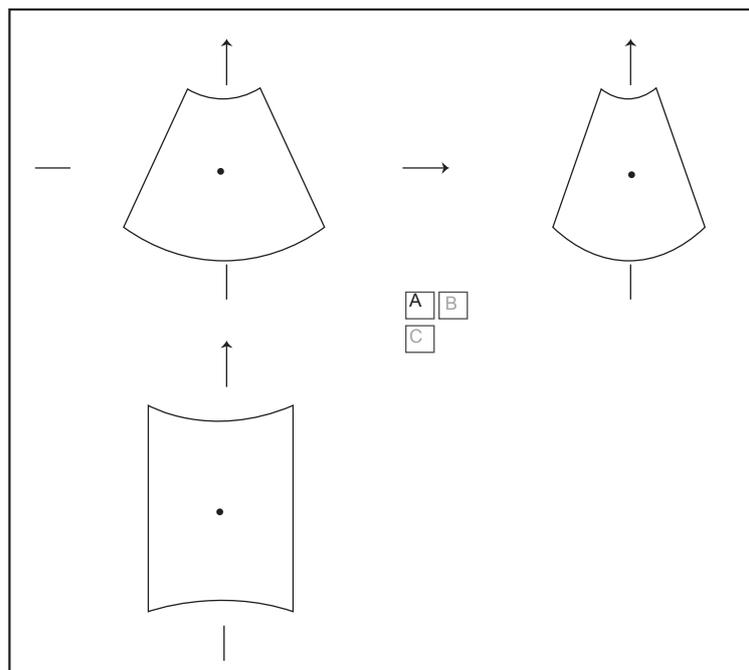
2. Tap **A**, **B** or **C** to select the desired reference image, and then tap $\boxed{\text{A}\,|\,\text{B}}$, $\boxed{\text{A}\,|\,\text{C}}$, $\boxed{\text{B}\,|\,\text{C}}$ or $\boxed{\substack{\text{A}\,|\,\text{B}\\\text{C}}}$ to select the display formate.

3. Move the cursor on the desired reference image by using the trackball, and observe reference images on the screen.

9.2.8 Observing Reviews by the Slice

You can observe reviews by using two or more slices. For example, each layer of an irregular tumor can be observed by applying this feature.

Perform the following steps to observe a review.

1. Tap **M-Slice** > **A**, **B** or **C** to select the desired image.

   After the selection, the desired image on the corresponding axis is displayed on the screen.

2. Tap **1*2, 2*2, 3*3, 3*4, 4*4** or **5*5** to set the slice number.

   In the following figure, 9-slice imaging on the X axis is taken as an example.
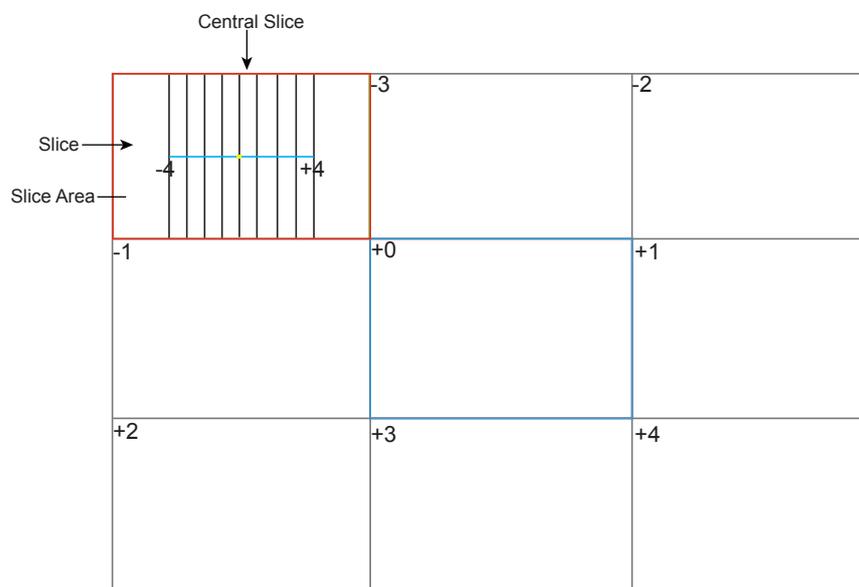
Figure 9-5 Multi-Slice Imaging Screen

Nine slices and the corresponding number are displayed on the slice imaging. The middle full line is the central slice in the current slice axis, and it is numbered as 0.

Except for the central slice, the other eight slices are indicated by the number at the top left corner of the slice and are displayed on the screen. Rotate the knob located directly below **Display** on the touch screen to move all the slices in the slice area left or right.

Move the cursor on the one slice by using the trackball to select it.

To adjust the slice position/slice distance/slice number,

- Rotate the knob located directly below **Adjust Pos.** to fine-tune the selected slice position.
- Rotate the knob located directly below **Distance** to adjust the span among the slices. The span and content vary with this setting.
- Rotate the knob located directly below **Slice Num** to decrease or increase the number of slice.

After adjusting, the slice position, slice distance, the slice number, and the corresponding image of the slice will change accordingly.

9.2.9   Setting the Scan Mode

Set **Scan Mode** in accordance with your preference.

Tap **Sector** or **Linear** to set the sweep mode.

NOTE:

This setting is only effective when entering 3D imaging from a frozen B image.

9.2.10   Adjusting ZAngle/ZScale

The image may be distorted if you perform the scan too quickly by using the probe. To acquire a vivid image, you can adjust the value of **ZAngle**/**ZScale** before the scan.

- If **Scan Mode** is set to **Sector**, you can adjust the sweep angle when performing the scan with the probe. Rotate the knob located directly below **ZAngle** to adjust the angle.

- If **Scan Mode** is set to **Linear**, you can adjust the sweep span when performing the scan with the probe. Rotate the knob located directly below **ZScale** to adjust the scale.

NOTE:

This setting is only effective when entering 3D imaging from a frozen B image.

9.2.11 Restoring the Image

Tap **3D/4D** > **Reset** to restore the views and cutting lines to the default position.

9.2.12 Customizing Presets

You can modify parameters, adjust sample volume or ROI in the 3D mode and save them as the application preset for future use. Moreover, the customized layout of the application mode screen can be modified and restored to factory defaults.

NOTE:

Only the volume probes are capable of this feature.

For details, refer to Section 6.1 Selecting a Probe and an Exam Type.

The application presets can be displayed as options of the **User Mode** item in the inactivated 3D mode.

9.2.13 Performing Follicle Auto-Measurement

Tap **AVC Follicle** > **Left Ovary/Right Ovary** to automatically measure the number and the volume of follicles. The position of follicles is displayed on three reference images and 3D image.

10 4D Imaging

4D imaging enables the display of real-time 3D anatomical structures.

4D imaging can only be performed by compatible volume probes. 4D imaging adds the dimension of "movement" to a 3D image by providing continuous, real-time displays of internal organs or fetus. 3D imaging provides single frame images, while 4D imaging provides continuous, high volume acquisition of 3D images.

The following description uses the fetal imaging as an example, the other imaging options are as the same.

Contrast 4D mode is available for the system.

To enter the Contrast 4D mode, press the **Contrast** button on the control panel and tap **3D/4D** on the touch screen, and then tap **Contrast 4D** on the touch screen to enter the inactivated Contrast 4D mode.

10.1   Acquiring 4D Images

The following description uses 4D imaging performed with the VC6-2 probe as an example.

10.1.1   Entering the Real-Time 4D Imaging

Perform the following steps as follows.

1. Enter the patient information, select the VC6-2 probe and an exam type (such as the obstetric exam used throughout this chapter) to enter the B mode.

2. Optimize imaging parameters in the B mode.

3. Apply adequate gel on the patient.

4. Acquire a high quality B-mode image.

5. Press the **3D/4D** button on the control panel.

6. Tap the **4D** tab on the touch screen to enter the inactivated 4D mode.

   NOTE:

   For volume probes, you can set the default inactivated mode. For details, refer to 4.1.3 Multikey Settings.

   The 2D imaging with a ROI and a sample line is displayed in the inactivated 4D mode. Only the data in the ROI is acquired for 4D imaging.
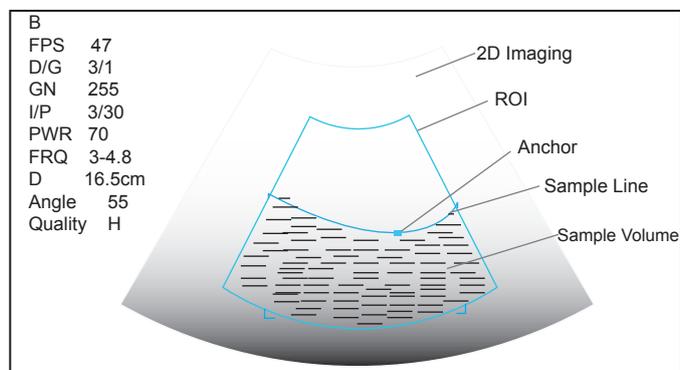
Figure 10-1 Inactivated 4D Imaging Screen

7. Adjust the ROI and sample line.

   − Use the trackball to position the ROI.

   − Press Set Key on the control panel, then use the trackball to resize the ROI.

   − Press Set Key on the control panel again, use the trackball to position the anchor to change the shape of sample line.

   − If needed, press Set Key on the control panel to position the ROI by using the trackball.

8. Set the sweep angle, focus position, image quality and stability.

   − Rotate the knob located directly below **Sweep Angle** to adjust the sweep angle of probe.

   − Rotate the knob located directly below **Focus** to decrease or increase the depth of focal zone.

   − Rotate the knob located directly below **Image Quality** to adjust quality of images.

   − Rotate the knob located directly below **Stability** to enable or disable the image quality feature.

   For other parameters, refer to Section 9.2 Working with 3D Images.

9. Display the 4D imaging in the following instructions.

   − Tap the ☐, ☐, ⊞ or button, and tap **Start** or press the ⏮ button to display the 4D imaging in a full, dual or quad display. The system automatically enters the 4D imaging in a quad display by default.

   − Press the **1**, **2** or **4** key on the key panel to display the 4D imaging in a full, dual or quad display.

   The imaging area of the screen is divided into 3 reference images and a dynamic 3D image by default.
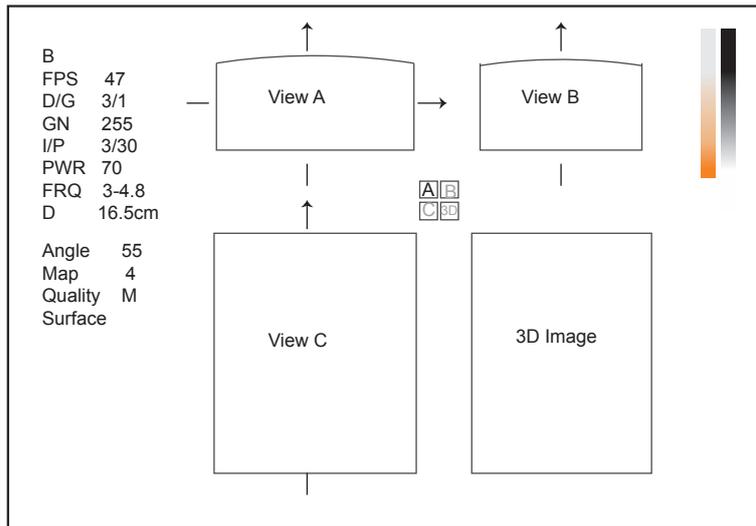
Figure 10-2 4D Imaging Screen

As the above figure shows,

● View A on the top left shows the image on the X-axis.

● View B on the top right shows the image on the Y-axis.

● View C on the bottom left shows the image on the Z-axis.

● The image on the bottom right shows the dynamic 3D image.

As Figure 10-3 shows, the touch screen displays all controls related to the 3D imaging.
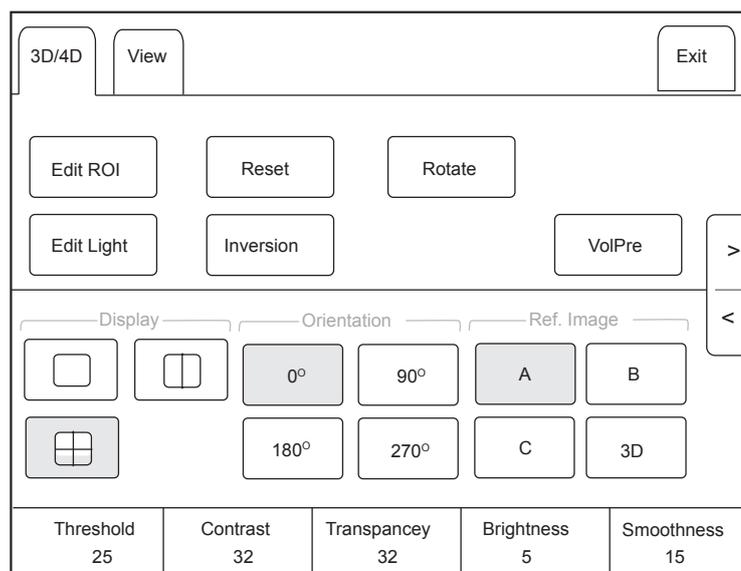
Figure 10-3 4D Imaging Parameters Menu

- Tap > or < to turn the current menu to the previous or the next page.
- Tap **VolPre** to return to the inactivated 4D mode.
- Tap **Exit** on the 3D/4D tab to return to the real-time B mode. Tap **Exit** on other tabs to switch to the 3D/4D tab.

10.1.2 Acquiring Dynamic 3D Image

You can acquire a dynamic 3D image of high quality in the real-time 4D mode by applying the features described in Section 9.2 Working with 3D Images. You can also tap **Edit ROI** on the touch screen to freeze three reference images and then use the trackball to view the 3D image for better observation; tap **Edit ROI** again to unfreeze three reference images.

Press the ⏭ button on the control panel to display the progress bar of cine review. Tap **Auto Play** to play the cine review. Tap it again to stop the cine review.

10.2 Working with 4D Images

You can review, optimize or save 4D images in the frozen mode. For details, refer to Section 9.2 Working with 3D Images.

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11 Working with Images

You can work with the acquired images by using the features provided by the system, such as the split screen, panoramic display and annotations.

11.1 Imaging Features

11.1.1 Imaging Reverse

Tap Я on the touch screen to reverse the real-time scan left or right.

Tap ⅄ on the touch screen to reverse the real-time scan up or down.

11.1.2 Split Screen Display

You can position two or four images side by side on the screen to compare the images by using the split screen display.

■ **Dual-Split Screen Display**

1. Press the **B**, **CFM**, **M**, **PW** or **CW** button on the control panel to select an imaging mode for the real-time scan.

2. Press the ▢ button on the control panel to enter the dual split screen display.

   The image is duplicated into two parts with a frozen image on the left and a real-time scan on the right. The real-time scan in B-mode is taken as an example in the following figure.
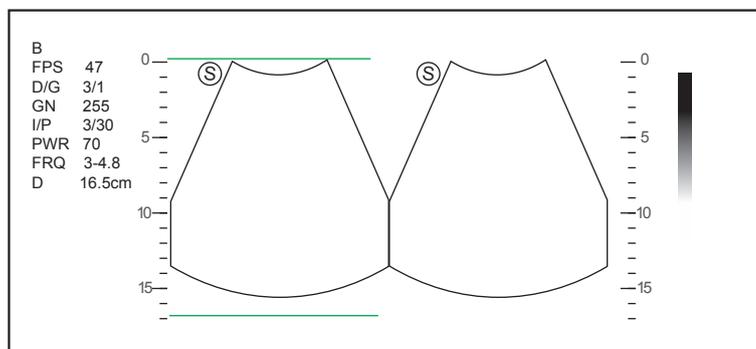
Figure 11-1 Real-time B+Frozen B

   − Press the ▢ button on the control panel to freeze the real-time scan and unfreeze the other image.
   − Press the **CFM**, **M**, **PW** or **CW** button to select an imaging mode for the real-time scan.
   − Tap **Dual Live** to display two real-time scans if one of the two images is a color-mode image.
   − Press the **B** button to exit the dual split display.

   The image is duplicated into two parts with two real-time scans.
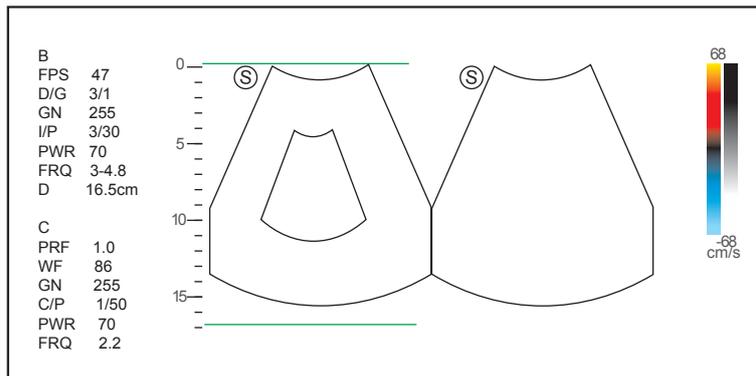
Figure 11-2 Real-time CFM + Real-time B

■   **Quad-Split Screen Display**

1. Press the **B**, **CFM**, **M**, **PW** or **CW** button on the control panel to select an imaging mode for a real-time scan.

2. Press the ⊞ button on the control panel to enter the quad split screen display.

    The B-mode image is taken as an example in the following figure.
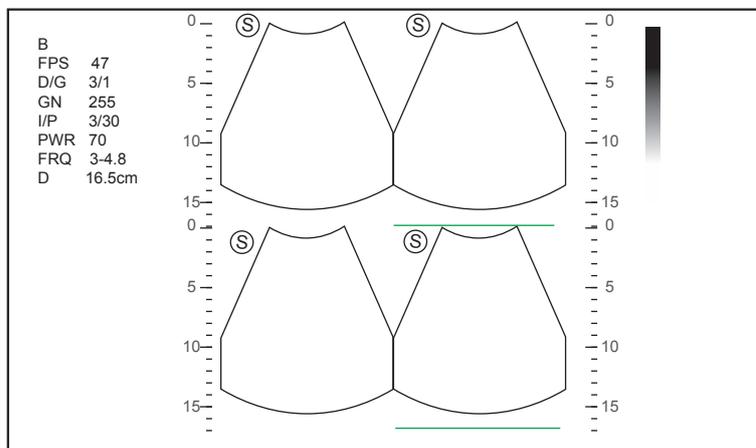
Figure 11-3 Quad-Split Screen Display

− Press the ⊞ button on the control panel to freeze the current image and unfreeze the following clockwise image.

− Press the **CFM**, **M**, **PW** or **CW** button to select an imaging mode for the real-time scan.

− Press the **B** button to exit the quad split screen display.

11.1.3 Auto

Auto optimizes the image quality.

To enable Auto:

Press the **Auto** button on the control panel to optimize image quality.

11.1.4 Harmonic Imaging

Harmonic Imaging uses the harmonic frequencies generated by tissue. The fundamental transmit frequency results in a harmonic frequency echo. The harmonic frequency received from the tissue is a multiple of the fundamental transmit frequency. The fundamental and any accompanying artifacts are missing from the harmonic frequency that the system receives. The artifact reduction, and the concomitant reduction in haze and clutter, increases contrast resolution and improves border delineation. THI is useful in difficult-to-image patients. Harmonic Imaging includes THI and PHI.

In real-time scan of B mode, tap **THI** on the touch screen or press the **THI** key on the key panel to enable the THI mode, and **THI or PHI** appears at the lower left corner of the screen. Optimize the image the same way you did in the B mode.

Tap **THI** on the touch screen or press the **THI** key on the key panel again to exit the imaging, and **THI** disappears from the screen.

NOTE

- The system optimizes certain parameters (B-mode gain and frequency, and frame rate) upon enabling Harmonic Imaging automatically.
- Compared to the B-mode imaging, Harmonic Imaging improves image resolution but decreases the frame rate. Therefore, you should make an optimal balance when choosing an imaging mode.
- Harmonic Imaging is only available with compatible probes.

11.1.5 Panoramic Imaging

Panoramic imaging is an imaging process that produces a panoramic image by using certain probes. The panoramic image provides sequentially and individually aligned 2D images on a static image. The 2D images are real-time, showing their anatomical context of an adjacent structure. Panoramic imaging allows you to display, view and measure a new stitched image constantly.

NOTE:

- Panoramic imaging is available with linear, curved and phased array probes.
- Apply an adequate amount of coupling gel along the intended path of the scan.
- Do not shake, rotate or tilt the probe during the scan.
- Ensure the probe remains to be in contact with the skin perpendicularly during the scan.
- Do not change the scan direction or move the probe backwards and forwards.
- When the scan depth increases, it is generally required to decrease the scan speed.

■ **Real-Time Panoramic Imaging**

Panoramic imaging is available in B mode, CFM mode and PDI mode. The operation for panoramic imaging in CFM and PDI mode is the same with that of B mode.

Perform the following steps to apply real-time panoramic imaging.

1. Optimize the B-mode image.

2. Tap **Panoramic** on the touch screen to enter the inactivated Panoramic Imaging mode.

   You can press the ⏮ button on the control panel to exit and return to the B mode.

3. Press the **Update** button on the control panel to enter the real-time panoramic imaging.

4. Perform the scan.

   A real-time stitched image is generated, on which probe a speed box and a hint are displayed. A blue speed box indicates a slower scanning speed, a green speed box indicates a normal scanning speed and a red speed box indicates a faster scanning speed.

5. Press the ⏮ button to display the panorama.

   You can press the ⏮ button again to return to the inactivated mode.
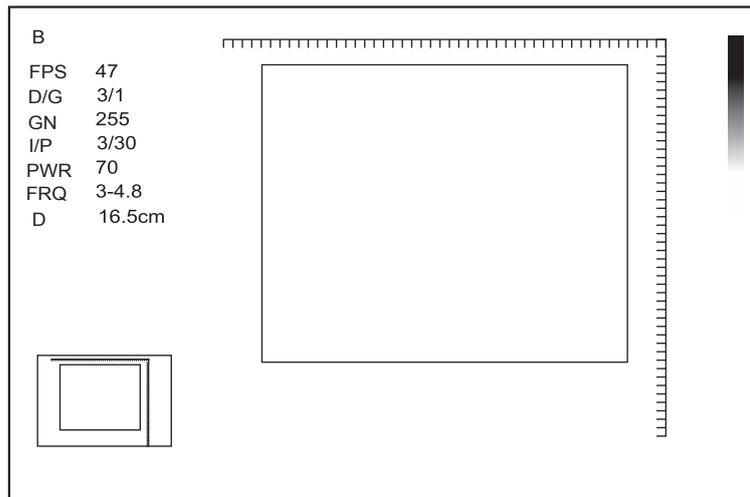
Figure 11-4 Real-Time Panoramic Imaging Screen

6. Work with the image.

   – Magnify the Image

      Tap **ZOOM** on the touch screen to enable the Picture-In-Picture feature, and a thumbnail is displayed in the lower left corner of the screen.

      Use the trackball to position the interest area, and rotate the knob located directly below **ZOOM** to zoom in or out the image.

   – Rotate the knob located directly below **Rotate** on the touch screen to rotate the image clockwise or counterclockwise.

   – Tap **Overview** on the touch screen to restore the image to the default setting.

   – Make measurements, annotations and body marks.

7. Tap **Exit** on the touch screen to exit panoramic imaging and return to B real-time mode.

■   **Frozen Panoramic Imaging**

   NOTE:

   Ensure you disable the compound imaging feature before you apply the frozen panoramic image.

   Perform the following steps to apply frozen panoramic imaging.

   1. Optimize the B-mode image, and press the ⏯ button on the control panel to freeze the image.

   2. Tap **Panoramic** on the touch screen, and the initialization message appears on the screen.
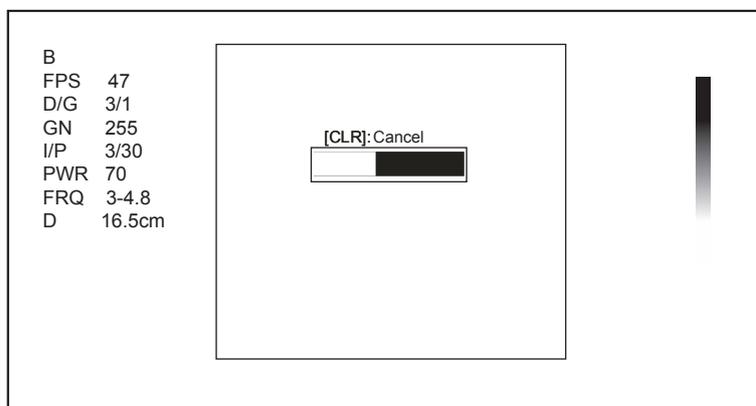
Figure 11-5 Frozen Panoramic Imaging Screen

Pressing the **Clear** button on the control panel can abort the initialization.

3. Work with the image.

  - Magnify the Image

    Tap **ZOOM** on the touch screen to enable the Picture-In-Picture feature, and a thumbnail is displayed in the lower left corner of the screen.

    Use the trackball to position the interest area, and rotate the knob located directly below **ZOOM** to zoom in or out the image.

  - Rotate the knob located directly below **Rotate** on the touch screen to rotate the image clockwise or counterclockwise.

  - Tap **Overview** on the touch screen to display or close the thumbnail.

  - Make measurements, annotations and body marks.

4. Press the ⏮ button on the control panel or tap **Exit** on the touch screen to exit panoramic imaging.

11.2 Magnifying an Image

11.2.1 Filling the Full Screen

Press the **Scr-Zoom** key on the key panel to magnify the imaging area to fill the full screen. Or, press the **Scr-Zoom** key again to exit the full-screen display.

11.2.2 Magnifying the Whole Image

You can magnify the whole image in the real-time or frozen mode.

Perform the following steps.

1. Rotate the **Zoom** button on the control panel to magnify the image.

   A size multiplier is displayed on the general parameters area.

2. Rotate the **Zoom** button to adjust the size multiplier and use the trackball to select a desired area on the thumbnail.

3. Press the **Zoom** button to disable this feature.

11.2.3 Magnifying the ROI

You can magnify the ROI in a real-time scan.

Perform the following steps.

1. Press the **Zoom** button on the control panel to enter the inactivated magnifying ROI mode.

2. Adjust the ROI to set an interest area.

   - Position the ROI by using the trackball.
   - Press Set Key on the control panel, and use the trackball to adjust the size of the ROI.
   - After adjusting the ROI, press Set Key.

3. Press the **Zoom** button to magnify the interest area.

4. Press the **Zoom** button again to disable this feature.

11.3 Freezing an Image

Press the ⏮ button on the control panel to capture an image in a real-time scan or dual/quad split screen display and the feature to be applied is also activated. For this setting, refer to Section 4.1.1 General Settings.

You can select any desired image mode, magnify the image, perform measurements, add annotations and body marks and adjust imaging parameters in the frozen mode.

11.4 Using Cine

The cine review is available by pressing the ⏮ button on the control panel and the progress bar appears on the screen.

```
      0           249          498
      ├──┬──┬──┬──┼──┬──┬──┬──┤
      └──────────┴──────────┘
```
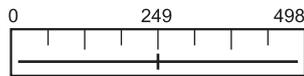
You can play back the cine by tapping **Auto Play** on the touch screen or review the cine by using the trackball. Moreover, the cine can also be cut for your actual use.

11.4.1 Reviewing Cine

■   **To view cine manually**

You can review the cine frame by frame by using the trackball or tapping **F By F** on the touch screen in the frozen B mode. Each image is identified by a number which indicates its position in the cine.

NOTE:
- You can adjust the parameter settings when review cine.
- You can tap **To First** or **To Last** on the touch screen to review the first or last frame.

■   **To review cine automatically**

Tap **Auto Play** on the touch screen to play or stop the cine review automatically.

Or, rotate the knob located directly below **Cine Speed** on the touch screen to adjust the review speed during the cine review.

11.4.2 Cutting Cine

To cut the cine:

1. In the frozen mode, rotate the knobs located respectively below **Set First/Last** on the touch screen to select the start frame and the end frame.

2. Press the **Cine** button on the control panel to save the cut cine.

11.5 Annotations and Body Marks

The annotation feature allows you to type or add an annotation from the predefined annotation library. You can annotate the cine, real-time image or frozen image. Arrows and body marks are also provided to annotate the image.

NOTE:
You should define an annotation library before applying this feature. For details, refer to Section 4.4 Body Mark Settings.

11.5.1 Annotating an Image

■   **Annotating an Image with Typed Words**

Perform the following steps.

1. Press the **Annot** button on the control panel or the **Space bar** on the key panel.
    The cursor becomes | on the screen and the predefined words appears on the touch screen.

2. Move the cursor to the desired place by using the trackball, and tap the predefined word on the touch screen to add it to the image.
    − Move the cursor to the desired place, and input an annotation by using the key panel.

- Move the cursor to an annotation, and press Set Key. Then move the annotation to the desired position by using the trackball, and press Set Key.
- Move the cursor onto an annotation to edit it by using the key panel.
- Press Set Key at the left side of the trackball to switch to arrow annotation.

3. Repeat the above steps to add more annotations if necessary.

4. Press the **Annot** button again or tap **Exit** on the touch screen to exit.

■ **Annotating an Image with Arrows**

Perform the following steps.

1. Press the **Arrow** key on the key panel, and the cursor becomes an arrow.

2. Move the arrow to the desired place by using the trackball.
   - Rotate the **Angle** knob to adjust the arrow angle.
   - Press the **Del** key on the key panel to delete the arrow.

3. Press Set Key to add it to the image

Repeat the above steps to add more arrows if needed.

■ **Setting an Initial Position for an Annotation**

Perform the following steps.

1. Press the **Annot** button on the control panel and the cursor becomes | on the screen.

2. Move the cursor to the desired position by using the trackball, and tap **Set Home** to set the initial position for an annotation.

After the settings,

- If a text annotation is being edited, tap **Home** to move the cursor to the initial position.
- If a text annotation is being moved, tap **Home** to move the text annotation to the initial position.
- After entering the text or arrow annotation screen next time, the cursor appears in the initial position.

11.5.2 Body Mark

Perform the following steps.

1. Press or rotate the **Body Mark** key on the control panel.

   The first body mark of the exam type is added to the image by default.

2. Tap a body mark on the touch screen to add it to the image.

3. Press the **Update** key and adjust the position of the body mark by using the trackball.

4. Position the probe marker to the desired place by using the trackball.

   If necessary, rotate the **Body Mark** key **or Angle** knob on the control panel to adjust the angle.

5. Press the Set Key to add it to the image.

11.5.3 Deleting Annotations and Body marks

■ **To delete annotations**

Perform the following steps.

1. Press **Annot** button on the control panel to enter the text annotation screen.

2. Move the cursor onto the annotation, and then tap **Delete** on the touch screen or press **Del** on the key panel.

NOTE:

You can enable the annotation-cleared feature. For details, refer to Section 4.1.1 General Settings.

■   **To delete arrows**

Perform the following steps.

1. Press the **Arrow** key on the key panel to enter the arrow annotation screen.

2. Press the **Del** key on the key panel.

■   **To delete body marks**

Perform the following steps.

1. Press the **Body Mark** key to enter the body mark editing mode.

2. Tap Delete on the touch screen or press the Del key on the key panel.

■   **To delete all annotations and body marks**

You can press the **Clear** button on the control panel to delete all annotations and body marks from the image. You can also tap **Clear** on the touch screen to delete them from the image when they are being edited. Perform this deletion with caution.

11.6   ECG Module

By using an optional ECG module (Type BF), 3-channel ECG signals are provided in cardiac applications. During an cardiac application, you can configure the ECG-control so that the ECG trace is displayed at the bottom of the screen.

The ECG cable includes three color-coded ECG electrode connectors: LL (left leg, red), LA (left arm, black), and RA (right arm, white).

The ECG module provided by this ultrasound system is for collecting and displaying 3-lead ECG trace.

⚠ WARNING
● This ECG module is not suitable for intracardiac use or direct cardiac contact.

● This ECG module provides 3-channel ECG signals, and it cannot be used for diagnosis and monitoring.

● To avoid electrical shock, ensure the ECG cable is intact and correctly connected.

● Conductive parts of electrodes and connectors for ECG should not come into contact with other conductive parts including earth/grounding.

● Stop using the system, if the patient use a pacemaker or implantable cardioverter-defibrillators. This system may interfere with these devices.

11.6.1   ECG

Perform the following steps.

1. Power off the system, and connect the ECG cable to the specific port of the system.

2. Power on the system, and attach the ECG electrodes on the patient's body, as shown in the following figure.
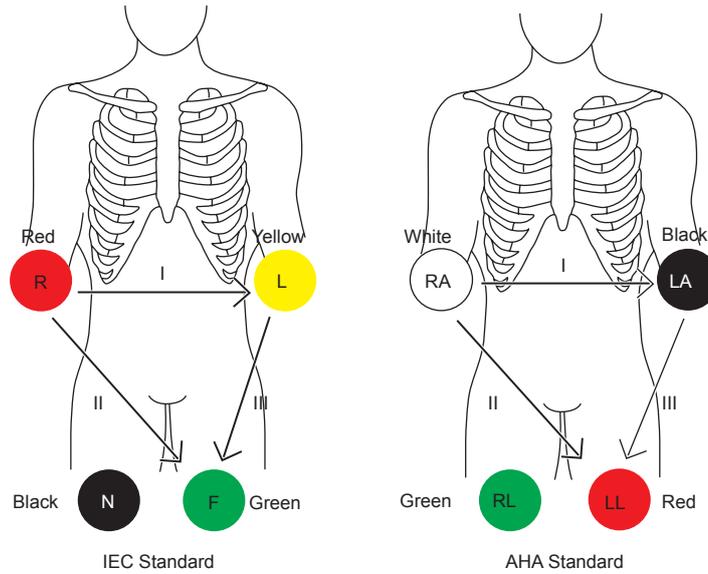
Figure 11-6 Electrode Placement

3. Tap **ECG** on the touch screen to display the submenu of the ECG module. Or, tap **ECG** again to hide it.

4. Make the relevant ECG settings.

Item	Description
ECG	Display or hide the ECG waveform.
ECG Gain	Set the amplitude of the ECG waveform.
ECG Position	Set the vertical position of the ECG waveform.
ECG Invert	Enable or disable the waveform inversion function.
R-Trigger	Enable or disable the R-trigger function. After enable the R-trigger function, the **R-Trigger** menu pops up, the menu contains **Trigger Delay**, **Frame Count**, and **Frame Int**. **NOTE:** Before enabling the R-trigger function, you should disable the compounding imaging function first.
Trigger Delay	Delay of trigger after the 2D refresh.
Frame Count	Image frames transferred per second.

5. Press the ⏮ button on the control panel to freeze an image, and the ECG waveform is frozen at the same time. The ECG waveform is the reference for time.

6. Exit the ECG mode, and remove ECG electrodes from the patient.

11.6.2   PCG

You can view the phonocardiogram with the help of a microphone connected to the system.

Perform the following steps.

1. Connect the PCG microphone to the USB port of the system.

2. Position the PCG microphone on the patient's skin.

3. Tap **ECG** on the touch screen to display two waveforms at the bottom. The electrocardiogram represents in green, the phonocardiogram represents in purple.

11.6.3   Pulse Wave

You can view the pulse wave with the help of a pulse sensor connected to the system.

Perform the following steps.

1. Connect the pulse sensor to the USB port of the system.

2. Attach the pulse sensor to the patient.

3. Tap **ECG** on the touch screen to display two waveforms at the bottom. The electrocardiogram represents in green, the pulse wave represents in blue.

11.7   Stress Echocardiography

Stress Echocardiography (Stress Echo) uses ultrasound imaging of the heart to assess the wall motion at rest and under physical stress, to find abnormalities caused by myocardial ischemia. It may also help to determine whether there is any myocardial ischemia, and produce assessments on ischemic degree, coronary flow reserve, patient's exercise ability, occurrence, and prognosis of cardiovascular events.

It mainly applies to cardiac exams.

NOTE:

Only phased probes are available for this feature.

Perform the following steps.

1. Take blood pressure, heart rate and electrocardiogram for the patient at rest.

2. Take stress echo for the patient at rest, and acquire and save the echocardiogram.

3. Take stress echo for the patient in response to stress at different stages, and acquire and save echocardiograms.

4. Review and make a comparative analysis on echocardiograms at rest, under stress and during recovery, the same slice at different stages, different slice at the same stage, or any slice at any stage.

5. Score for wall motions of different segments.

11.7.1   Acquiring Echocardiograms

Perform the following steps.

1. Connect the ECG cable to the specific port of the system, and attach electrodes to the patient as shown in Figure 11-6.

2. Enter the patient information, and select the probe type and **Cardiac** as the desired exam type to enter the real-time B mode.

3. Acquire a B-mode image of high quality.

4. Tap **Stress Echo** on the touch screen and create a new patient to enter the following screen. If the patient information already exists, skip the procedure of creating new patient.
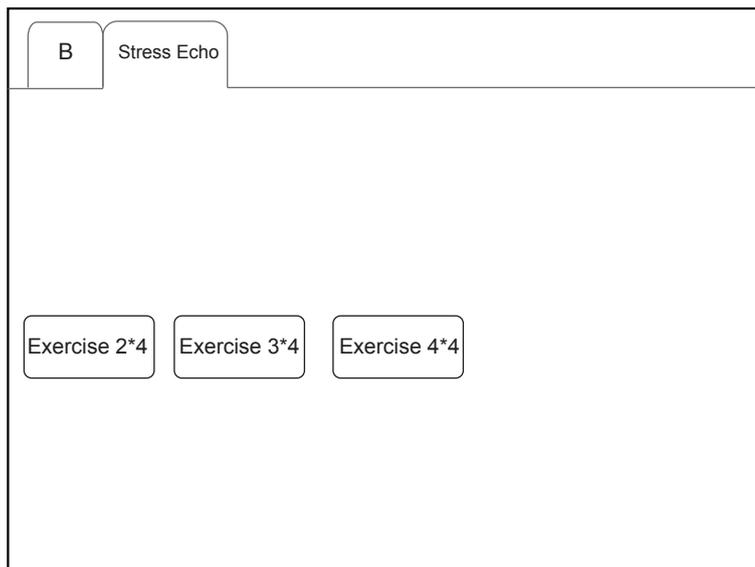
Figure 11-7 Protocol Select Screen

5. You can select the stress echo protocol on the touch screen to enter the following screen.
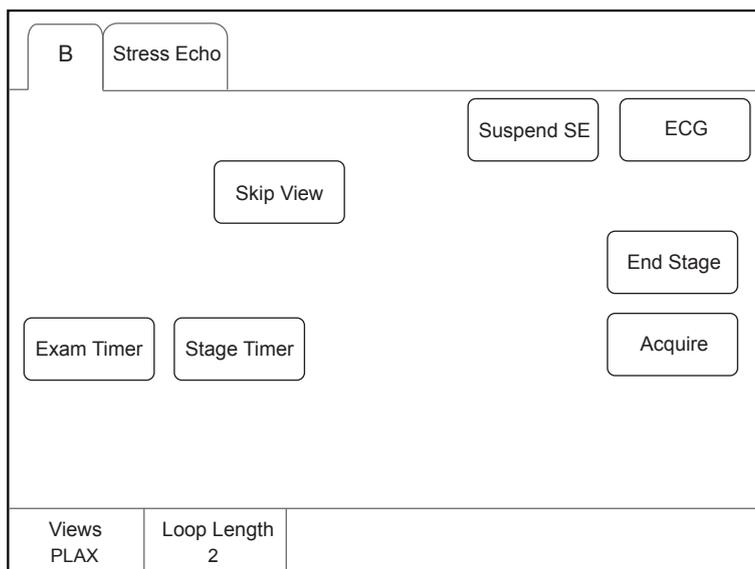
Figure 11-8 Touch Screen Display

- − View: Rotate the knob located directly below **View** to select from the four types.
- − Loop Length: Rotate the knob located directly below **Loop Length** on the control panel to set the number of the ECG cardiac cycle.
- − Skip View: Tap **Skip View** on the touch screen to skip the view.
- − End Stage: Tap **End Stage** on the touch screen to skip the image acquisition at current stage.
- − Exam Timer: Calculate the time for the whole exam procedure.
- − Stage Timer: Calculate the time for a specific exam stage.

6. Tap **Acquire** on the touch screen or press the **Cine** button on the control panel to acquire the echocardiogram.

7. After the acquisition is completed, the system enters the following cardiac cycle selection screen.

```
┌─────────────────────────────────────────────────────────┐
│ ╭──────╮╭────────╮                                        │
│ │ Cine ││ Stress │                                        │
│ │Review││  Echo  │                                        │
│ │      ││ Review │                                        │
│ ┌──────┴┴────────┴─────────────────────────────────────┐ │
│ │                                                       │ │
│ │   ╭──────────╮                                        │ │
│ │   │  Clip 1  │                                        │ │
│ │   ╰──────────╯                                        │ │
│ │                                                       │ │
│ │                          ╭────────╮   ╭──────────╮    │ │
│ │                          │To First│   │Re Acquire│    │ │
│ │                          ╰────────╯   ╰──────────╯    │ │
│ │                          ╭────────╮                   │ │
│ │                          │To Last │                   │ │
│ │                ╭────────╮╰────────╯╭───────────────╮  │ │
│ │                │ Accept ││Auto Play││Display Selected│ │ │
│ │                │ Select ││         ││               │ │ │
│ │                ╰────────╯╰─────────╯╰───────────────╯  │ │
│ ├───────────────────────┬───────────┬──────────────────┤ │
│ │                       │Cine Speed │                  │ │
│ │                       │    2      │                  │ │
│ └───────────────────────┴───────────┴──────────────────┘ │
└─────────────────────────────────────────────────────────┘
```
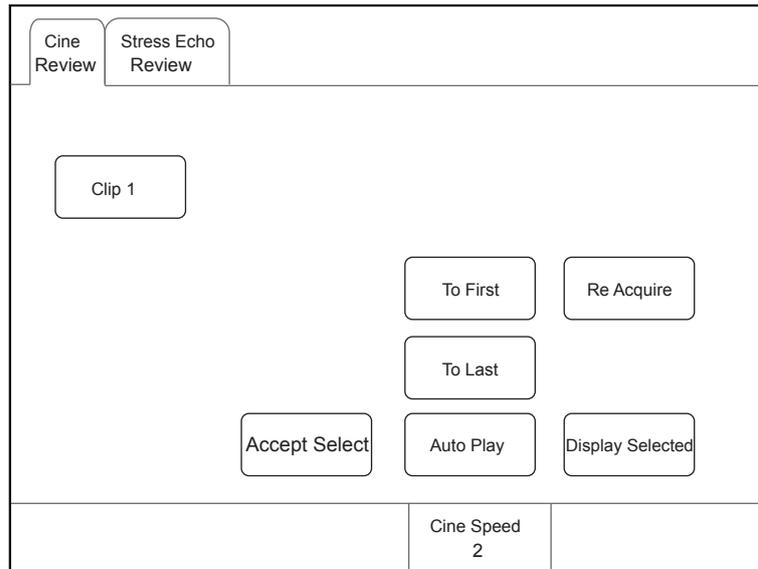
Figure 11-9 Cardiac Cycle Select Screen

- Accept Select: Tap Accept Select to confirm the selected echocardiogram.
- Auto Play: Tap it to play the clip automatically.
- Cine Speed: Rotate the knob located directly below **Cine Speed** to adjust the cine speed.
- Re Acquire: Drop the acquired cine of the current view and acquire again.
- Display Selected: Tap it and the selected image is displayed on the screen. Otherwise, all the acquired images are displayed.

8. After the image acquisition at REST stage is completed, the system enters the image acquisition at UNREST stage, and the acquisition progress bar is displayed on the screen.

```
┌────────────────────────────────────────────────┐
│ ╭────╮╭──────────╮                              │
│ │ B  ││  Stress  │                              │
│ │    ││   Echo   │                              │
│ ┌────┴┴──────────┴────────────────────────────┐ │
│ │                                             │ │
│ │            ╭─────────╮                      │ │
│ │            │   ECG   │                      │ │
│ │            ╰─────────╯                      │ │
│ │                                             │ │
│ │ ╭──────────╮╭──────────╮╭──────────╮╭──────────╮│
│ │ │  Exam    ││  Stage   ││   End    ││  Pause   ││
│ │ │  Timer   ││  Timer   ││ Acquire  ││ Acquire  ││
│ │ ╰──────────╯╰──────────╯╰──────────╯╰──────────╯│
│ │                                             │ │
│ ├──────────┬──────────────────────────────────┤ │
│ │  View    │                                  │ │
│ │  PLAX    │                                  │ │
│ └──────────┴──────────────────────────────────┘ │
└────────────────────────────────────────────────┘
```
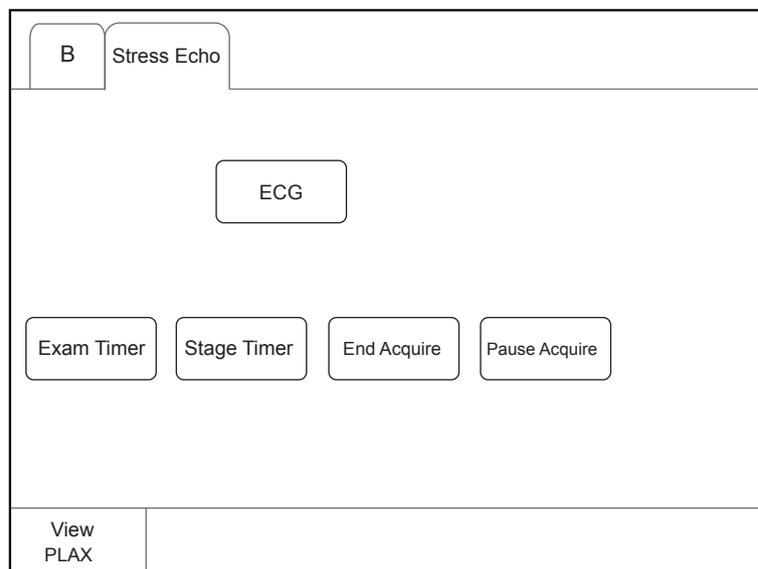
Figure 11-10 Acquisition Process Touch Screen Display

- End Acquire: Tap it to end acquisition in advance and enter the cardiac cycle select screen.
- Pause Acquire: Tap it to pause acquisition, and the progress bar flashes, the scanned image and ECG continue to refresh and display.
- Freeze: Press the **Freeze** button on the control panel to stop acquisition, and then the scanned image and ECG are frozen.

9. After the acquisition is completed, the system enters the cardiac cycle image select screen.
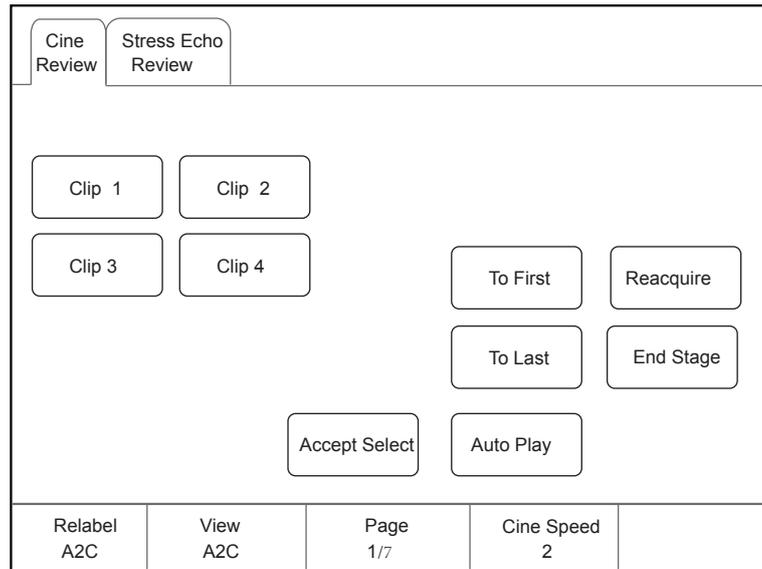
Figure 11-11 Cardiac Cycle Touch Screen Display

  − Relabel: Tap it to rename a single clip.
  − Auto Play: Tap it to play the clip automatically.
  − Cine Speed: Rotate the knob located directly below **Cine Speed** to adjust the cine play speed.
  − Accept Select: The clip on the touch screen corresponds with that of the main scree. Tap it to save the selected cine.

10. Tap **End Stage** on touch screen to end the image acquisition and storage at the current stage.

11. Repeat the acquisition process to acquire and save images at all stages.

11.7.2   Making Comparative Analysis

You can make a diagnosis and assessment for the cardiac function by comparing the echocardiograms for all chambers at all stages.
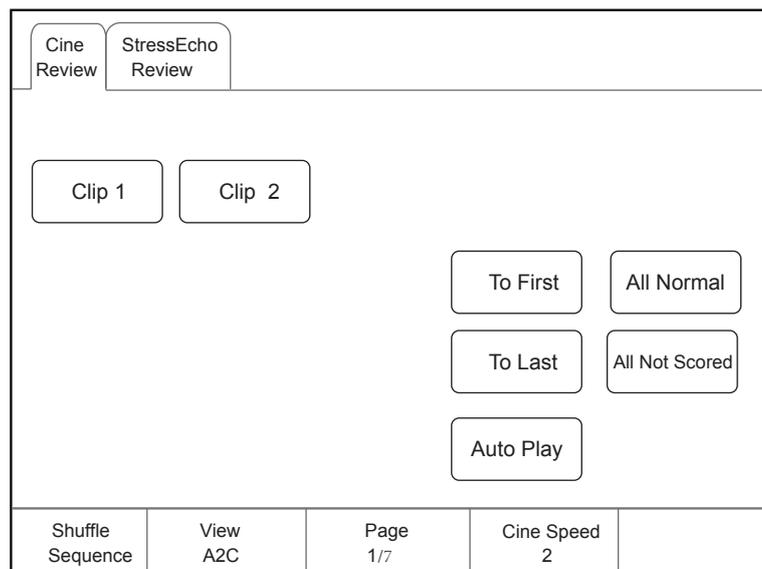
Figure 11-12 Echocardiogram Comparison

Rotate the knob located directly below **Shuffle** to select the comparison type.

View Compare: Compare the same view at different stages.

Stage Compare: Compare images for different chambers.

Order Compare: Compare images for the same chamber in order.

11.7.3 Scoring for Wall Motion

You can score for myocardial wall motions for segments of four chambers.

Tap **Scoring** on the touch screen to enter the following screen.
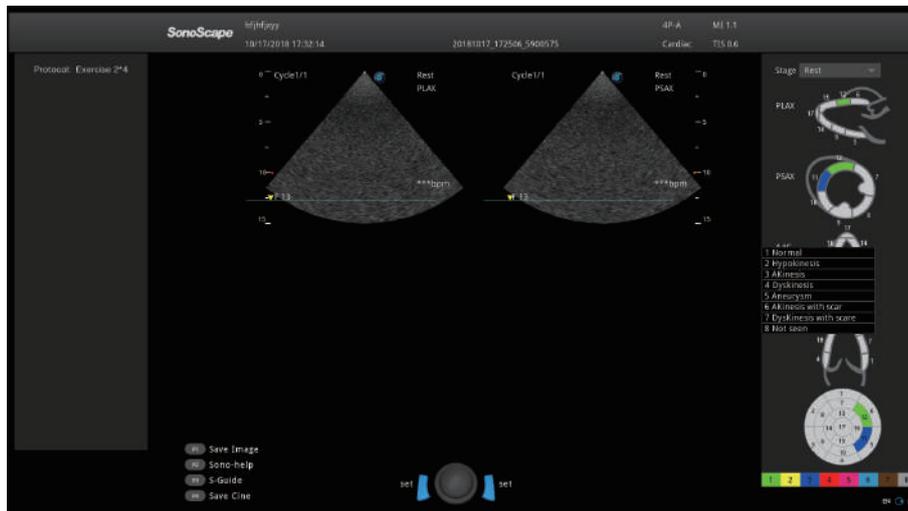
Figure 11-13 Segement Scoring Screen

- Select the desired stage in the Stage drop-down list.
- Select the cardiac stage, and then the selected stage is shown in the color of the corresponding grade.

After finishing scoring, the system saves these modifications automatically, and you can view them on the **Report** screen.

11.8 Quantitative Analysis

The quantitative analysis is designed to analyze deformation of wall motion for segments of four chambers. It mainly focuses on analysis of wall motion velocity, displacement or strain rate, to detect regional wall movement abnormalities in patients with myocardial dysfunction.

It mainly applies to cardiac exams.

NOTE:

Only phased probes performed in the TDI mode are available for this feature.

Perform the following steps.

1. Select the desired probe and exam type, the system automatically enters the real-time B mode.

2. Acquire a B-mode image of high quality.

3. Press the **TDI** key on the key panel to enter the TDI mode.

4. Apply adequate gel on the patient.

5. Acquire a TDI-mode image of high quality.

6. Press the **Calc** button on the control panel to display the Cardiology Measurement menu.

7. Tap **Wallmotion** on the touch screen, and a marker appears on the screen.

8. Set sampling position on the image.

    a. Move the marker to the desired position by using the trackball, press Set Key on the control panel to confirm, and a second marker appears on the screen.

    b. Move the second marker to the desired position by using the trackball, and press Set Key to confirm.

       You can press the **Update** button on the control panel to activate the fixed marker.

    c. Repeat step b to set other positions, and press Set Key twice to confirm.

A velocity trace is generated in accordance with velocity changes of a fixed sampling position over time, colors of velocity trace and fixed sampling position are consistent.
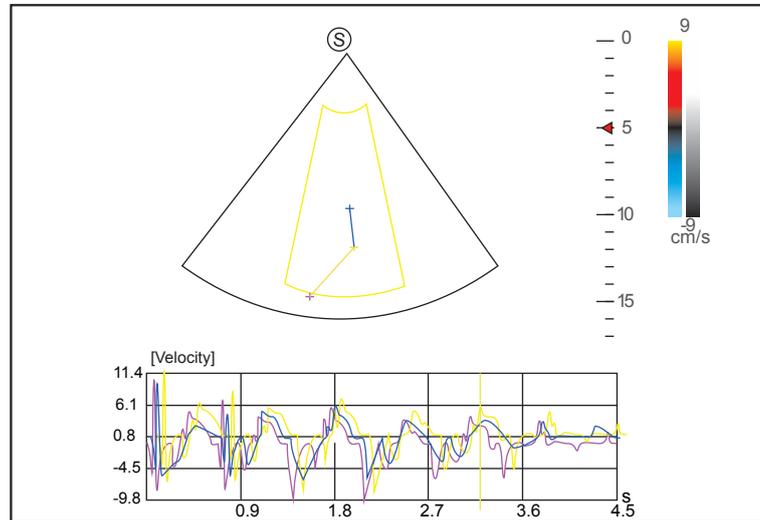
Figure 11-14 Analysis Screen - Velocity Trace

    – X-axis is the time scale.

    – Y-axis is the velocity scale.

Pressing the **Clear** button on the control panel can delete all sampling positions.

9. Make the quantitative analysis of wall motion.

    – Rotate the knob located directly below **Strain Curve** on the touch screen to view displacement, strain or strain rate traces.

    – Use the trackball to view the cine.

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12   Managing Images/Data

In this ultrasound system, images include frame images and cine. You can save or review images after the acquisition. Meanwhile, images can also be backed up to a USB drive for future review if it is needed.

12.1   Storing an Image

NOTE:
- You can define the keys on the **General** menu > **Multikey** tab. For details, refer to Section 4.1.3 Multikey Settings.
- The system saves all data by default. If **Export to medium** is ticked on the **General** menu > **Multikey** tab, connect an USB drive, and the saved data will be stored to the USB drive synchronously.

12.1.1   Storing 2D Image

Press the **Image** button on the control panel in the real-time or frozen mode to save the current image. In frozen mode, press the **Cine** button on the control panel to save the current cine. In frozen mode, if **P3/P4** is set as the key to store screen capture on the **General** menu > **Multikey** tab, and press **P3/P4** on the control panel to save the screen capture.

The system beeps if the image is saved successfully. Meanwhile, the corresponding thumbnails for the stored image, cine or screen capture also appears in the clipboard.

12.1.2   Storing 3D/4D Image

1. In 3D mode, press the **Image** button on the control panel to save the current image.

2. In 4D mode, press the **Cine** button on the control panel to save the current cine.

3. In 3D/4D mode, if **P3/P4** is set as the key to store volume data or screen capture on the **General** menu > **Multikey** tab, press **P3/P4** on the control panel to save the volume data or screen capture.

The system beeps if the image is saved successfully. Meanwhile, the corresponding thumbnails for the stored image, cine, volume data or screen capture also appears in the clipboard.

12.1.3   Storing a Sonogram Navigation Image

Perform the following steps.

1. In a real time scan, press the **P3** key on the key panel to enter the sonogram navigation menu, as shown in Figure 12-1.
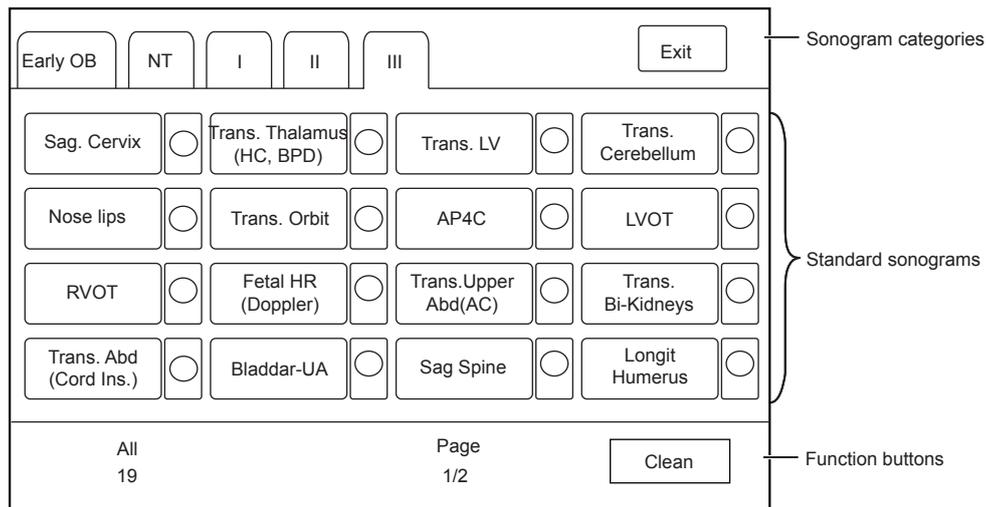
Figure 12-1 Sonogram Navigation Menu

2. Tap a sonogram category on the touch screen and then tap a standard sonogram.

   The selected standard sonogram is displayed on the left part of the basic screen.

3. Acquire a real-time image according to the standard sonogram.

4. Press the **Image** key to save the acquired image.

5. Tap the check box beside the current standard sonogram on the touch screen.

   The √ sign appears in the check box, indicating that image scanning corresponding to the standard sonogram is completed.

6. Repeat steps 2-5 to perform image scanning for other standard sonograms.

   − Rotate the knob located directly below **Unfinished** or **All** on the touch screen to view all sonograms or unfinished sonograms under the selected sonogram category on the touch screen.

   − Rotate the knob located directly below **Page** on the touch screen to go to the previous or next page.

   − Tap **Clean** to clear the status of all standard sonograms under the selected category.

7. Press the **P3** key or tap **Exit** to exit the sonogram navigation menu.

NOTE:

If the **End Exam** key is pressed to end the current exam, the status of standard sonograms of all sonogram categories will be cleared.

12.2 Viewing an Image

You can view the images for the current or a previously examined patient by using the clipboard or the **Review** screen.

12.2.1 Viewing a Current Image

■ **To view an image by using the clipboard**

1. Press the **Pointer** button on the control panel in the real-time or the frozen mode.

2. Select the image in the clipboard by using the trackball, and then press Set Key to view the image/cine.

   − Click ☑ to select all images.

   − Click ⌄ or ⌃ to go to the previous or the next page.

   − Click ▒ᴰᶜᴹ to export images to the USB drive or DICOM.

   − Click 🗑 to delete the desired image/cine.

You can also amplify the image or review the cine and perform a measurement.

■ **To view an image on the View Image screen**

1. Press the **Review** button on the control panel to enter the **Review Exam** screen.

   The following screen is displayed with images and cine thumbnails.
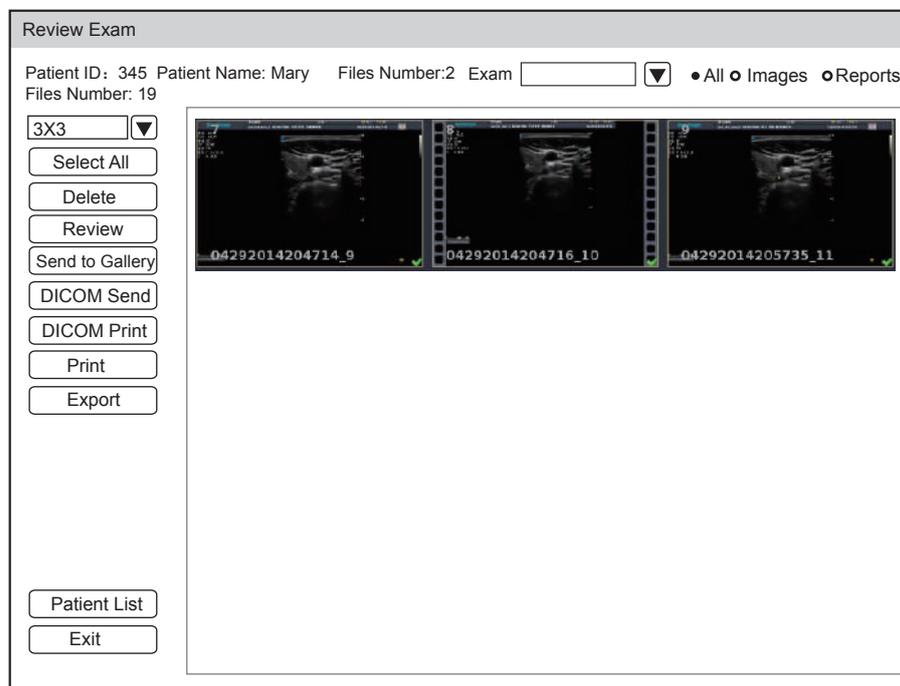
   – If the patient has had more than one exam, you can select the desired exam from the **Exam** drop-down list.

   – Tick **Images** and you can only view the images on the screen. Tick **Reports** and you can only view the reports on the screen. Tick **All** and you can view both image and reports

2. Move the trackball to the desired thumbnail and click Set Key to select the desired image.

3. View the image.

   – Double click Set Key to view the image.

     You can press the ⏮ button at any time to return to the **View Image** screen.

   – Click **Review** to view the image.

4. Click **Patient List** to enter Exam List and view the image and cine of selected patient.

5. If the selected cine belongs to OB exam type and can be identified,

   After you select the standard image, you can tap S-Fetus (meas.) on the touch screen to perform automatic measurement. The measurement result is displayed in the result box on the main screen.

6. If the selected single image belongs to OB exam type, tap S-Fetus (meas.) on the touch screen to perform automatic measurement. The measurement result is displayed in the result box on the main screen.

NOTE:

Only when you add S-Fetus(Meas.) into the items displayed on the touch screen in Touch Screen setting, the item will be displayed on the touch screen.

12.3 Sharing Data

You can remote access to the data stored in the system through a computer.

Perform the following steps

1. Connect the computer to the system.

2. Set **Image Share Service** to **On** on the **System Settings** > **General** menu > **Multikey** tab.

3. Type the IP address in the search box of the computer and press **Enter**.

4. Type the user name and password in the pop-up dialogue box.

12.4　Backing up Data

⚠️ **WARNING**
- The system save all data by default. To avoid data loss due to unexpected system breakdown or software update, it is recommended to back up the data.
- Complete all exams before backing up the data.

12.4.1　Backing up Data to a USB drive

Perform the following steps.

1. Connect a USB drive to the system.

2. Press the **Patient** button to enter the **Patient Information** screen, and then click **Patient List** to enter the **Exam List** screen. Select the desired exam and click **Export**.

3. Select a **USB** drive from the **USB devices** drop-down list, and then select the exported image format, including System Format, PC Format, DICOM and DICOMDIR.

    If you select PC image format, you can also select the exported image or cine format.

4. Click **Export** to back up all data relevant to the USB drive.

You can export images only on the **Review Exam** screen.

12.4.2　Backing up Data to DVD

You can back up data to a DVD. DVD (DVD-R/RW, DVD+R/RW, 4.7GB capacity or more) manufactured by SONY is recommended.

Perform the following steps.

1. Place an empty DVD in the CD-ROM drive.

    NOTE:
    Make sure the DVD is facing upward in the CD-ROM drive.

2. Press the **Patient** button to enter the **Patient Information** screen, and then click **Patient List** to enter the **Exam List** screen. Select the desired exam and click **Export**.

3. Select **DVD** from the **USB devices** drop-down list.

4. Click **Export** to back up all data relevant to the DVD.

    DVD ejects after a successful data backup export prompt is displayed.

5. Take the DVD out from the CD-ROM drive, and close the tray.

You can export images only on the **View Image** screen.

12.5　Importing Data to the System

NOTE:
- Only data generated by this ultrasound system can be imported.
- Ensure the current exam is completed before importing data. Otherwise, data importing may be failed.

Perform the following steps.

1. Connect the USB drive to the system.

    Or, place an empty DVD in the CD-ROM drive.

2. Press the **Patient** button to enter the **Patient Information** screen, and then click **Patient List** to enter the **Exam List** screen.

3. Click **Import** to enter the **Import Screen**.

4. Select the import device in the **Import Screen** drop-down list.

5. Select the imported device from the **Import/Export** drop-down list.

6. Select the desired patient information to be imported.

7. Click **Import Patient** to import the desired data.

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13 Working with DICOM

DICOM (Digital Imaging and Communications in Medicine) is a standard created by National Electrical Manufacturers Association (ACR-NEMA) to regulate the distribution and viewing of medical images such as ultrasound images and cine.

If the system is configured with the DICOM module, you can:

- Search the archived patient information set on the DICOM server, and copy the patient information to the system so that the correct patient can be examined.
- Send stored images or data on the system to the DICOM server.
- Print images on a DICOM printer.

DICOM service of the system consists of DICOM storage, DICOM print, DICOM worklist, MPPS, storage commitment and Q/R list.

If you need *DICOM 3.0 Compatibility Declaration*, please contact the manufacturer.

13.1 Verifying Connectivity

Perform the following steps.

1. Connect the system to the local DICOM network server by using a network cable.

2. Edit the relative settings for the local network and DICOM server. For details, refer to 4.2 Peripheral Settings and 4.8 Configuring DICOM.

3. If the verification is successful, you can use the DICOM services.;

NOTE:
Connect the system to the server before using the DICOM service. Otherwise, the service cannot be used.

13.2 DICOM Storage

DICOM Storage is used to send patient data to the DICOM storage server for storage.

■ **Storing the Current Image**

1. Connect an USB drive to the system.

2. The default storage type for the **Image** button is image, or you can select **Save Image** as the storage type for **P3/P4** key.

3. Define the **Image** button or the **P3/P4** key as **DICOM Storage** on the **System Settings** > **General** menu > **Multikey** tab.

4. Press the **Image** button or the **P3/P4** key in the real-time or frozen mode to send the current image to the DICOM storage server.

■ **Storing Cine**

1. Connect an USB drive to the system.

2. The default storage type for the **Cine** button is cine, or you can select **Save Cine** as the storage type for **P3/P4** key.

3. Define the **Cine** button or the **P3/P4** key as **DICOM Storage** on the **System Settings** > **General** menu > **Multikey** tab.

4. Press the **Cine** button or the **P3/P4** key in the frozen mode to send the cine to the DICOM storage server.

■ **Storing Screen capture or Volume Data**

1. Connect an USB drive to the system.

2. Select **Screen Capture** or **Volume** as the storage type for **P3/P4** key and define the key as **DICOM Storage** on the **System Settings** > **General** menu > **Multikey** tab.

3. Press the **P3/P4** key in the frozen mode to send the screen capture or volume data to the DICOM storage server.

■ **Storing Patient Data**

1. Choose the **Patient** button > **Patient List** > **Exam List** to enter the **Exam List** screen.

2. Select the desired patient.

3. Click **DICOM Send** and select the desired storage device from the drop-down list beside **Storage Destination** in the pop-up dialogue textbox.

4. Click **Send** to send the patient information and the relevant images to the DICOM storage server.

If you want to check the status of items sent to the DICOM storage server, choose the **Patient** button > **Patient List** > **DICOM Queue**.

13.3 DICOM Print

DICOM Print is used to send images to the DICOM print server for printing.

You should properly connect the system to the print server and edit the relevant settings. For details, refer to 4.8 Configuring DICOM.

■ **Printing the Current Image**

1. The default storage type for the **Image** button is image, or you can select **Save Image** as the storage type for **P3/P4** key.

2. Define the **Image** button or the **P3/P4** key as **DICOM Print** on the **System Settings** > **General** menu > **Multikey** tab.

3. Press the **Image** button or the **P3/P4** key in the real-time or frozen mode to send the current image to the DICOM printer server.

■ **Printing Cine**

1. The default storage type for the **Cine** button is cine, or you can select **Save Cine** as the storage type for **P3/P4** key.

2. Define the **Cine** button or the **P3/P4** key as **DICOM Print** on the **System Settings** > **General** menu > **Multikey** tab.

3. Press the **Cine** button or the **P3/P4** key in the frozen mode to send the cine to the DICOM print server.

■ **Printing Screen Capture or Volume Data**

1. Connect an USB drive to the system.

2. Select **Screen Capture** or **Volume** as the storage type for **P3/P4** key and define the key as **DICOM Print** on the **System Settings** > **General** menu > **Multikey** tab.

3. Press the **P3/P4** key in the frozen mode to send the screen capture or volume data to the DICOM print server.

■   **Printing Patient Data**

1. Choose the **Patient** button > **Patient List** > **Exam List** to enter the **Exam List** screen.

2. Select the desired patient.

3. Click **DICOM Print** and select the desired print device from the drop-down list beside **Print Destination** in the pop-up dialogue textbox.

4. Click **Print** to send the patient information and the relevant images to the DICOM print server.

5. Click **DICOM Print** to send the patient information and the relevant images to the DICOM print server.

If you want to check the status items sent to the DIOCM print server, choose **Patient** button > **Patient List** > **DICOM Queue**.

13.4   DICOM Worklist

The DICOM Worklist is used to search the archived patient information on the DICOM server, and copy the patient information to the system so that the correct patient can be examined.

Press the **Patient** button on the control panel to enter the **New Patient** screen and then click **WorkList** to enter the **WorkList** screen.

Figure 13-1 WorkList Screen

Perform the following steps.

1. Search for the patient information.

    Enter the search requirements, such as **Patient Name**, **Patient ID**, **Accession#**, **Exam Date/Time** or **Requested Procedure ID**, and then click **Search** to search for the desired information.

    Clicking **Reset** can clear all the search information.

    Clicking **Date/Time** can display the patient data by order of oldest or newest input date/time.

2. Start an exam.

    Select the desired patient.

    –   Click **Select** to enter the **Patient Information** screen, and then input the relevant patient information and select the desired exam type.

﹣ Click **Start Exam** to start the exam for the selected patient.

13.5   MPPS

MPPS is used to send exam status information to the MPPS server, which facilitates the other systems to obtain the exam progress in time.

The status information is described as below:

- When the exam is started, the system sends the status information "In Process" to the MPPS server.
- When the exam is completed by pressing the **End Exam** button on the control panel, the system sends the status information "Complete" or "Discontinue" to the MPPS server.

If you want to check the status items sent to the MMPS server, choose the **Patient** button > **Patient List** > **DICOM Queue**.

You can add MPPS manually to check the processing status of the discontinued exam or other order operations.

NOTE:

MPPS can only be added when you perform the scan or other order operations.

Perform the following steps.

1. Choose the **Patient** button > **Patient List** > **Patient Review** to enter the **Patient Review** screen.

2. Click **PPS Screen** to enter the **PPS** screen.

PPS Screen							
PPS Information							
Patient ID	Patient Name	DOB	Sex	Description	Start Time	End Time	Status
20140505	Mary		Unknown				IN PROGRESS

Exit   Append   Discontinue   Complete
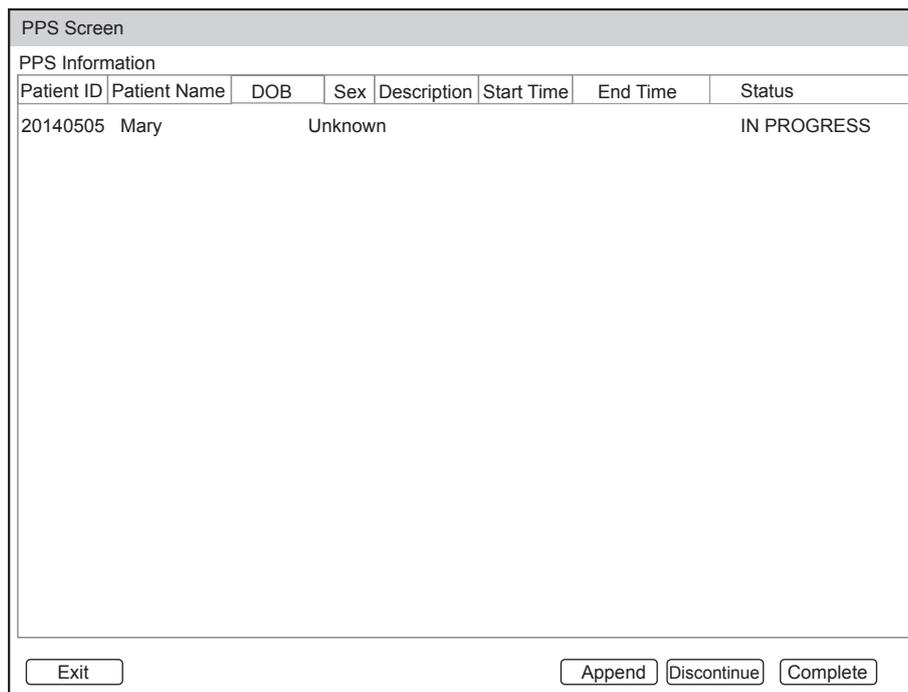
Figure 13-2 PPS Screen

The **PPS** screen displays MPPS information about the current patient.
﹣ Click **Discontinue** to discontinue the current exam.
﹣ Click **Complete** to complete the current exam.
﹣ Click **Append** to restart the exam.

13.6   Storage Commitment

Storage commitment is used to confirm whether the images or structured reports are successfully stored to the DICOM storage server.

If you want to check the status of items sent to the DICOM storage server, choose the **Patient** button > **Patient List** > **DICOM Queue**.

13.7 DICOM Queue

The DICOM Log is used to check the sending status of DICOM storage, DICOM print, MPPS and Storage Commitment.

Choose the **Patient** button > **Patient List** > **DICOM Queue** to enter the DICOM Queue screen.

Figure 13-3 DICOM Queue Screen

Perform the following steps.

1. Search for the patient information

   Enter the search requirements, such as **Patient Name**, **Patient ID**, **Type** or **Exam Date/Time**, and then click **Search** to search for the desired information.

2. Check the sending status

   You can check the sending status by viewing **Run State**, **Status** or **Details**.

3. Deal with the failure sending information

   - Select the desired patient information and click **Refresh** to refresh the patient information. If it does not work, you can click **Resend** to resend all information.
   - Click **All Select** > **Resend Fail** to resend the information.
   - Select the desired patient information and click **Delete** to delete the information.

13.8 DICOM Q/R

The **Query/Retrieve List** is used to retrieve patient information from the query server. User can import the retrieved patient exam information to the system and view it.

Press the **Patient** button on the control panel to enter **New Patient** list. Click **Patient List** to enter **Patient List** screen and click **DICOM Q/R** to enter **Query/Retrieve List** screen.

Figure 13-4 Query/Retrieve List

Perform the following steps.

1. Inquire patient information.

   Select the desired query condition, such as **Patient ID**, and enter the related information. Click **Query Patients**, and patient information will be displayed on the **Patient List**.
   Click **Reset** to delete the entered query condition.
   Click **Last Time**, the system will arrange the patient information in chronological order of exams.

2. Inquire exam type.

   Select the desired patient information in the **Patient List** and click **Query Exams**, and then all the exam types of the patient will be displayed on the **Exam List**.
   Click **Exam Time**, the system will arrange the exams in chronological order.

3. Retrieve image

   Select the desired exam type in the **Exam List** and click **Retrieve Exams**, the thumbnails of the saved image and cine will be displayed in the bottom display box.

4. Import patient information.

   a. Select the image or cine to be imported with the trackball and press the Set Key.

   You can click ∧ or ∨ to turn the current menu to the previous or the next page if it displays over one page, or click ☑ to select all images and cines.

   b. Select the desired exam type from the drop-down list beside Exam Type, and then click **Import Screen**.
   The selected patient information and the corresponding images and cines will be imported into the system.

14   Probes and Biopsy

You should become thoroughly familiar with the operations of the probe and biopsy bracket before using them. To ensure the performance of the probe and the biopsy bracket, you should periodically check, clean, disinfect and maintain them.

NOTE:

A general instruction for the probe and the biopsy bracket is provided in this manual. For details, refer to the relevant manuals.

14.1   Probe

This ultrasound system supports a wide range of probes which make the system remarkably versatile.

The schematic diagrams of probes are as follows.

Body surface probe   Endocavitary probe

Intraoperative probe
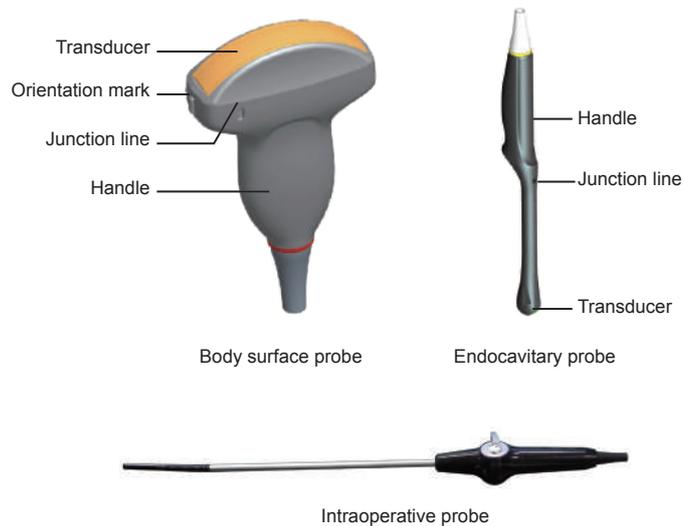
14.1.1   Available Probes

The available probes are listed as follows.

Probe Model	Application
3C-A, C1-6, C1-6A, C2-9, L742, 12L-A, 12L-B, 13L-A, 9L-A, 18L-A, 10I2, 10L-I, 4P-A, S1-5, 7P-A, 8P1, VC6-2, VC2-9A, VC2-9, VL12-5, C322, C613, 12LT-A, 12LI-A, 6CT-A, 6CI-A, ML3-18, PWD2.0, CWD2.0, CWD5.0, CWD8.0, MPTEE, MPTEE mini, L741, 7P-B, 3P-A	Body surface
6V3, EC9-5, VE9-5, 6V1, 6V7, BCC9-5, BCL10-5, C3-10V, 6V3A, 12C-ER, VE3-10	Intracavitary
LAP7	Intraoperative

14.1.2   Probe Usage

⚠ **WARNING**
- Use only the probes provided by the manufacturer. Otherwise, the system may not perform and an accident such as a fire may result.
- Use the probe carefully. If any part of the probe surface is scratched, immediately stop using the probe. Otherwise, electrical shock may occur.
- A legally marketed probe sheath is required for intracavitary operations. If lubricant is used, it must be water-soluble. Do not apply coupling gel directly on the patient's skin. Please dispose of the sheath in accordance with local laws and regulations.
- Use a sterile probe sheath and sterile coupling gel when performing an intraoperative, trans-vaginal, trans-rectal or trans-esophageal (Cardiac) exam. If lubrication is insufficient because of age and personal reason during the exam, you need to apply a sufficient amount of sterile coupling gel on the surface of the sheath.
- To avoid contamination, please use the coupling gel and probe sheath before performing an exam.
- Use legally marketed coupling gel in accordance with relevant local regulations. Read and understand all precautions in the relevant manual of the coupling gel before use. For recommended coupling gels, please refer to Appendix D.1 Coupling Gel.
- Latex or natural rubber contained inside medical equipments or accessories can cause severe anaphylactic reactions in some individuals. It's suggested by the FDA that the operator should identify latex-sensitive patients and be prepared to treat anaphylactic reactions promptly.
- After being contaminated by pathogenic bacterium that is hard to kill, such as cryptosporidium or prion virus, the probe and its accessories should be destroyed by melting or burning when necessary because they cannot be completely disinfected or sterilized.

⚠ **CAUTION**
- Avoid immersing the transducer surface in the coupling gel for a long period of time. Otherwise, damage to the probe may occur.
- Avoid any fluid flowing into the probe or probe connector when cleaning, disinfecting or sterilizing the probe and probe cable.

■ **Special concerns before probe usage**

Inspect the probe before each use. If the following damage is found, stop using the probe immediately.
- Cracks on the probe handle (user section).
- Cracks on the transducer surface (applied section).
- Scratches on the transducer surface (acoustic window surface).
- Swelling of the acoustic window material.
- Cracks or wear on the probe cable.
- Cracks on the probe connector or any other kinds of visible damage.
- Deformed pins or broken pins inside the probe connectors.

■ **Body surface probe usages**

1. Wear medical sterile gloves.
2. Orient the probe.
3. Perform a scan.

■ **Endocavitary probe usages**

1. Wear sterile medical gloves.
2. Wear the probe sheaths
   a. Remove the packaging and unfold the probe sheath.

b. Apply an appropriate amount of coupling gel to the inside of the sheath and onto the face of the probe.

c. Hold the probe and unroll the sheath onto the probe.

d. Pull the probe sheath tightly over the face of the probe to remove wrinkles.

e. Secure the sheath to the probe with the adhesive tapes or elastic bands.

3. Orient the probe.

Check the probe orientation mark before the scan.

4. Perform a scan.

■   **Intraoperative probe usages**

1. Wear sterile medical gloves.

2. Ensure the bending section of intraoperative probe is free and can bend freely.

a. Rotate two angulation knobs to adjust the probe distal end to the desired angle.

b. Lock the angulation knobs if they are adjusted properly.
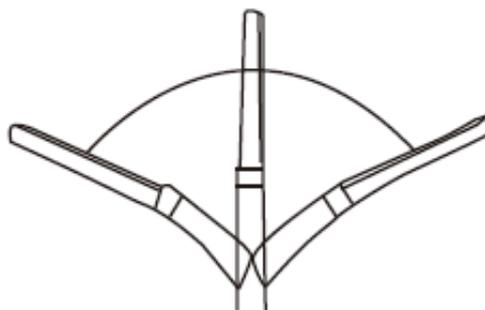
3. Perform a scan.

14.1.3   Cleaning the Probe

⚠ **WARNING**
- To avoid electrical shock, disconnect the probe from the system before cleaning.
- To avoid potential disease transmission, you should wear sterile medical gloves and protective goggles while cleaning.

⚠ **CAUTION**
- Do not use the cleaner that contains sodium sulfate and/or sodium hypochlorite to clean the probe. Otherwise, the probe may be damaged.
- To avoid probe damages, do not bump the probe on hard surfaces.
- Use only the cleaner recommended by the manufacturer to clean the probe. Otherwise, the probe may be damaged.

You should clean the probe after each use. Probe cleaning is an essential step of the disinfection and sterilization.

Perform the following steps to clean the probe.

1. Remove the coupling gel from the probe surface after exam.

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

3. Use a lint-free soft cloth dampened with mild soapy water or the recommended cleaner (see Appendix D.2 Cleaner) to wipe the probe.

If there are dried stains on the surface or in the grooves of the probe, remove them by a brush dampened with an enzymatic clearer.

4. Rinse the surfaces of the probe with the fresh running water to completely remove any residual cleaner.

5. Dry the probe with a lint-free soft dry cloth.

14.1.4   Disinfecting or Sterilizing the Probe

⚠ **WARNING**

- There is a cleared list of sterilants and high-level disinfectants for use in processing reusable medical and dental devices on the FDA website. That list can be consulted to find agents that may be useful for probe disinfection. Please refer to the following URL for FDA-Cleared Sterilants and High Level Disinfectants: http://www.fda.gov/MedicalDevices/DeviceRegulationandGuidance/ReprocessingofSingle-UseDevices/ucm133514.htm.

- Use the liquid disinfectant/sterilant that meets local laws and regulations or the recommended disinfectant/sterilant.

- The probe sheath may be damaged during exam and contamination risk level caused by the damaged sheath is difficult to estimate. Therefore, probe sheath cannot change the level of disinfection for a probe. Please clean and sterilize (or high level disinfect) the endocavitary probe and clean and sterilize the probe for biopsy and coming into contact blood after exam.

- Do not use an expired disinfectant/sterilant.

- Store the probe in a sterile environment, and review its expiration date before use.

⚠ **CAUTION**

- If you use the recommended disinfectant/sterilant, ensure the requirements for the disinfection level and probe soaking period are met. Otherwise, the probe could be damaged and your warranty may be void. If you have further use or needs for the probe, ensure the level of the make-up disinfectant/sterilant and the probe soaking period are suitable for the intended clinical application.

- Do not use the following methods to sterilize the probe.
  - Autoclave
  - Ultraviolet sterilizer
  - Gamma ray sterilizer
  - Ethylene oxide gas
  - Ethylene oxide
  - Thermal disinfection/sterilization. Temperature higher than 66°C (150°F) will damage the probe.

- Do not allow any disinfectant/sterilant to be air-dried on the probe.

■   **Disinfection Levels**

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

Classification	Definition	Level of Disinfection	Application
Critical	A device that enters normally sterile tissue or the vascular system.	Sterilization	Intraoperative, biopsy use or blood contacting probe
Semi-critical	A device that comes into contact with intact mucous membranes and does not ordinarily penetrate sterile tissue.	High	Endocavitary probe

Classification	Definition	Level of Disinfection	Application
Noncritical	Devices that do no ordinarily touch the patient or touch only intact skin.	Medium or low	Body surface probe

■ **Soaking Requirements**

Do not immerse the probe beyond its junction line.

■ **To disinfect the body surface probe**

You should disinfect the body surface probe after each use.

Perform the following steps.

1. Clean the probe.

    For details, refer to Section 14.1.3 Cleaning the Probe.

2. Perform the medium-level disinfection to the body surface probe as shown in Table 14-1.

    Or select a recommended disinfectant (see Appendix D.3 Disinfectant) to disinfect the probe by following the instruction provided by disinfectant's manufacturer.

3. Rinse the probe with fresh running water to completely remove the residual disinfectant.

4. Dry the probe with a lint-free soft dry cloth.

Table 14-1 Recommended Method for Medium-level Disinfection

Disinfectant	Manufacturer	Active Ingredient	Level for Active Ingredient	Contact Type	Contact Period
70% Isopropyl alcohol	ALL	Isopropyl alcohol	70%	Spray/Wipe	<10 minutes
T-spray II	Pharm. Inc.	Quat. Ammonia	/	Spray/Wipe	<10 minutes
T-spray	Pharm. Inc.	Quat. Ammonia	/	Spray/Wipe	<10 minutes

■ **To disinfect the endocavitary probe**

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

Perform the following steps.

1. Clean the probe.

    For details, refer to Section 14.1.3 Cleaning the Probe.

2. Perform the high-level disinfection to the endocavitary probe as shown in Table 14-2.

    Or select the recommended disinfectant (see Appendix D.3 Disinfectant) to disinfect the probe by following the instruction provided by disinfectant's manufacturer.

3. Rinse the probe with running sterile water to completely remove the residual disinfectant.

4. Dry the probe with a lint-free soft dry cloth.

Table 14-2 Recommended Method for High-level Disinfection

Disinfectant	Manufacturer	Active Ingredient	Level for Active Ingredient	Contact Type	Contact Period
Cidex™ Activated Dialdehyde Solution	J&J	Glutaraldehyde	2.4%	Soak	45-50 minutes
Resert XL HLD	STERIS	H_2O_2	2.0%	Soak	8 minutes
Tristel Duo for Ultrasound	Tristel	Chlorine dioxide	0.02%	Wipe	0.5 minutes
Tristel Sporicidal Wipe* (* part of the Tristel Trio Wipes System)	Tristel	Chlorine dioxide	0.02%	Wipe	0.5 minutes

14.1.5   Sterilizing the Probe

You should sterilize the intraoperative, biopsy use probe or any probe that comes into contact with blood after each use.

Perform the following steps.

1. Clean the probe.

    For details, refer to Section 14.1.3 Cleaning the Probe.

2. Sterilize the intraoperative probe as shown in 14.1.3.

    Or select the recommended disinfectant (see Appendix D.3 Disinfectant) to sterilize the probe by following the instruction provided by disinfectant's manufacturer.

3. Rinse the probe with running sterile water to completely remove the residual sterilant.

4. Dry the probe with a lint-free soft dry cloth.

Table 14-3 Recommended Method for Sterilization

Disinfectant	Manufacturer	Active Ingredient	Level of Active Ingredient	Contact Type	Contact Period
Cidex™ Activated Dialdehyde Solution	J&J	Glutaraldehyde	2.4%	Soak	10 hours

14.1.6   Disinfecting and Sterilizing the Probe Cable

⚠ **WARNING** To avoid potential disease transmission, you should wear sterile medical gloves and protective goggles during disinfection or serialization.

⚠ **CAUTION** Do not immerse the probe cable in alcohol or isopropyl alcohol at any concentration for a long period of time. Avoid any contact with iodine or phenols. Otherwise, it will accelerate the aging of the cable and decrease the service time of the probe, or even result in cable damages.

■ **Daily Disinfection**

Perform the following steps to clean the probe cable.

1. Use a lint-free soft dry cloth dampened with mild soapy water to wipe the probe cable.

2. Perform the medium-level disinfection to th probe cable as shown in Table 14-1.

3. Rinse the surfaces of the probe cable with fresh running water to completely remove the residual disinfectant.

4. Dry the probe cable with a lint-free soft dry cloth.

Table 14-4 Recommended Method for Medium-level Disinfection

Disinfectant	Manufacturer	Active Ingredients	Level of Active Ingredients	Contact Type	Contact Period
T-spray II	Pharm. Inc.	Quat. Ammonia	/	S p r a y / Wipe	<10 minutes
T-spray	Pharm. Inc.	Quat. Ammonia	/	S p r a y / Wipe	<10 minutes

■ **Sterilization**

If the probe cable comes into contact with any blood or body fluid, you should sterilize it. For details, refer to Section 14.1.5 Sterilizing the Probe.

14.1.7 Storage and Transportation

You should store or transport the probe in accordance with Appendix A Specifications.

■ **To store the probe**

Follow the following items to store the probe.

- Store the probe in a probe holder or specific package when not in use.
- Ensure the probe holder is clean before storing it.
- To avoid contaminating the package, disinfect or sterilize the probe before storage or store it in a disposable probe package.
- Do not expose it to direct sunlight or sudden environmental temperature changes.
- Store the probe alone to avoid any impact on the probe head.
- Carefully wind the probe cable.
- Dry the probe before storing it.

■ **To transport the probe**

Perform the following steps to transport the probe.

1. Clean and disinfect the probe before transportation.

2. Place the probe fully into the carrying case and carefully wind the cable.

3. Close the cover of the carrying case.

4. Pack the carrying case with sponge and place it in a carton.

14.2 Biopsy

You should properly assembly and verify the biopsy bracket before performing a biopsy.

⚠ **WARNING**

- Only use the biopsy bracket in conjunction with the probe provided by the manufacturer. Otherwise, the system and probe may be damaged, an accident such as a fire may result in the worst case.

- Only trained physicians or sonographers under ultrasound guidance can handle the biopsy needle guides. During operation, the operator must observe the proper needle insertion sequencing with the needle guide in order to avoid undue discomfort and unnecessary risk and injury to the patient.

- The biopsy guidelines that display on the monitor are intended as a reference. It is the operator's responsibility to verify the correct positioning of the needle during a biopsy.

- Do not use a needle guide if the path of the needle is not accurately indicated by the on-screen guidelines. The path of the needle must be displayed within the guidelines. Contact the manufacturer or the local distributer if the needle path is not accurately indicated.

- Do not freeze an image when performing a biopsy.

- To avoid hurting the patient accidentally, the operator should be highly focused during a biopsy.

- You should activate the biopsy guidelines before performing a biopsy.

- The biopsy needle is disposable.

- To avoid infection, disinfect the probe and cover it with the probe sheath when performing a biopsy.

- To avoid possible personnel injury, the operator should perform the biopsy using an appropriate biopsy bracket.

14.2.1   Available Biopsy Brackets

Biopsy Bracket Model	Available Probe Model	Available Biopsy Needle	Application
NGBC613	C613	14G, 16G, 18G, 20G, 22G	Body surface
NGB3C-A	3C-A	14G, 16G, 18G, 20G, 22G	Body surface
NGBC322	C322	14G, 16G, 18G, 20G, 22G	Body surface
NGBC1-6	C1-6	14G, 16G, 18G, 20G, 22G	Body surface
NGBC1-6A	C1-6A	14G, 16G, 18G, 20G, 22G	Body surface
NGBC2-9	C2-9	14G, 16G, 18G, 20G, 22G	Body surface
NGBVC6-2	VC6-2	14G, 16G, 18G, 20G, 22G	Body surface
NGBVC2-9	VC2-9	14G, 16G, 18G, 20G, 22G	Body surface
NGBVC2-9A	VC2-9A	14G, 16G, 18G, 20G, 22G	Body surface
NGBL742-2	L742	14G, 16G, 18G, 20G, 22G	Body surface
NGB12L-A	12L-A	14G, 16G, 18G, 20G, 22G	Body surface
NGB9L-A	9L-A	14G, 16G, 18G, 20G, 22G	Body surface
NGB12L-B	12L-B	14G, 16G, 18G, 20G, 22G	Body surface
NGB13L-A	13L-A	14G, 16G, 18G, 20G, 22G	Body surface
NGB18L-A	18L-A	14G, 16G, 18G, 20G, 22G	Body surface
NGB10L-I	10L-I	14G, 16G, 18G, 20G, 22G	Body surface
NGBML3-18	ML3-18	14G, 16G, 18G, 20G, 22G	Body surface
NGBVL12-5	VL12-5	14G, 16G, 18G, 20G, 22G	Body surface
NGB4P-A	4P-A	14G, 16G, 18G, 20G, 22G	Body surface

Biopsy Bracket Model	Available Probe Model	Available Biopsy Needle	Application
NGBS1-5	S1-5	14G, 16G, 18G, 20G, 22G	Body surface
NGB7P-A	7P-A	14G, 16G, 18G, 20G, 22G	Body surface
NGB6V1	6V1	16G, 18G, 20G, 22G	Intracavity
NGB6V3-2	6V3	16G, 18G, 20G, 22G	Intracavity
NGB6V7	6V7	16G, 18G, 20G, 22G	Intracavity
NGBBCL10-5	BCL10-5	14G, 16G, 18G, 20G, 22G	Intracavity
NGBVE9-5	VE9-5	16G, 18G, 20G, 22G	Intracavity
NGBVE3-10	VE3-10	16G, 18G, 20G, 22G	Intracavity
NGBC3-10V	C3-10V	16G, 18G, 20G, 22G	Intracavity
NGBBCC9-5	BCC9-5	16G, 18G, 20G, 22G	Intracavity
NGBEC9-5	EC9-5	16G, 18G, 20G, 22G	Intracavity

14.2.2   Assembling the Biopsy Bracket

■   **To assemble the surface biopsy bracket**
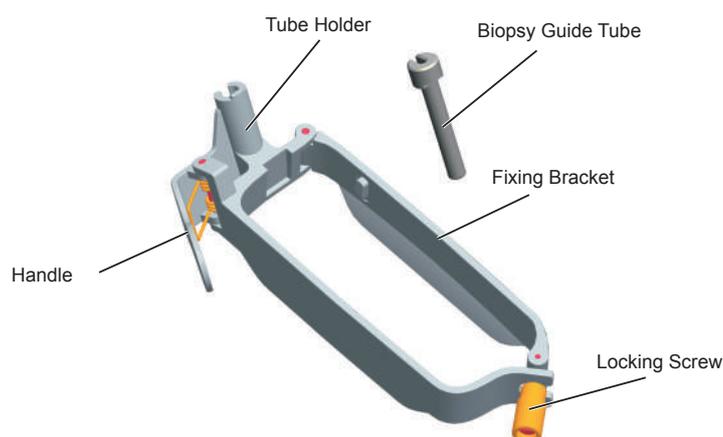
Perform the following steps.

1. Check and ensure that there is no damage, deformation, malfunction, loose or missing parts on the biopsy bracket before assembly.

2. Wear sterile gloves.

3. Unfold the probe sheath and apply an appropriate amount of coupling gel to the inside of the sheath and onto the face of the probe.

4. Hold the probe and unroll the sheath onto the probe. Pull the probe sheath tightly over the face of the probe to remove any wrinkles.

5. Align the biopsy bracket with the orientation mark of the probe.

Orientation
mark

6. Attach the biopsy bracket to the probe and fasten the biopsy bracket with the locking screw.

7. Press the handle and insert the biopsy bracket tube into the biopsy bracket.

8. Insert the biopsy needle into the guide tube and make sure that the biopsy bracket is firmly attached to the probe.

9. Unfold another probe sheath, and apply an appropriate amount of coupling gel to the inside of the sheath.

10. Hold the probe attached with the biopsy bracket and unroll the sheath onto both the probe and attached biopsy bracket.
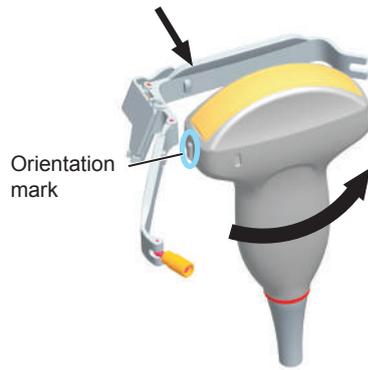
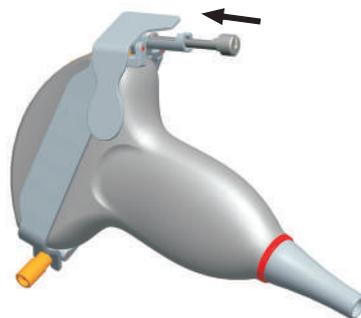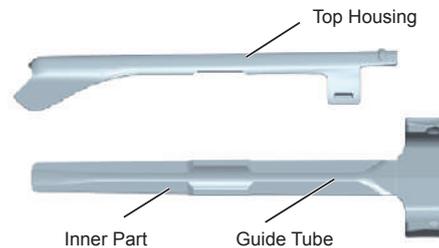■ **To assemble the endocavitary biopsy bracket**

Perform the following steps.

1. Check and ensure that there is no damage, deformation, malfunction, loose or missing parts on the biopsy bracket before assembly.

2. Wear sterile gloves.

3. Unfold the probe sheath, and apply an appropriate amount of coupling gel into the sheath.

4. Hold the probe and unroll the sheath onto it. Pull the probe sheath tightly over the face of the probe to remove any wrinkles.

5. Assemble the metal top housing and the biopsy bracket. Slide the inner part into the top housing and push forward until it clicks.

6. Align the tip of the biopsy bracket with the left and right grooves on the head of the probe.

7. Hold the tip of the bracket and the head of the probe, and push the other end of the bracket towards the probe to attach it on the probe.
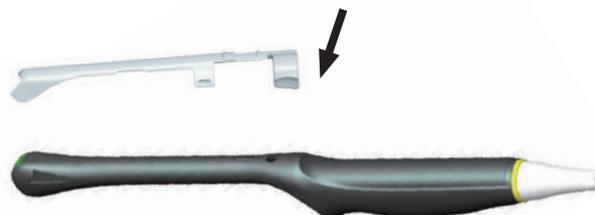
8. Insert the biopsy needle into the guide tube.

9. Check if the bracket has been firmly attached to the probe. If it is loose, reattach the biopsy bracket.

10. Unfold another probe sheath, and apply an appropriate amount of coupling gel into the sheath.

11. Hold the probe attached with the biopsy bracket, and unroll the sheath onto the probe and attached biopsy bracket.

14.2.3 Preparing for a Biopsy

⚠ WARNING Before and after using a rectal or transvaginal probe to perform a biopsy, you should clean and sterilize the probe and all the biopsy accessories. Otherwise, it may cause a infection risk to the next patient who uses the probe and accessories.

You should prepare the following items before performing a biopsy.

- New, straight, biopsy needle
- Sterilized container of sterile and degassed water
- Probe attached with biopsy needle
- Activated biopsy guidelines
- Sterile probe sheath

14.2.4   Verifying the Biopsy Bracket

NOTE:

Ensure the biopsy bracket is properly attached to a compatible probe before verification.

Perform the following steps.

1. Select **Biopsy** on the control panel in the real time B mode.

2. Immerse the probe (the part that is not beyond the junction line) in the degassed water.

3. Insert the biopsy needle into the maximum depth of the water.

4. Verify that the path of the needle is displayed according to the guidelines shown on the image screen. After verification, the needle guide is ready for use.

14.2.5   Performing a Biopsy

NOTE:

Ensure the biopsy bracket is properly attached to the compatible probe and be verified before you perform a biopsy.

Perform the following steps.

1. Set the Guide Line Type to **Biopsy Guide Line** or **Biopsy Safe Range** on the **System Settings** > **General** menu > **Biopsy** tab.

2. In the real-time B mode, press **Biopsy** on the control panel or tap Biopsy on the touch screen to enable the biopsy feature. Tap it again, you can preset the biopsy angle.

3. Tap **Dot Size** on the touch screen to adjust the size of the dot on the biopsy line.

4. Perform a scan to locate the target.

5. Perform the puncture by sliding the needle through the groove in the guide until the needle, as shown on the display, intercepts the target.
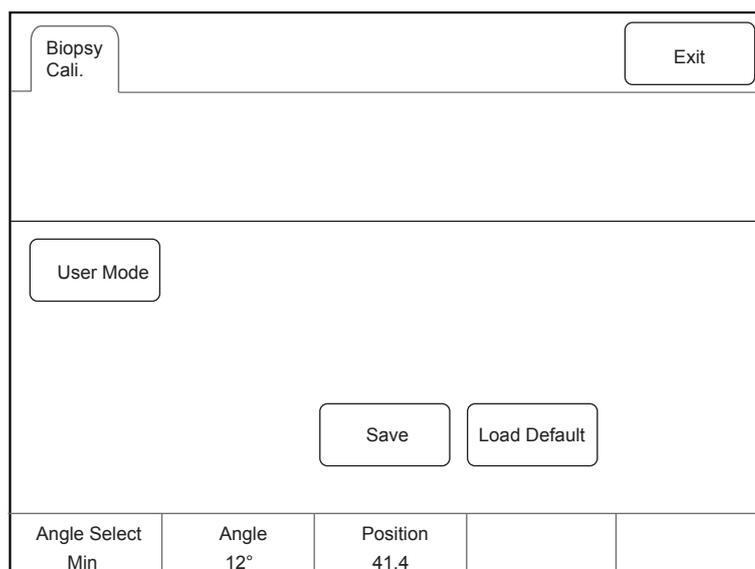
You can select **Bio Cali.** to adjust the biopsy guideline.

- Rotate the knob located directly below **Angle Select** to adjust the angle of the biopsy guideline freely.
- Rotate the knob located directly below **Offset** or **Angle** to adjust the position or angle of the biopsy guideline gradually.
- Tap **Save** to save settings of the biopsy guideline.
- Tap **Load Default** to restore defaults.

6. Adjust the brightness of the biopsy needle on the image.

- For linear probes, you can select **Vis-Needle** to enhance the brightness for the biopsy needle.
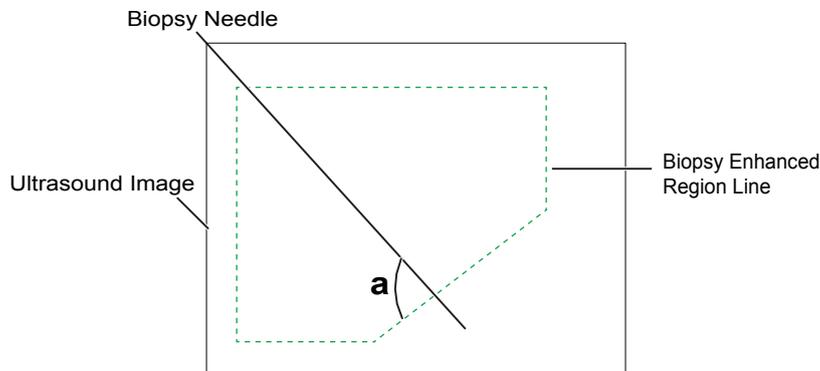
- You can select **Steer Angle** or rotate the **Angle** knob on the control panel to adjust the angle of the biopsy enhanced region line. The closer to a 90° angle, the stronger brightness the biopsy needle will be.
- You can select **Dual Live** to activate the dual-split display for better observation.

7. Gently remove the probe from the patient after completing the biopsy.

The biopsy feature is also available in CFM/PDI/TDI mode, and the operation is the same with that of B mode.

14.2.6 Cleaning the Biopsy Bracket

WARNING
- Clean the biopsy bracket after each use.
- Wear sterile medical gloves and protective goggles during cleaning.

Perform the following steps.

1. Disconnect the probe from the ultrasound system, and remove the biopsy bracket and biopsy guide tube from the probe.

2. Brush and rinse the bracket with an enzymatic cleaner to remove any residue.

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

14.2.7　Sterilizing the Biopsy Bracket

⚠ **WARNING**

- Disinfect the biopsy bracket after each use.
- Use the liquid sterilant that meets local laws and regulations.
- If you use the recommended sterilant, ensure the requirements for the sterilant level and probe soaking period are met. Otherwise, the biopsy bracket could be damaged and your warranty may be void. If you have further use or needs for the probe, ensure the level of the make-up sterilant and the biopsy bracket soaking period are suitable for the intended clinical application.
- Do not use the expired sterilant.
- If you use other contact type to sterilize the biopsy bracket, ensure it is guaranteed by the manufacturer or the local distributer.
- Do not sterilize the biopsy bracket with any ethylene oxide.
- Do not allow any sterilant to be air-dried on the biopsy bracket.

You should sterilize the biopsy bracket after each use.

Perform the following steps.

1. Clean the biopsy bracket.

    For details, refer to Section Table 14-3 Recommended Method for Sterilization.

2. Sterilize the biopsy bracket as shown in Table 14-3 for the entire recommended soaking period.

3. Rinse the bracket with running sterile water to completely remove any sterilant residue.

4. Dry the bracket with a lint-free soft dry cloth.

Table 14-5 Recommended Method for Sterilization

Sterilant	Manufacturer	Active Ingredient	Level for Active Ingredient	Contact Type	Contact Period
Cidex™ Activated Dialdehyde Solution	J&J	Glutaraldehyde	2.4%	Soak	10 hours

14.2.8　Storage

Ensure the biopsy bracket is cleaned, sterilized and completely dried before storing it. Store the biopsy bracket in a sterile environment and keep it away from the environment of sudden temperature changes or direct sunlight.

14.3　Lithotripsy

The lithotripsy guideline is used to assist a lithotriptic device to destruct hardened masses.

1. In the real-time B mode, tap **Biopsy** to enable the biopsy feature.

2. Tap **Biopsy** repeatedly to select **Mid Line**. The lithotripsy guideline appears on the center of image.

3. Use the trackball to adjust the depth identifier. The depth is displayed on the lower part of image.

4. Tap **Biopsy** to disable the biopsy feature.++.

15   System Maintenance

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

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

15.1   Cleaning the System

■ **To clean the system surface**

1. Power off and unplug the 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.

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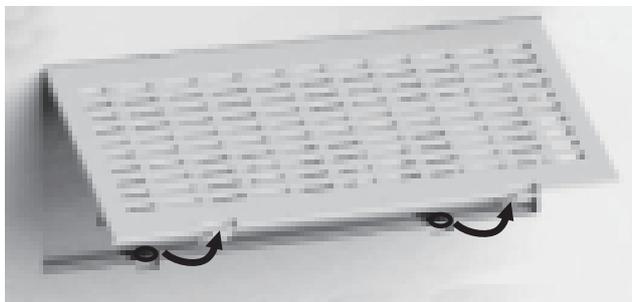
The dust filter must be cleaned at least once every 3 months for ventilation.

1. Power off and unplug the 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 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 fixing ring by both hands.

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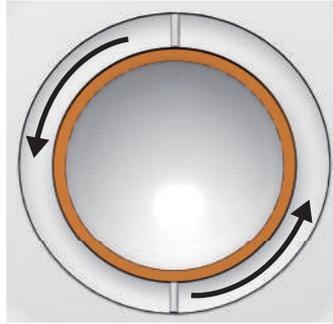
4. Take out the dust ring, the fixing ring and the ball (careful not to drop the ball) from the control panel.

5. Use a lint-free soft cloth dampened with 75% ethanol to clean the dust ring, the fixing ring and the ball.

6. Use a cotton swab dampened with 75% ethanol to remove stains from the surrounding area and edge.

7. Place the ball, the fixing ring and the dust ring back to the control panel, and turn the fixing ring clockwise to install the trackball.

15.2 Maintenance Checks

To maintain the safety and functionality of the system, the following maintenance checks must be performed by service personnel at least once every year.

- ■ **Electric Safety**
  - Integrity of power cable
  - Protective conductor resistance
  - Ground line leakage current
  - Enclosure leakage current
  - Patient leakage current
  - Patient auxiliary leakage current

- ■ **Mechanical Safety**

  NOTE:

  The surfaces of the control panel or the key panel may be abrasive because of the split liquid or other cleaning sprays. Check the potential problems carefully during maintenance checks.

  - Appearance of the system enclosure
  - Appearance of the control panel and the key panel
  - Control of foot brake
  - Connectivity of interfaces

- ■ **Image Recording**
  - Images in each mode
  - Image recording using the standard probe

15.3 Troubleshooting

Q1: Cannot start the system.

A1: Check whether the system is plugged in, the main power switch is located to I position and the fuse is intact. If the fuse is blown, replace it as described in Section 15.4 Replacing the Fuse.

Q2: No images are displayed on the monitor.

A2: Check whether the power supply cable and video cable are securely connected.

Q3: The monitor displays abnormal.

A3: Check whether probe and a compatible exam type are selected, or the imaging parameters are optimized correctly. For details, refer to Chapter 6 Acquiring Images.

Q4: The measurement cannot be performed after pressing the **Calc** button on the control panel.

A4: Ensure you pressing the **Calc** button in the frozen mode.

If any of the above problems still exist, please contact the Customer Service Department of the manufacturer for help.

15.4   Replacing the Fuse

WARNING

Power off the system and disconnect the power cable from the socket before replacing the fuse.

Two fuses with specifications of 50CT-T5AH 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 under the instructions of the service personnel if the fuse is blown.

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

15.5   Equipment Disposal

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

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

15.6   Customer Service

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

Contact address: 2F, 12th Building, Shenzhen Software Park Phase II, Keji Middle 2nd Road, Nanshan District, Shenzhen, 518057, Guangdong, China

Tel: +86-755-26722890

E-mail: service@sonoscape.net

Appendix A Specifications

Comply with	EN 60601-1 (IEC 60601-1), Medical electrical equipment Part 1: General requirements for basic safety and essential performance, Class I, BF, continuous operation EN 60601-2-37 (IEC 60601-2-37), Medical Electrical Equipment Part 2-37: Particular Requirements for the Basic Safety and Essential Performance of Ultrasonic Medical Diagnostic and Monitoring Equipment EN 60601-1-2 (IEC 60601-1-2), Medical electrical equipment- Part 1-2: General requirements for basic safety and essential performance - Collateral standard: Electromagnetic disturbances - Requirements and tests

Classifications	Type of protection against electrical shock	Class I
	Degree of protection against electrical shock	Type-BF applied part
	Installation Type	Mobile equipment
	Degrees of protection against harmful liquid	System is IPX0 Probe (from the acoustic window to the junction line) is IPX7 Foot switch is IPX8
	According to the degree of safety of application	The equipment is not suitable for use in the presence of a flammable anesthetic mixture with air, oxygen or nitrous oxide.

		Operations	Storage and Transportation
Environmental Requirement			
	Ambient Temperature	+10°C ~ +40°C	-20°C ~ +55°C
	Relative Humidity	30% ~ 75% (no condensation)	20% ~ 90% (no condensation)
	Atmospheric Pressure	700hPa ~1060hPa	700hPa ~1060hPa

Power Supply	Voltage: 100-127V/220-240V~ Frequency: 50/60Hz Power consumption: 500VA
Fuse	Type: 50CT Breaking capacity: 1500 amperes at 250V AC Blowing time rating: 30 minutes (Max.) Current rating: 5A
Applied Parts	Probes, ECG electrodes

Appendix B EMC Guidance and Manufacturer's Declaration

B.1   Electromagnetic Emissions

The equipment is intended for use in the electromagnetic environment specified below. The customer or the user of the EQUIPMENT should assure that it is used in such an environment.

Emissions Test	Compliance	Electromagnetic Environment and Guidance
RF emissions CISPR 11	Group 1	The equipment uses RF energy only for its internal function. Therefore, its RF emissions are very low and are not likely to cause any interference in nearby electronic equipment.
RF emissions CISPR 11	Class B	The equipment is suitable for use in all establishments, including domestic establishments and those directly connected to the public low-voltage power supply network that supplies buildings used for domestic purposes.
Harmonic emissions IEC 61000-3-2	Class A	
Voltage fluctuations/ flicker emissions IEC 61000-3-3	Complies	

B.2　Electromagnetic Immunity

The equipment is intended for use in the electromagnetic environment specified below. The customer or the user of the equipment should assure that it is used in such an environment.

Immunity Test	IEC 60601 Test Level	Compliance Level	Electromagnetic Environment and Guidance
Electrostatic discharge (ESD) IEC 61000-4-2	±8 kV contact ±15 kV air	±8kV Contact ±15kV Air	Floors should be wood, concrete or ceramic tile. If floors are covered with synthetic material, the relative humidity should be at least 30%. If ESD interfere with the operation of equipment, counter measurements such as wrist strap, grounding shall be considered.
Electrical fast transient/burst IEC 61000-4-4	±2 kV for power supply lines	±2 kV for power supply lines	Mains power quality should be that of a typical commercial or hospital environment.
Surge IEC 61000-4-5	±1 kV differential mode ±2 kV common mode	±1kV differential mode ±2kV common mode	Mains power quality should be that of a typical commercial or hospital environment.
Voltage dips, short interruptions and voltage variations on power supply input lines IEC 61000-4-11	0 % UT (100 % dip in UT) for 0,5 cycle 0 % UT (100 % dip in UT) for 1 cycles 70 % UT (30 % dip in UT) for 25/30cycles 0 % UT (100 % dip in UT) for 250/300 cycles	0 % UT (100 % dip in UT) for 0,5 cycle 0 % UT (100 % dip in UT) for 1 cycles 70 % UT (30 % dip in UT) for 25/30cycles 0 % UT (100 % dip in UT) for 250/300 cycles	Mains power quality should be that of a typical commercial or hospital environment. If the user of the equipment requires continued operation during power mains interruptions, it is recommended for the equipment to be powered from an uninterruptible power supply or a battery.
Power frequency (50/60Hz) magnetic field IEC 61000-4-8	30 A/m	30 A/m	Power frequency magnetic fields should be at levels characteristic of a typical location in a typical commercial or hospital environment.

NOTE: U_T is the a.c. mains voltage prior to application of the test level.

The equipment is intended for use in the electromagnetic environment specified below. The customer or the user of the equipment should assure that it is used in such an environment.

Immunity Test	IEC 60601 Test Level	Compliance Level	Electromagnetic Environment and Guidance
Conducted RF IEC 61000-4-6	3 Vrms 150 kHz to 80 MHz (6V in ISM and amateur radio bands between 0.15MHz and 80 MHz)	3 Vrms 150 kHz to 80 MHz (6V in ISM and amateur radio bands between 0.15MHz and 80 MHz)	Portable and mobile RF communications equipment should be used no closer to any part of the EQUIPMENT, including cables, than the recommended separation distance calculated from the equation applicable to the frequency of the transmitter. Recommended separation distance: $$d = 1.2\sqrt{p}$$ $$d = 1.2\sqrt{p} \quad \text{80MHz-800 MHz}$$
Radiated RF IEC 61000-4-3	10 V/m 80 MHz to 2,7 GHz	10V/m	$$d = 2.3\sqrt{p} \quad \text{800 MHz-2.5GHz}$$ Where P is the maximum output power rating of the transmitter in watts (W) according to the transmitter manufacturer and d is the recommended separation distance in meters (m). Field strengths from fixed RF transmitters, as determined by an electromagnetic site survey,[a] should be less than the compliance level in each frequency range. [b] Interference may occur in the vicinity of equipment marked with the following symbol:

NOTE 1: At 80 MHz and 800 MHz, the higher frequency range applies.

NOTE 2: These guidelines may not apply in all situations. Electromagnetic propagation is affected by absorption and reflection from structures, objects and people.

[a] Field strengths from fixed transmitters, such as base stations for radio (cellular/cordless) tele- phones and land mobile radios, amateur radio, AM and FM radio broadcast and TV broadcast cannot be predicted theoretically with accuracy. To assess the electromagnetic environment due to fixed RF transmitters, an electromagnetic site survey should be considered. If the measured field strength in the location in which the EQUIPMENT is used exceeds the applicable RF compliance level above, the EQUIPMENT should be observed to verify normal operation. If abnormal performance is observed, additional measures may be necessary, such as re-orienting or relocating the EQUIPMENT.

[b] Over the frequency range 150 kHz to 80 MHz, field strengths should be less than 3 V/m.

B.3   Recommended Separation Distances between Portable and Mobile RF Communications Equipment and the Equipment

The equipment is intended for use in an electromagnetic environment in which radiated RF disturbances are controlled. The customer or the user of the equipment can help prevent electromagnetic interference by maintaining a minimum distance between portable and mobile RF communications equipment (transmitters) and the equipment as recommended below, according to the maximum output power of the communications equipment.

Rated Maximum Output Power of Transmitter (W)	Separation distance according to frequency of transmitter (m)		
	150 kHz to 80 MHz $d = 1.16\sqrt{p}$	80 MHz to 800 MHz $d = 1.16\sqrt{p}$	800 MHz to 2.5 GHz $d = 2.33\sqrt{p}$
0.01	0.12	0.12	0.23
0.1	0.38	0.38	0.73
1	1.2	1.2	2.3
10	3.8	3.8	7.3
100	12	12	23

For transmitters rated at a maximum output power not listed above, the recommended separation distance d in meters (m) can be estimated using the equation applicable to the frequency of the transmitter, where P is the maximum output power rating of the transmitter in watts (W) according to the transmitter manufacturer.

NOTE 1: At 80 MHz and 800 MHz, the separation distance for the higher frequency range applies.

NOTE 2: These guidelines may not apply in all situations. Electromagnetic propagation is affected by absorption and reflection from structures, objects and people.

Appendix C In Situ, Derated, and Water Value Intensities

All intensity parameters are measured in water. Since water absorbs very little acoustic energy, these water measurements represent a worst case value. Biological tissue does absorb acoustic energy. The true value of the intensity at any point depends on the amount and type of tissue and the frequency of the ultra-sound that passes through the tissue. The intensity value in the tissue, In Situ, has been estimated by using the following formula:

In Situ = Water$[e^{-0.23alf}]$

Where,

$$In\ Situ = In\ Situ\ Intensity\ Value$$

$$Water = Water\ Value\ Intensity$$

$$e = 2.7183$$

$$a = Attenuation\ Factor$$

$$Tissue = a\ (dB/cm\text{-}MHz)$$

$$Amniotic\ Fluid = 0.006$$

$$Brain = 0.53$$

$$Heart = 0.66$$

$$Kidney = 0.79$$

$$Liver = 0.43$$

$$Muscle = 0.55$$

$$l = Skin\ line\ to\ measurement\ depth\ (cm)$$

$$f = Center\ frequency\ of\ the\ transducer/system/mode\ combination\ (MHz)$$

Since the ultrasonic path during an examination is likely to pass through varying lengths and types of tissue, it is difficult to estimate the true In Situ intensity. An attenuation factor of 0.3 is used for general reporting purposes; therefore, the In Situ value which is commonly reported uses the formula:

In Situ derated = Water$[e^{-0.069lf}]$

Since this value is not the true In Situ intensity, the term "derated" is used.

Appendix D Recommended Coupling Gel, Cleaner and Disinfectant

NOTE:

- Coupling gels, cleaners and 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.

- This appendix contains the latest information about the recommended coupling gels, cleaners and disinfectants when the user manual is released. The appendix is subject to change without prior notice.

- Some of the probe models listed in the following tables can be used with this system. For details, refer to Section 14.1 Probe.

D.1   Coupling Gel

Probe Model	Applicable	Inapplicable
MPTEE, MPTEE mini, 12C-ER	Aquasonic 100, Aquasonic Clear, Sterile Aquasonic, Clear Image/Single, Sterile Ultraphonic Gel	Transonic gel, Clear Scanning Gel, Multigel Gel
LAP7, 10I2, 6CI-A, 6CT-A, 10L-I, 12LI-A, 12LT-A,	Aquasonic 100, Aquasonic Clear, Sterile Aquasonic, Clear Image/Single, Sterile Ultraphonic Gel, Transonic gel	Clear Scanning Gel, Multigel Gel
EC9-5, 6V1, 6V3, BCC9-5, BCL10-5, 6V1A, 6V3A, 6V7	Aquasonic 100, Aquasonic Clear, Sterile Aquasonic, Clear Image/Single, Sterile Ultraphonic Gel, Transonic gel, Clear Scanning Gel	Multigel Gel
VC6-2, VE9-5, CWD2.0, CWD5.0, VC2-9	Aquasonic 100, Aquasonic Clear, Sterile Aquasonic, Clear Image/Single, Sterile Ultraphonic Gel, Transonic gel	Clear Scanning Gel, Multigel Gel
2P1, 5P1, 10L1, C344, C361, C362, C542, C611, L741, L741V, L742, L743, L746, L752, C322, C322V, C353, C354, C613, 3C-A, C1-6, 3P-A, 4P-A, 5P2, 7P-A, 7P-B, 8P1, 9L-A, 13L-A, 18L-A, S1-5, C1-6A, 12L-A, 12L-B	Aquasonic 100, Aquasonic Clear, Sterile Aquasonic, Clear Image/Single, Sterile Ultraphonic Gel, Transonic gel, Clear Scanning Gel, Multigel Gel	-

D.2　Cleaner

Probe Model	Applicable	Contact Type
MPTEE, MPTEE mini, 12C- ER	Mild soapy water	Spray / Wipe
LAP7	Mild soapy water	Spray / Wipe
VC6-2, VE9-5, VC2-9	Mild soapy water	Spray / Wipe
CWD2.0, CWD5.0	Mild soapy water	Spray / Wipe
2P1, 5P1, 10L1, C344, C361, C362, C542, C611, L741, L741V, L742, L743, L746, L752 , C322, C322V, C353, C354, C613, 3C-A, C1-6, 3P-A, 4P-A, 5P2, 7P-A, 7P-B, 8P1, 9L-A, 13L-A, 18L-A, S1-5, C1-6A, 12L-A, 12L-B, 10I2, 6CI-A, 6CT-A, 10L-I, 12LI-A, 12LT-A, EC9-5, 6V1, 6V3, BCC9-5, BCL10-5, 6V1A, 6V3A, 6V7	Mild soapy water, Transeptic	Spray / Wipe

D.3　Disinfectant

Probe Model	Applicable	Contact Type
MPTEE, MPTEE mini, 12C-ER	Cidex OPA Solution, Cidex, Metricide 14	Soak
LAP7	Cidex	Soak
10I2, 6CI-A, 6CT-A, 10L-I, 12LI-A, 12LT-A	Cidex,	Soak
	70% Isopropyl alcohol, T-spray, T-spray II	Spray / Wipe
CWD2.0, CWD5.0,	Cidex OPA Solution, Cidex, Metricide 14	Soak
VC2-9, VC6-2, VE9-5	Cidex OPA Solution, Cidex, Metricide 14	Soak
	Tristel Sporicidal Wipe*, Tristel Duo for Ultrasound	Wipe
EC9-5, 6V1, 6V3, BCC9-5, BCL10-5, 6V1A, 6V3A, 6V7, 2P1, 5P1, 10L1, C344, C361, C362, C542, C611, L741, L741V, L742, L743, L746, L752, C322, C322V, C353, C354, C613, 3C-A, C1-6, 3P-A, 4P-A, 5P2, 7P-A, 7P-B, 8P1, 9L-A, 13L-A, 18L-A, S1-5, C1-6A, 12L-A, 12L-B	Cidex OPA Solution, Cidex, Metricide 14, Resert XL HLD	Soak
	Tristel Sporicidal Wipe*, Tristel Duo for Ultrasound	Wipe
	70% Isopropyl alcohol, T-spray, T-spray II	Spray / Wipe

* Part of the Tristel Trio Wipes System

Appendix E Acoustic Output Data

Please refer to Section 4.11.2 Acoustic Output.