DP-6600/DP-6500

Digital Ultrasonic Diagnostic Imaging System

Operator's Manual

[Basic Volume]

Product Information:

Product Name: Digital Ultrasonic Diagnostic Imaging System

Model: DP-6600/DP-6500

Issued Date of this manual: 2007-11

Version: 1.6.

CE 0123

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

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2. Freight policy: The customer is responsible for freight charges when this product is shipped to Mindray for service (this includes customs charges).
3. Return address: Please send the part(s) or equipment to the address offered by the Customer Service Department.

Company Contact

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2. The warranty does not cover the following items, even during the warranty period:
   (1) Damage or loss due to misuse or abuse.
   (2) Damage or loss caused by Acts of God such as fires, earthquakes, floods, lightning, etc.
   (3) Damage or loss caused by failure to meet the specified conditions for this system, such as inadequate power supply, improper installation, or unacceptable environmental conditions.
   (4) Damage or loss due to use outside the territory in which the system was originally sold.
   (5) Damage or loss involving system purchased from a source other than Mindray or its authorized agents.
3. This system shall not be used by persons other than fully qualified and certified medical personnel.
4. Do not make changes or modifications to the software or hardware of this product.
5. In no event shall Mindray be liable for problems, damage, or loss caused by relocation, modification, or repair performed by personnel other than those designated by Mindray.
6. The purpose of this system is to provide physicians with data for clinical diagnosis.
   The responsibility for diagnostic procedures lies with the physicians involved. Mindray shall not be liable for the results of diagnostic procedures.
7. Important data must be backed up on external recording media such as clinical records, notebooks etc.
8. Mindray shall not be liable for loss of data stored in the memory of this system caused by operator error or accidents.
9. This manual contains Warnings regarding foreseeable potential dangers. Be alert at all times to dangers other than those indicated. Mindray shall not be liable for damage or loss that results from negligence or from ignoring the precautions and operating instructions contained in this operator’s manual.
10. On the occasion of change of the administrator or manager for this system, be sure to hand over this operator’s manual.

Introduction

This operator's manual describes the operating procedures for the diagnostic ultrasonic imaging system DP-6600/DP-6500. To ensure safe and correct operation of the system, carefully read and understand the manual before operating the system.

1. Notation Conventions

In this operator's manual, the following words are used in addition to the signal words related to the safety precautions (refer to "Safety Precautions"). Please read this operator's manual before using the system.

NOTE:	Indicates information of interest to users of system as to exceptional conditions or operating procedures.

2. Operator's Manuals

A Mindray service person or instructor will explain the basic operating procedures for this system at the time of delivery. However, read this operator's manual carefully before using the system in order to understand the detailed operating procedures, functions, performance, and maintenance procedures. The organization of the documents supplied with this system is shown below:

Operator's manual of main unit	Describes detailed system information on preparation, operating procedures, maintenance checks, and functions.
Operator's manuals of transducers	Describe the operating and sterilization procedures for transducers.

NOTE: For certain applications, the following manuals are available:

- (Advanced Volume)

3. Interface in This Operator's Manual

Depending on the software version and configuration of each system, interfaces or menus may appear different from those shown in this manual.

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Safety Precautions

1. Meaning of Signal Words

In this operator's manual, the signal words **⚠DANGER**, **⚠WARNING**, **⚠CAUTION** and **NOTE** are used regarding safety and other important instructions. The signal words and their meanings are defined as follows. Please understand their meanings clearly before reading this manual.

Signal word	Meaning
⚠DANGER	**Indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.**
⚠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 minor or moderate injury.**
NOTE	Indicates a potentially hazardous situation which, if not avoided, may result in property damage.

2. Meaning of Safety Symbols

Symbol	Description
	Type-BF applied part Note： All ultrasound transducers can be connected to this system are Type-BF applied parts.
	"Attention" indicates the points requiring attention. Be sure to read the operator's manual concerning these points before using the equipment.

3. Safety Precautions

Please observe the following precautions to ensure patient and operator safety when using this system.

⚠DANGER: Do not use flammable gasses such as anesthetic gas, oxygen or hydrogen, or flammable liquids such as ethanol, near this product, because there is danger of explosion.

⚠WARNING:

1. **Do connect the plug of this equipment and its peripheral equipments to the wall receptacle meeting the rating nameplate. Using adapter or multi-functional receptacle may affect system grounding performance and thus cause leakage current exceeding safety requirement. Please use the supplied power cable. No other power cables should be used.**
2. **Be sure to connect the potential-equalization lead wire before inserting the equipment power plug into the receptacle. Also, be sure to remove the equipment power plug from the receptacle before disconnecting the wire to avoid electrical shock.**
3. **Connect the earth conductor only before turning ON the system. Disconnect the grounding cable only after turning OFF the system. Otherwise, electric shock may result.**
4. **For the connection of power and grounding, follow the appropriate procedures described in this operator's manual. Otherwise, there is risk of electric shock. Do not connect the grounding cable to a gas pipe or water pipe, otherwise functional grounding may not be effective or there may be risk of a gas explosion.**
5. **Do not connect this system to outlets with the same circuit breakers and fuses that control current to devices such as life-support systems. If this system malfunctions and generates an overcurrent, or when there is an instantaneous current at power ON, the circuit breakers and fuses of the building's supply circuit may be tripped.**
6. **No waterproof device is applied to this equipment. Do not use this equipment in any place with the possibility of water ingress. There is risk of electric shock if any water is sprayed on or into the equipment. If carelessly spray any water onto the equipment contact the Mindray sales office, customer service department or representative.**
7. **Use the transducer carefully. In case that the body contacts the scratched transducer surface, immediately stop using the transducer and contact the Mindray sales office, customer service department or representative. There is risk of electric shock if using the scratched transducer.**
8. **After the sterilization or disinfection of accessories, chemicals must be washed out or gases must be discharged thoroughly from the accessories. Remaining residual chemicals or gases will not only result in damage to the accessories but also can be harmful to human bodies.**
9. **Do not allow this system or other equipment to come into contact with the patient. If this system or other equipment is defective, the patient may receive an electric shock.**

⚠WARNING:

10. **Do not use the transducers other than those specified by Mindray. If a transducer other than those specified by Mindray is connected, the equipment and the transducer may be damaged, causing an accident such as a fire in the worst case.**
11. **Do not subject the transducers to knocks. Use of defective transducers may cause an electric shock.**
12. **Do not open the shell or front panel. If open the shell when the machine is powered on, there may be a short circuit or electric shock.**
13. **Do not use this system at the same time with other equipment such as electric knife, high-frequency therapy equipment and defibrillator, etc., Otherwise there is a danger of electric shock.**
14. **Precautions during transportation: When moving the equipment, first turn it off and close up the keyboard, then disconnect it with other devices(including transducer), disconnect it with power supply, and wrap the power cable on the winding rack, finally lift it carefully by handle and move it to a proper position.**
15. **Prolonged and repeated use of keyboards can result in hand or arm nerve disorders in some individuals. Observe the local institution work safety/health regulations on keyboard use.**
16. **Accessory equipment connected to the analogue and digital interfaces must be complied with the relevant IEC standards. Furthermore all configurations should comply with the standard IEC60601-1-1.Everybody who connects additional equipment to the signal input part or signal output part configures a medical system, and is therefore responsible that the system complies with the requirements of IEC60601-1-1. If in doubt, consult Mindray sales office, customer service department or representative.**

⚠CAUTION:

1．Precautions concerning clinical examination techniques

(1) This system must be used only by medical personnel fully trained in clinical examination techniques.

(2) This operator's manual does not describe clinical examination techniques. Selection of the proper clinical examination technique must be based on specialized training and clinical experience.

2．Malfunctions due to radiowaves

(1) Use of radiowave-emitting devices in the proximity of this kind of medical electronic system may interfere with its operation. Do not bring or use devices which generate radio waves, such as cellular telephones, transceivers, and radio controlled toys, in the room where the system is installed.

(2) If a user brings a device which generates radio waves near the system, they must be instructed to immediately turn OFF the device. This is necessary to ensure the proper operation of the system。

3．Precautions concerning installation and movement of the system

(1) Do not place any objects on top of the monitor. They may fall, causing injury.

⚠CAUTION: **(2) Confirm that the peripheral units are secured before moving the system. Otherwise, the peripheral units may fall and cause injury.**

4. Please use the supplied or recommended peripheral devices and optional parts. Please use the supplied cables. Using other devices or cables may degrade the system performance and even cause an electrical shock.

5. Always keep the machine dry. Avoid transporting this machine quickly from the cold place to the warm place, otherwise condensation or water drops may be formed, which will cause short circuit.

6. If the circuit breaker is tripped or the fuse is blown, it indicates that the machine or the peripheral devices have problems. In these cases, the user cannot repair by him but contact the Mindray sales office, customer service department or representative.

7. There is no risk of high-temperature burns during routine ultrasound examinations. To prevent high-temperature burns, do not apply the transducer to the same spot on the patient for a long time. Apply the transducer only for as long as required time for diagnosis.

8. Before cleaning the system, be sure to disconnect the power cable from the outlet. If the system is defective, there is a risk of electric shock.

9. Before examining a new patient, press [Patient] to delete the patient information and data recorded in the image memory for the previous patient. Otherwise, the new data may be confused with the data of the previous patient.

10. Do not pull out the system and its accessories plug without turn OFF the power. Doing so may cause these equipment damaged even electric shock.

11. Press『Clear』key, all comments, bodymarks, measurements scale and general measurement data on the screen will be cleared up.

12. Do not turn OFF the system during printing, saving, or invoking. Otherwise may cause these processes to not operate correctly.

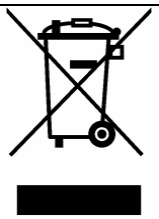
NOTE:

1. Do not use the machine in the vicinity of strong electromagnetic field (such as the transformer), which may affect the performance of the monitor.
2. Do not use the machine in the vicinity of high-frequency radiation source (such as the cellular phone), which may affect the performance of the machine or even lead to failure.
3. To avoid damaging the machine, do not use the machine in following environment:
   (1) Locations exposed to direct sunlight;
   (2) Locations subject to sudden changes in temperature
   (3) Dusty locations
   (4) Locations subject to vibration
   (5) Locations near heat generators
   (6) Locations with high humidity

NOTE:

4. Turn ON the system only after the power has been OFF for more than 5 seconds. If the system is turned ON immediately after being turned OFF, the system may malfunction.
5. Turn OFF the system or stop transmission by [FREEZE] key before connecting or disconnecting a transducer. Otherwise, it may result in malfunction of the system and/or the transducer.
6. After using the transducer, remove the gel (acoustic coupler) on it and place the transducer on the transducer holder. Otherwise, water in the gel may enter the acoustic lens, thus adversely affecting the performance and safety of the transducer.
7. The user can record registration data (including hospital data and patient data). To ensure the security of the data, be sure to back up the data on external storage media. Data stored in the equipment may be lost due to improper operation or an accident.
8. If this equipment is used in a small room, the room temperature may rise. Proper ventilation must be provided.
9. The fuse inside the machine can be replaced only by the Mindray service engineer or the technician specified by MINDRAY.
10. Do not turn OFF the system during printing, saving, or invoking. Otherwise may cause these processes to not operate correctly.
11. Please use the USB storage device compliant with the relevant local regulations. The format of the USB storage device file system should be FAT or FAT32, and the instruction is SCSI
12. Some USB portable hard disks must be connected to the external power（the external power must be compliant with the relevant local regulations）, otherwise they can not be distinguished.
13. When disposing of this system or any part of the system, contact Mindray sales office, customer service department or representative. Do not dispose of this system without consulting Mindray sales office, customer service department or representative first. Mindray does not assume any responsibility for damage resulting from disposal of this system without consulting MINDRAY。
14. Deterioration of electrical and mechanical safety characteristics (such as generation of a leakage current or deformation/abrasion of mechanical parts) and of image sensitivity and resolution may occur over a period of time. To guarantee the normal performance of the equipment, it is proposed to enter into an agreement on maintenance and service to prevent accident.

NOTE: The following definition of the WEEE label applies to EU member states only: The use of this symbol indicates that this product should not be treated as household waste. By ensuring that this product is disposed of correctly, you will help prevent bringing potential negative consequences to the environment and human health. For more detailed information with regard to returning and recycling this product, please consult the distributor from whom you purchased the product.



* For system products, this label may be attached to the main unit only.

4. WARNING Labels

Various WARNING labels are attached to this system in order to call the user's attention to potential hazards.

The symbol ⚠ on the WARNING labels attached to the system indicates safety precautions. The WARNING labels use the same signal words as used in the descriptions in the operator's manuals.

Detailed information about the WARNING labels is given in the main body of this operator's manual. Read the operator's manual carefully before using the system.

The name, appearance, and the indication of each WARNING label are shown as follows.

No.	Label	Meaning
<1>		Cautions that no object or force or any stress is added on keyboard. Close up the keyboard before moving the equipment.
<2>		(a) Cautions that the system must not be used around flammable gasses, otherwise there may be risk of explosion. (b) Urges Caution related to handling of the transducers. For handling of the transducers, refer to the transducers' operator's manual.
<3>		(a) Cautions that the system must not be removed covers because the high voltage may cause electric shock.

Contents

1 Intended Use

The DP-6600/DP-6500 digital ultrasonic diagnostic imaging system can be used in whole body including abdomen, gynecology, obstetrics, cardiac, small parts (breast, thyroid, testes, etc.) ultrasonic examinations.

Contraindication: none.

2 Specifications

2.1 Conditions

(1) Power

Line voltage	:	100－240 V～
Line frequency	:	50 / 60Hz
Power consumption	:	less than 150 VA

(2) Operating environmental conditions

Ambient temperature	:	5°C to 40°C
Relative humidity	:	35% to 85% (no condensation)
Atmospheric pressure	:	700 hPa to 1060 hPa

(3) Storage and transportation conditions

Ambient temperature	:	-20°C to 55°C
Relative humidity	:	30% to 85% (no condensation)
Atmospheric pressure	:	700 hPa to 1060 hPa

NOTE: The line voltage differs depending on the area.

2.2 External Dimensions and Mass

(a) External dimensions (excluding handle, winding rack, wire hanging rack, etc):
265mm broad × 410 mm length × 330 mm height

(b) Mass (excluding optional units): Approx. 12 kg

3 System Configuration

3.1 Basic Configuration

(1) Main unit

(2) Standard Transducer: 1

(3) Accessories (Please refer to the package list)

3.2 Optional Transducers

Transducer model	Intended use	Applicable parts
35C50EA (for DP-6600 only)	Abdomen, pediatrics, gynecology and obstetrics examinations	Body surface
35C20EA	cardiology, abdomen, pediatrics, gynecology and obstetrics examinations	Body surface
65EC10EA	gynecology , obstetrics and urology examinations	Transvaginal, Transrectal
75L38EA	small parts (breast, thyroid, testes, etc.), neonatal cephalic, peripheral vascular, muscular-skeletal (conventional, superficial)	Body surface
35C50EB (for DP-6500 only)	Abdomen, pediatrics, gynecology and obstetrics examinations	Body surface
75L60EA	small parts (breast, thyroid, testes, etc.), neonatal cephalic, peripheral vascular, muscular-skeletal (conventional, superficial)	Body surface
65C15EA	Pediatric abdomen and head	Body surface

3.3 Optional Devices

Optional Devices for DP-6600:

No.	Name	Model
1	Mobile Trolley	UMT-100
2	DICOM Software	/
3	Footswitch	971-SWNOM, 68-S3

Note: The 68-S3 footswitch is not sold to the EU member states.

Optional Devices for DP-6500:

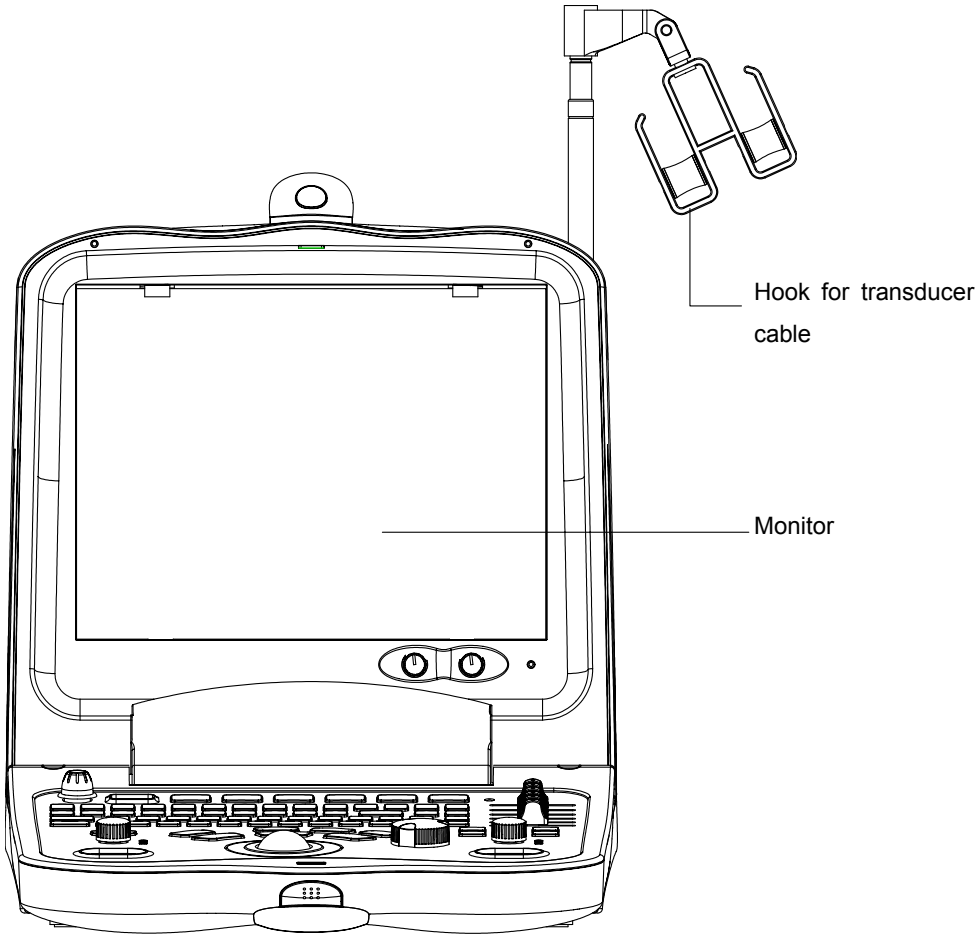
No.	Name	Model
1	DICOM Software	/
2	Dual-transducer Socket	/

3.4 Peripheral Devices

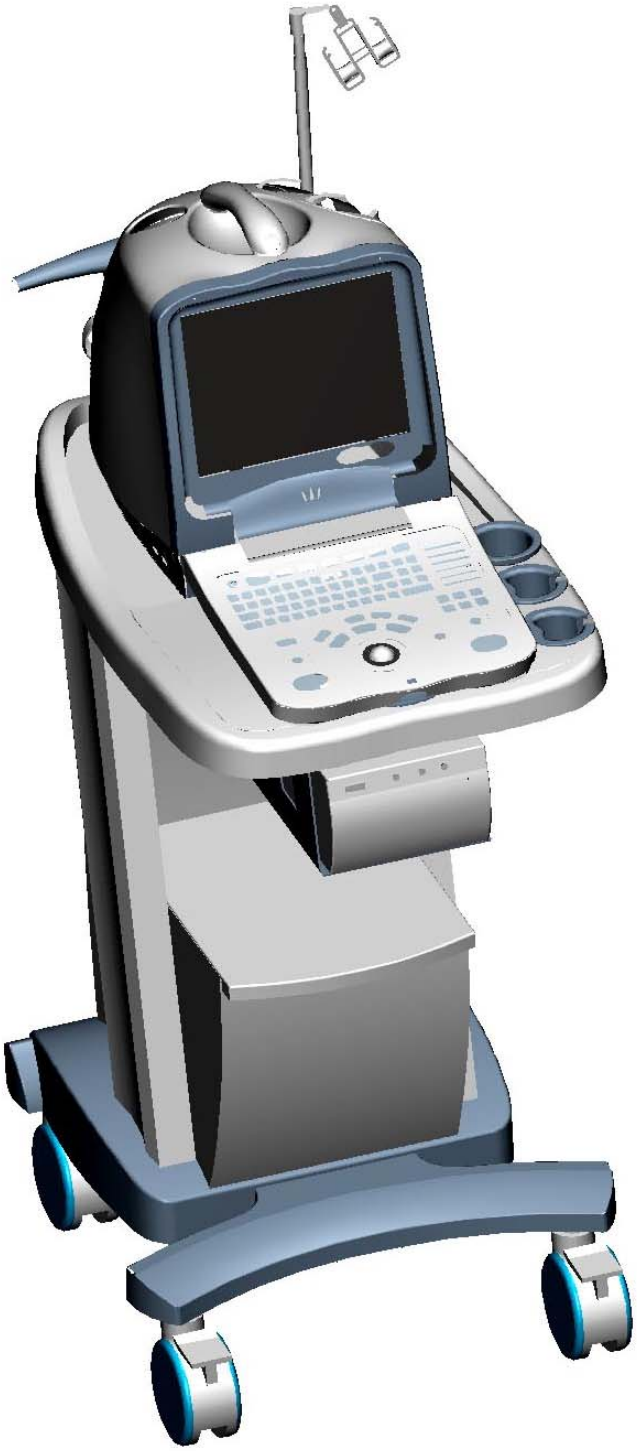
No.	Name	Model
1	Video printer	SONY UP-895MD SONY UP-897MD MITSUBISHI P93W
2	Graph/text printer	HP DeskJet 5652/5650（LPT port/USB port） Business Inkjet 1200（LPT port/USB port） HP Laserjet2420d（LPT port/USB port） HP DeskJet6548（USB port）

4 System Overview

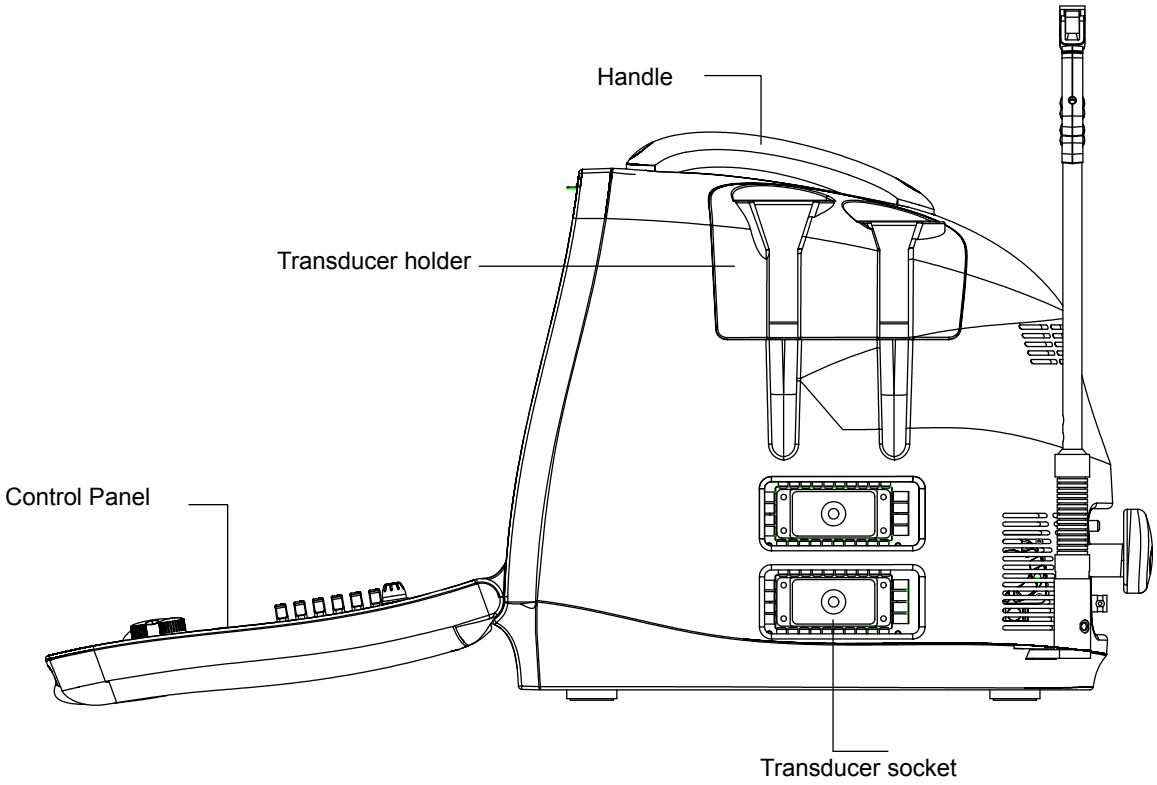
4.1 Name of Each Part



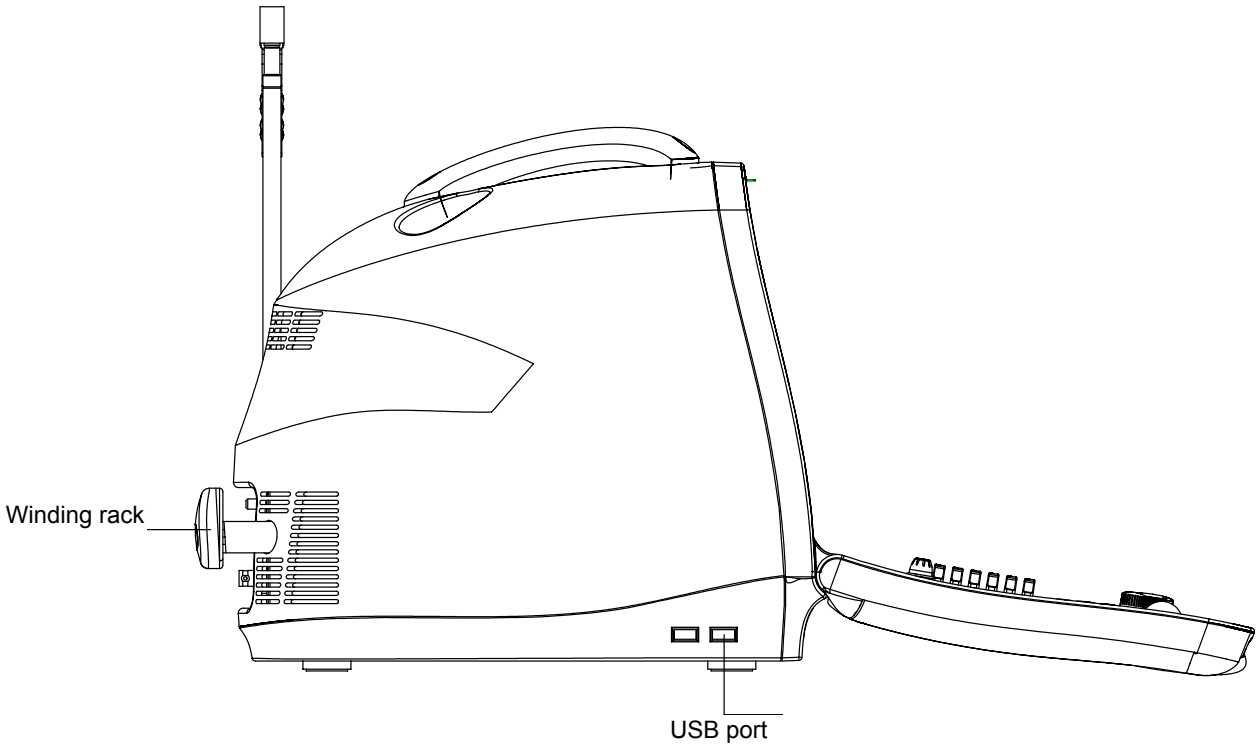
Front view



View with Mobile trolley



Right side view



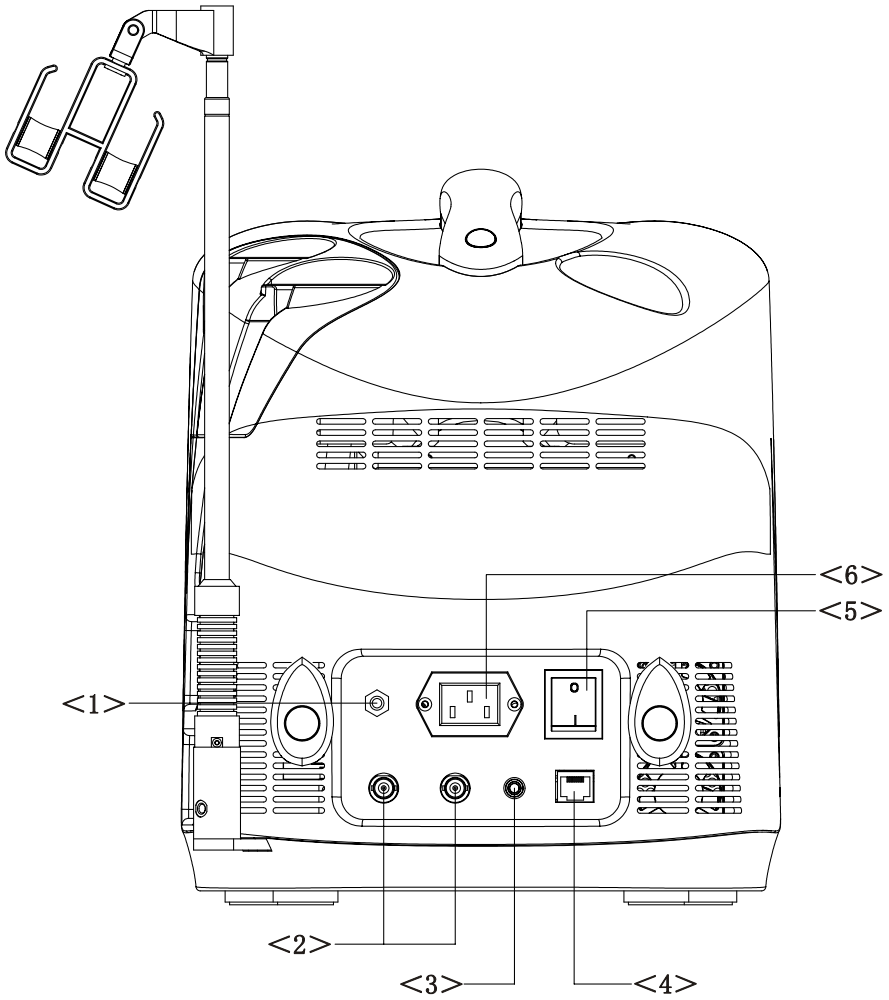
Left side view

No.	Name	Introduction
<1>	Monitor	Display images and parameters etc, 10″non-interlaced VGA
<2>	Hook for transducer cable	Hook to the transducer cable
<3>	Handle	Use to lift the machine
<4>	Transducer Holder	Place transducer provisionally
<5>	Transducer Socket	Connect or disconnect transducer with host
<6>	Control panel	Interface for human-machine dialogue, for various operation
<7>	Winding rack	Used for power cable
<8>	USB port	Used for USB storage, USB printer or USB footswitch.

DP-6600 is configured with a dual-transducer socket.

DP-6500 is configured with a single-transducer socket, while the dual-transducer socket is optional.

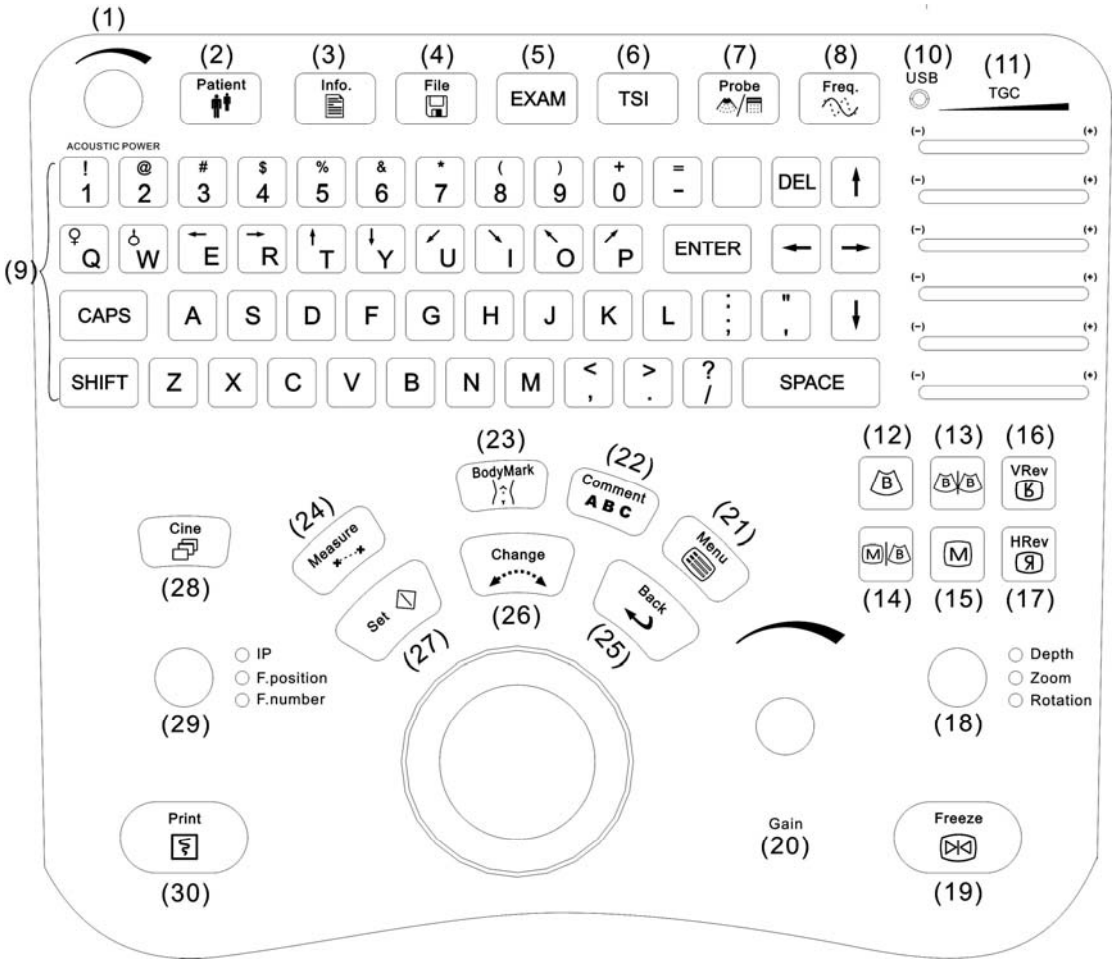
4.2 Rear Panel



Rear view

No.	Name	Introduction
<1>	Equipotential terminal	Equipotential terminal connecting
<2>	video printer data port	Data port for video printer（PAL or NTSC）
<3>	Control port for video printer	Use to control video printer remotely
<4>	DICOM port	DICOM network port
<5>	Main Power	Turn on/off the power of the system
<6>	AC input	AC power input inlet for system unit

4.3 Control Panel



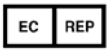
Control panel

No.	Key name	Function
<1>	ACOUSTIC POWER	Adjust acoustic power value
<2>	Patient	Delete the previous patient's data in the temporary memory, get ready for new patient examination
<3>	Info.	Patient information display, input or change
<4>	File	Save or load files, enter into preset mode
<5>	EXAM	Select exam modes through menu: Abd, Gyn, Car, Ob, Sml
<6>	TSI	Tissue specific imaging: Four type of image effects
<7>	Probe	Switch the transducer, and this button is only available for DP-6600 and DP-6500 with dual-transducer socket.
<8>	Freq.	Switch the transmission frequency of transducer

No.	Key name	Function
<9>	Character & number keys	Input characters and symbols SHIFT+ character or number input the symbol in the row above of the same key. Press CAPS key, input the corresponding capital letter
<10>	USB	USB indicator light
<11>	TGC	In terms of depth apart from body surface, adjust the receiving sensitivity of ultrasonic echo
<12>	B	Enter B mode
<13>	B/B	Enter dual B mode
<14>	M/B	Enter M/B mode
<15>	M	Enter M mode
<16>	VRev	Reverse image vertically
<17>	HRev	Reverse image horizontally
<18>	functional dial	Adjust depth of image, zoom multiple and comment arrow rotation and transducer rotation on BodyMark
<19>	Freeze	Freeze/unfreeze image, If the image is frozen, transmission of acoustic power will stop.
<20>	Gain	Adjust gain of image
<21>	Menu	Open or close menu according to system
<22>	Comment	Enter comment mode
<23>	Body Mark	Enter the mode of Body Mark edit
<24>	Measure	Enter measurement mode
<25>	Back	Go back to previous step
<26>	Change	During measurement switch between movable end and fixed end of scale, and open comment library
<27>	Set	Fix option, and fix cursor position of comment and measurement, etc.
<28>	Cine	Enter/exit manual CINE review mode
<29>	parameter dial	Adjust IP parameters, focus position and number
<30>	Print	Video print
<31>	Trackball	Adjust cursor position

4.4 Symbols

This system uses the following symbols, whose meanings are described in the table below. For safety symbols, refer to “Safety Precautions”.

Symbol	Description
	Consult the Operator’s Manual when this sign is encountered on the machine to prevent safety accidents.
	Danger voltage.
	AC (Alternating current)
	Equipotentiality
	Protective earth
	Main switch OFF
	Main switch ON
	Transducer socket A
	Transducer socket B
	The device is fully in conformance with the Council Directive Concerning Medical Devices 93/42/EEC. The number adjacent to the CE marking (0123) is the number of the EU-notified body that certified meeting the requirements of Annex II of the Directive.
	Serial number
	Date of manufacture
	Manufacturer
	Authorised representative in the European community

5 Preparation for Examination

5.1 Moving and Placing the System

Please read and understand the safety precautions before moving and placing the system.

(1) Turn off the power and disconnect the peripheral devices.

(2) Move the system by holding the handle.

(3) Place the system in the desired position.

(4) Leave at least 20cm clearance at the back and two sides of the machine.

⚠CAUTION: Ensure enough clearance at the back and both side of the machine, otherwise failure may happen because of the increasing temperature inside the machine.

5.2 Connect/Disconnect Transducers

⚠CAUTION:

1. Connect/disconnect the transducer only after the system power is turned off or the image is frozen (by Freeze key), otherwise failure may happen.

2. When connecting/disconnecting the transducer, place the transducer on the corresponding transducer holder and hook the transducer cable on the cable hanger to avoid accidental falling of the transducer, which may damage the transducer.

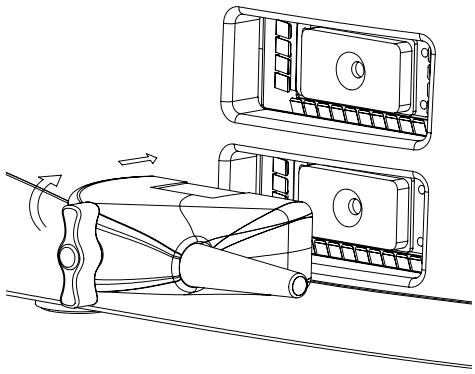
3. Be sure to hang the transducer cable on the cable hanger when the transducer is in use. Otherwise, the cable may be twisted or even damaged.

4. Use the transducer provided by Mindray only. Otherwise may damage the system and transducer or cause a fire.

5.2.1 Connecting the transducer

⚠WARNING: **Prior to connecting the transducer, the user should ensure that the transducer, cable and the connector are all in good condition (no rift or fall-off). Electric shock may happen if using any abnormal transducer.**

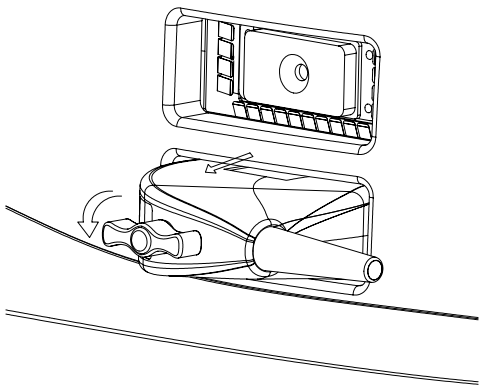
1. Release the lock on the transducer connector. Plug the transducer connector into the transducer socket. See the following figure.
2. Contact transducer connector with metal leaf, and press tightly.
3. Turn the lock clockwise for 90^0.
4. Check if the transducer socket is locked securely.



Connecting the transducer

5.2.2 Disconnecting the transducer

Turn the lock on the connector counter-clockwise for 90° , pull out the connector pin vertically. See the following figure.



Disconnecting the transducer

5.3 Connecting Power Cable and Protective Earth

5.3.1 Power connection

The power system for this machine must satisfy following specifications:

100－240V～

50 /60 Hz

Output power of the supply system >150 VA

5.3.2 Grounding terminal

The power cable of the machine is three-wire cable. The grounding terminal should be connected to the grounding protection phase of the power system. Ensure the normal function of the grounding protection phase of the power system.

Connect the power plug to an outlet of the system. By doing this, the protective earth line is connected.

⚠WARNING: Do not connect the three-wire power cable of the machine to a two-wire plug without grounding protection phase, otherwise electric shock may happen.

5.3.3 Equipotential terminal

 is the equipotential terminal, used to balance the grounding protection potential between this equipment and other electric devices.

⚠WARNING:

1. **Be sure to connect the potential-equalization lead wire before inserting the equipment power plug into the receptacle. Also, be sure to remove the equipment power plug from the receptacle before disconnecting the wire to avoid electrical shock.**
2. **When there is other device connected to the equipment, the user should use the equipotential cable to connect each equipotential terminal, otherwise electric shock may happen.**

⚠WARNING:

3. **Connect the earth conductor only before turning ON the system. Disconnect the grounding cable only after turning OFF the system. Otherwise, electric shock may result.**

4. **Do not connect this system to outlets with the same circuit breakers and fuses that control current to devices such as life-support systems. If this system malfunctions and generates an overcurrent, or when there is an instantaneous current at power ON, the circuit breakers and fuses of the building's supply circuit may be tripped.**

5.4 Connecting printers

Please refer to chapter 4 for each port of the system.

Please refer to the instructions of the printer manufacturer concerning detailed operation procedure of the printer.

5.4.1 Connecting the video printer

1. Turn off the ultrasonic diagnostic imaging system and the video printer.
2. Connect the "VIDEO IN" port of the video printer and the "Video output" port of the ultrasonic diagnostic imaging system by the data cable of the printer.
3. Connect the "REMOTE" port of the video printer and the "REMOTE" port of the ultrasonic diagnostic imaging system by the remote cable of the printer.
4. Connect the power cable of the ultrasonic diagnostic imaging system.
5. After turning on the printer and the system, the printer can work normally.

5.4.2 Connecting the graph/text printer

1. Turn off the ultrasonic diagnostic imaging system and the graph/text printer.
2. Connect the USB port of the printer and the USB port of the ultrasonic diagnostic imaging system by the USB data cable of the printer.
3. Connect the power cable of the printer to the power supply net.
4. After turning on the printer and the system, the printer can work normally.
5. If the printers cannot be connected, set the printer type in the general preset dialog box. For detailed operations, please refer to section 1.3 of the Advanced Volume.

6 Power ON/OFF

6.1 Power On

6.1.1 Check the items below before turning the power ON

1 Check all the power supplies and connecting cables for any abnormity such as scratch or crack.

2 Check the control panel, display and the shell of the equipment for any abnormity such as crack.

3 Check the transducer and the connecting parts for any abnormity such as scratch or fall-off.

4 Check the outlet of the auxiliary power supply of this equipment and all I/O ports to ensure that there is no abnormity such as damage or occlusion by foreign objects.

6.1.2 Turning on the power

1 Turn on the power of the equipment (The power switch is on rear panel). The start-up screen is firstly displayed. After 15 seconds or so, the menu and the image are displayed. Check if the equipment is started up normally.

2 Check the transducer surface in the process of application for abnormal heat.

⚠WARNING： Using the transducer giving abnormal heat may burn the patient.

NOTE: When turn on the system power and switch transducer, the sound of “pi pa” indicates the system in normal state.

3 Please check steps below:

(1) Check the image for any abnormity such as abnormal noise or flicker.

(2) Check the control panel and ensure that the keys and rotary knob can function normally.

⚠WARNING： If any abnormity is detected, it indicates that the equipment is defective. In this case, shut down the machine immediately and contact the Mindray sales office, customer service department or representative.

6.2 Power OFF

After using the system, the power must be turned off. Prior to turning off the power, do following steps:

(1) Place the transducer on the corresponding transducer holder and hook the transducer cable on the cable hanger.

(2) As per the requirements in the operator's manual, turning off all the power supplies for the peripheral devices connected to this equipment.

6.3 Power OFF/ON in the case of System Failure

When any of the following abnormalities occurs with the system, the system may be able to recover from the abnormality by power OFF/ON once again:

- An error message is displayed and does not disappear.
- The screen display is abnormal.
- The system operations are disabled.

7 Checks Before and After Use

⚠WARNING: Daily maintenance and checks are required to ensure the safe and effective operation of the system. Do the following checks prior to each start-up. Once any abnormity is detected, shut down the system immediately and contact the Mindray sales office, service department or representative. Using the system with abnormal function may harm the patient and damage the equipment.

7.1 Checks before Use

Before turn on the power, perform the following checks.

No.	Check item	Check column
1	The temperature, humidity, and atmospheric pressure should meet the conditions of use.	☐
2	There should be no condensation.	☐
3	There should be no deformation, damage, or stains to the system and peripheral units. * If any stains are present, perform cleaning referring to subsection 19.1"Cleaning the system".	☐
4	There should not loose screws in monitor, control panel, etc.	☐
5	There should be no damage to cables (such as power cable, etc.) and no looseness in the connectors.	☐
6	There should be no damage or stains to the transducer and transducer cables. * If any stains are present, perform cleaning, disinfection, or sterilization referring to the operator's manual provided with the transducer.	☐
7	There should be no obstacles in the area around the system and ventilation opening.	☐
8	Cleaning the equipment. (refer to 19.1.1 "Cleaning the System")	
9	Cleaning, disinfecting, or sterilizing the transducer. (Please refer to the operator's manual provided with the transducer.)	☐
10	Cleaning the field and environment.	☐

7.2 Checks after Use

After turn on the power, perform the following checks.

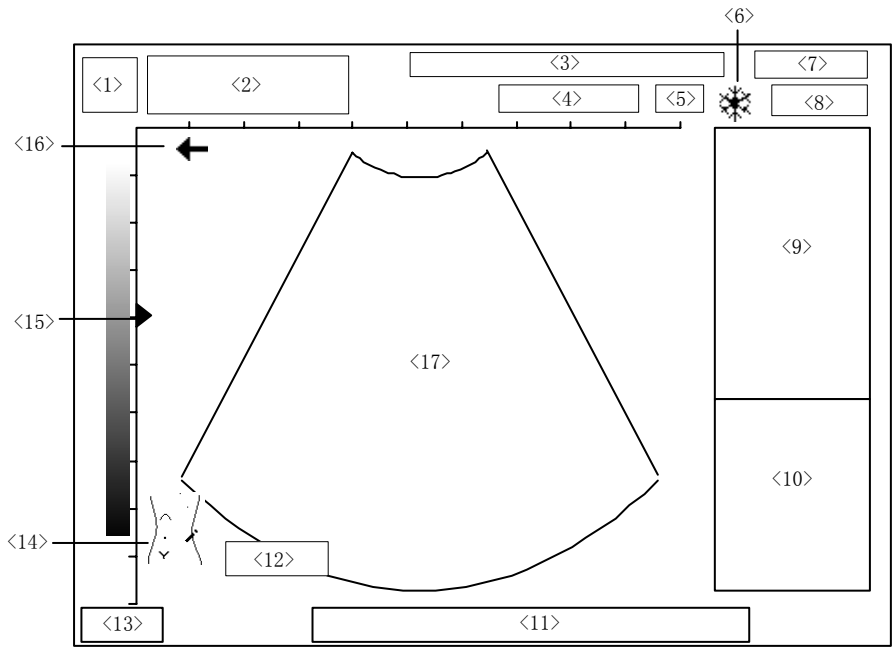
No.	Check item	Check column
1	There should be no abnormal sound, unusual smells, or overheating.	☐
2	No error message is displayed in use.	☐
3	There should be no obviously abnormal noise, discontinuous display, or dark areas for B-mode images in use.	☐
4	The acoustic lens surface of the transducer should not be unusually hot. (Perform check by hand.)	☐
5	Switches and knobs on the panel should function normally.	☐

8 Basic Screen and Menu

8.1 Display of Parameter Items

After turn on the system power in normal condition, the system may go to the corresponding screen according to the initial settings.

The following figure gives a basic screen explanation by using B as an example.



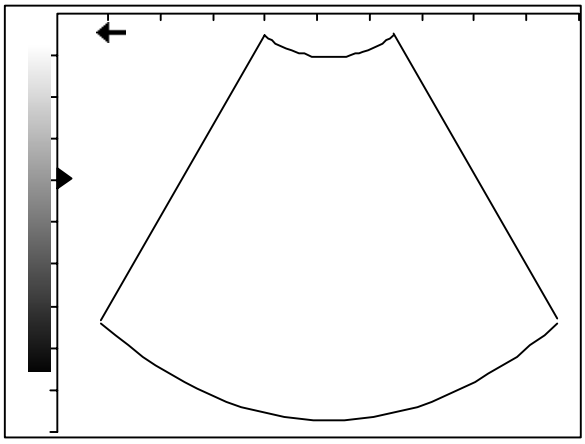
In correspondence with the numbers in the figure above, each item is described as follows:

No.	Introduction
<1>	Manufacturer's logo
<2>	Display area for preset hospital name, patient name and ID
<3>	Current image parameter BIP/MIP, gain BG/MG, acoustic power AP, frame rate FR; refer to Chapter 11 for more information.
<4>	Display of transducer model and its current frequency
<5>	Display of selected speed type for TSI
<6>	FREEZE icon（when an image is frozen, this icon appears）

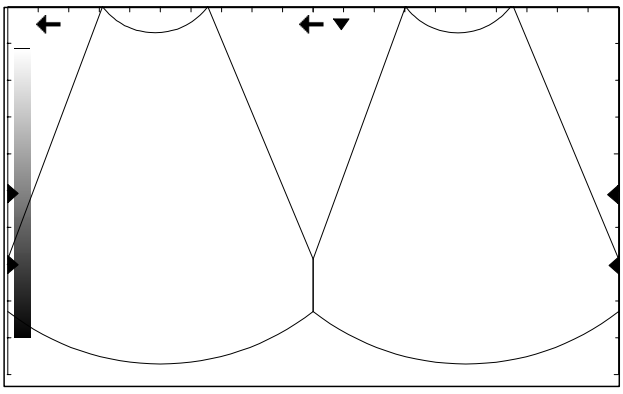
<7>	System current date
<8>	System current time
<9>	Menu display area
<10>	Display area for measurement or calculation result
<11>	Prompt operating information
<12>	Display of current image depth
<13>	Display of current exam mode
<14>	Body Mark icon
<15>	Focus icon（used for focus position and focus number）
<16>	The first scanning line from the left is corresponding to initial scanning position of the transducer
<17>	Image area

8.2 Image Mode

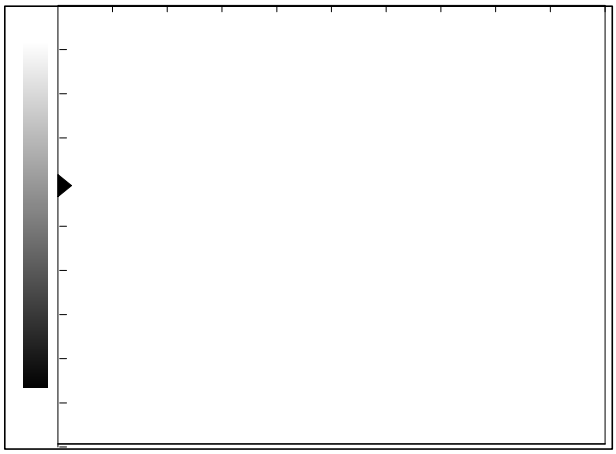
- **B Mode:**



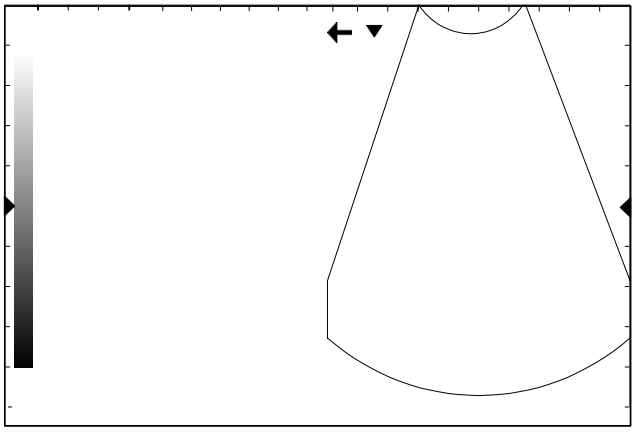
- **B+B Mode:**



◆ **M Mode:**



◆ **M+B Mode:**



8.3 Menu and menu options

Menu is displayed on the right side of the screen. The menu consists of following items.

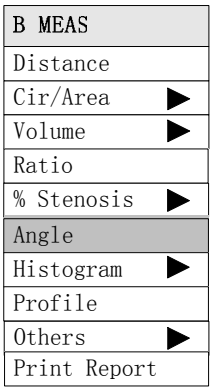
Menu Item Type	Function
Command	Execute an action, such as starting a measurement, calling up a dialog box, etc.
Number	Adjust a numerical parameter, such as [Dyn Rng]
Switch	Toggle a switch parameter, such as [Display]
Character	Adjust a character parameter, such as [Gray Map]
Sub-menu	Open a sub-menu, such as [Scan Mode]

8.3.1 Command items

Command items are used to order the system to execute an action, such as popping up a dialog box or starting a measurement, etc.

Use the [Angle] item in the menu of B MEAS as an example to explain the operating method of command items:

Roll the trackball to highlight the [Angle] item. Press the 『Set』 key to start the Angle Measurement. See the figure below:

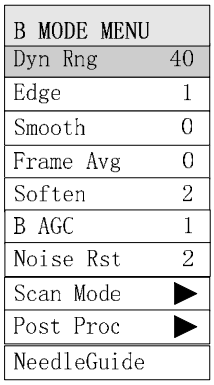


8.3.2 Number items

Number items are used to adjust the value of the specified parameter in the menu. The name of the parameter being adjusted is displayed in the left side of the menu item while the value is in its right.

Use the [Dyn Rng] item in the B MODE MENU as an example to explain the operating method of the number items:

Roll the trackball to highlight the [Dyn Rng] item. Press the 『Set』 key to increase the value and the [Back] key to reduce the value. See the figure below:



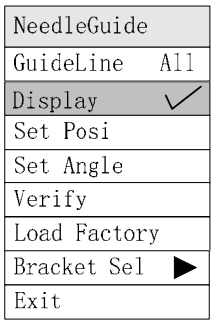
8.3.3 Switch items

Use switch items to adjust the parameter having only two states: On and Off. The name of the parameter being adjusted is displayed in the left side of the item and the symbols like

" √ " or " × " in its right indicating On or Off respectively.

Use the [Display] item as an example to explain the operating method of the Switch items:

Roll the trackball to anchor the cursor to the [Display] item, which is then highlighted. Press the 『Set』 or the [Back] key to toggle between On and Off. See the figure below:



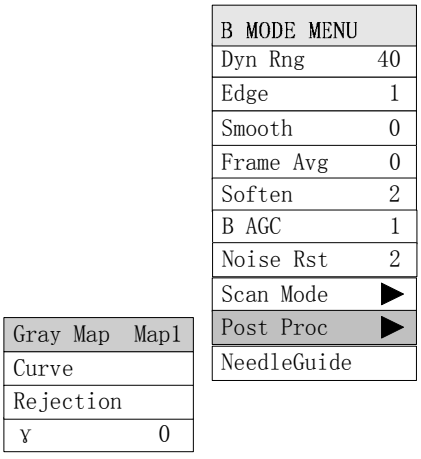
8.3.4 Character items

Of the character items, the name of the parameter being adjusted is displayed in the left side of the item and value in its right. What is different from the number items is that the value is displayed in characters.

Use the [Gray Map] item in the B MODE MENU as an example to explain the operating method of character items:

Roll the trackball to highlight the [Gray Map] item in the [Post Proc] submenu. Press the 『Set』 or the [Back] key to toggle among the setup values of the character items.

See the figure below:



8.3.5 Submenu items

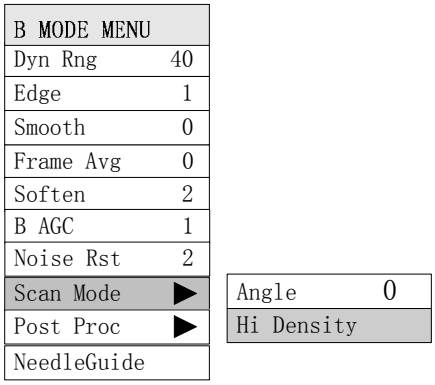
The item is used to call up a sub-menu. The name of the sub-menu is displayed in the left side of the item and a sign " ▶ " in its right indicating that there is a sub-menu for this item.

Use the [Scan Mode] item in the B MODE MENU as an example to explain the operating method of an item for a sub-menu:

Roll the trackball to highlight the [Scan Mode] item, at the same time a sub-menu appears.

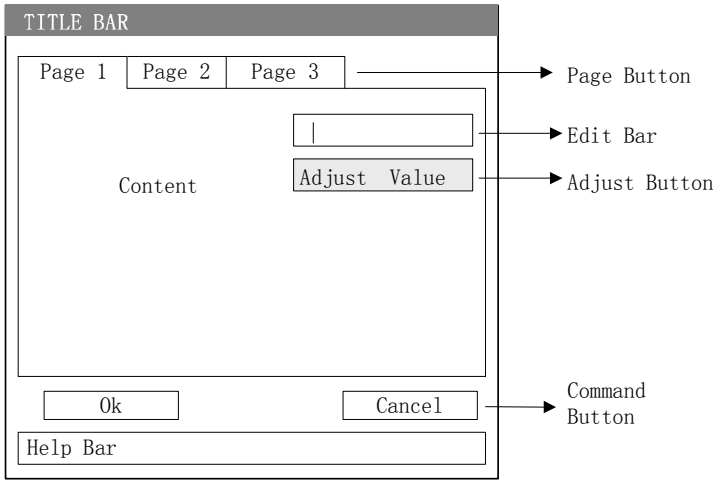
Anchor the cursor to the item in the sub-menu to execute the corresponding operation.

See the figure below:



8.4 Dialog Box

The sketch map for the dialog box is shown in figure below. A dialog box consists of following parts.



Part	Description
Title Bar	The title bar is used to give a general description to the dialog box. Besides, the user can use it to drag the dialog box.
Page	Some dialog boxes have too much data to be put in the dialog box. In this case, the system will divide these data into different pages based on their content. But some other dialog boxes have no page.
Content	The content is the object to be operated. Different dialog boxes have different contents, such as Edit Bar, Adjust Button and Command Button, etc.
[Ok] and [Cancel]	After the operation in the dialog box, press [Ok] or [Cancel] to save or cancel the operation in this box and close the dialog box.
Help Bar	The Help Bar is located in the bottom part of each dialog box, in which the user can obtain some Prompt Information about the operation.

8.4.1 Operation for content of dialogue box

Different dialogue boxes are corresponded to different operations. Adjusting buttons in the dialogue box are similar to adjusting items in menu, refer to the description of menu items to see the operation method. For the command button, anchor the cursor onto the button, press 『Set』 key, the system will perform corresponding operation.

Operation method for edit bar in dialogue box:

Roll the trackball, anchor the cursor in the edit bar, press 『Set』 key, after the "|" cursor displays, characters or numbers can be entered into the edit bar.

8.4.2 Changing page

When there are several pages in the dialogue box, roll the trackball to anchor the cursor onto the button of the page, then press 『Set』 key, switch to the page.

8.4.3 Dragging the dialogue box

When the dialogue box needs to be dragged during operation, the method is shown as follows:

1. Roll the trackball to anchor the cursor onto the title bar of the dialogue box, while the cursor"✣" displays, press 『Set』 key;
2. Roll the trackball, there is a rectangle frame as big as dialogue box moving along with the cursor, anchor the rectangle frame to the position where the dialogue box will be moved,
3. Press 『Set』 key again, the dialogue box automatically moves to where the rectangle frame is placed.
4. After step 2, press [Back] key, cancel the operation of dragging the dialogue box, the dialogue box remains where it is.

8.4.4 Confirm or cancel operation, and close dialogue box

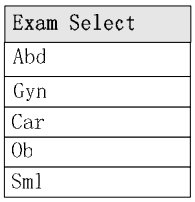
If confirm the operation of the dialogue box, select [OK] button, otherwise select [CANCEL] button. Selecting [OK] or [CANCEL] button can close the dialogue box.

9 Examination Beginning

9.1 Selecting the Exam Mode

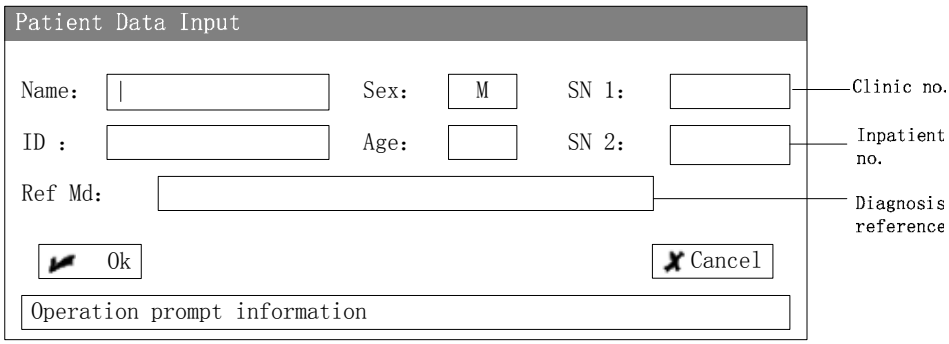
After power-on, the system automatically enters the exam mode preset in advance.

Press EXAM key, enter [Exam Select] menu, select the exam mode among abdominal, gynecology, cardiac, obstetrics and small parts, and select the corresponding item and press 『Set』 key to enter the corresponding exam mode.



9.2 Entering the Patient Information

To enter the patient information, press the [Info.] key or move the cursor to the Name or ID position on the screen and press the 『Set』 key. At this time, the 『Info.』 lamp lights on and the Patient Data Input box pops up as shown in following figure.



(1) Please press the 『Set』 or [Back] key to change “M” and “F” in “Sex” column.

(2) After the data has been entered, select [Ok] to affirm the data.

The characters that can be entered for ID is：English letters, numbers 0-9 and “-” can be entered, up to 12 English characters. ID value can be empty.

(3) When [Ok] or [Cancel] is selected, the system exits the dialogue box.

10 Presets

10.1 Introduction

Preset function is used to set the system operating environment, status and the configuration parameters for each exam mode. The preset values are saved in the memory inside the system, which will not be lost if power-off occurs so as to ensure that the system operates in the user-desired status automatically after each start-up. This chapter gives introduction about how to make system configuration through using the preset menu in preset mode. Please refer to the Advanced Volume for the detailed operation.

10.2 Enter/Exit Preset Mode

10.2.1 Enter the preset mode:

Press the [File] key on left side of the control panel. Its lamp lights up. The 「File」 menu appears on the right part of the screen. Select the「Preset」item, press『Set』key to enter 「Preset」 menu, the system enters the Preset mode.

Select the item in the PRESET menu to preset the corresponding parameters. See the figure below.

10.2.2 Exit Preset mode:

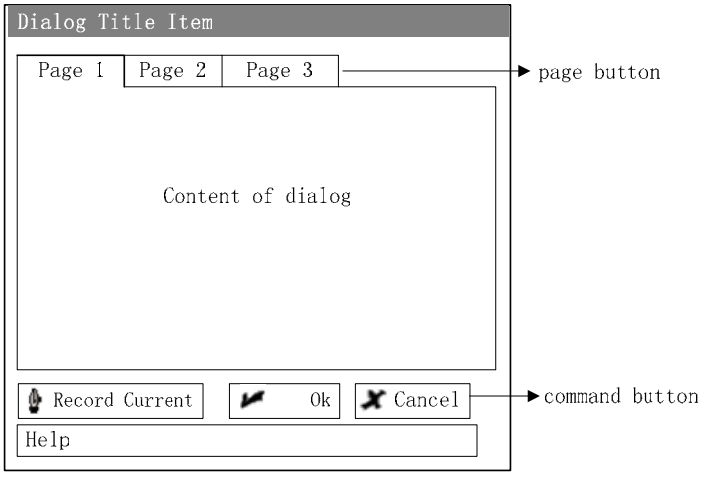
In Preset mode, move the cursor to the [Return] item of the menu and press the 『Set』 key to close the PRESET menu. The system exits the Preset mode and begins running according to the modified parameters.

NOTE: After defining the parameters, click [Return] to exit and to apply the new settings.

10.3 Display/Modify Preset Information

10.3.1 Procedures to modify the preset values

To set up all the preset parameters and curves, the user should select the item in the PRESET menu to call up the preset dialog box. The general outline of the preset dialog box is shown in figure below.



Procedures:

1. Select the corresponding item, press the 『Set』 key to call up the corresponding preset dialog box.
2. Move the cursor to select the button of the desired page so as to open the corresponding preset page
3. Use the 『Set』 or the [Back] key to adjust the parameter. At this time, some help information is displayed in the bottom of the box.
4. After setting the information in the current page, select the button of another page to set other parameters. After all the parameters have been set up, press the『Set』key on the [Ok] button to make these settings come into effect and be saved in the system, and at the same time to close the dialog box.
5. To cancel the modifications, just press the 『Set』 key on the [Cancel] button. This action at the same time closes the dialog box.
6. Move the cursor to [Return] item in the PRESET menu; press the 『Set』 key to close the PRESET menu. The system exits the Preset mode and begins run according to the modified preset parameters.

10.3.2 Special function keys

There are also some special buttons in the preset dialog box, whose functions are:

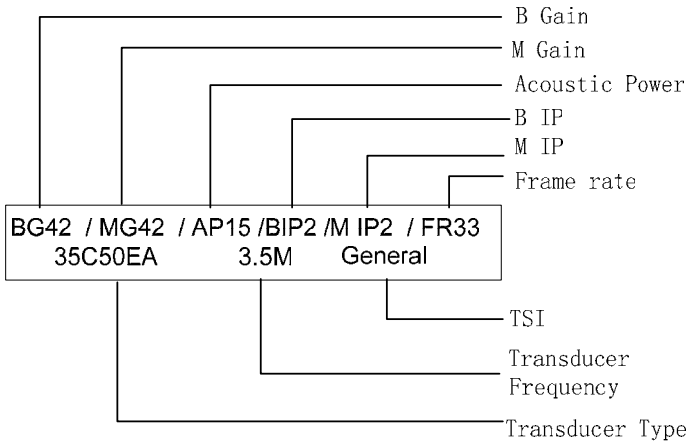
[Record Current]

Besides setting the parameters in the current page one by one, the user can also use the “record the current value” method to preset parameters. Press the 『Set』 key on the [Record Current] to set each parameter as the value used by the system before entering the preset mode. That is, to set up the current operating parameters of the system as the preset parameters.

NOTE: [Record Current] button is only valid in the current preset page.

11 Image Control and Adjustment

Keys on the control panel and items in the menu are provided to adjust the image. For number parameters to be adjusted through menu item, their values are displayed on the right of the menu items. For number parameters to be adjusted by keys on the control panel, most of their values are displayed in the Parameter Area on the top of the screen. See figure below.



The adjustment of image parameters can all be performed in B image menu or M image menu, which will be introduced subsequently for each parameter.

11.1 B/M Gain

Adjusting B/M Gain is to adjust the gain of the whole receiving system and the signal sensitivity of B/M image. The adjusting range is 0dB～98dB. B-mode and M-mode Gains are displayed in the Parameter Area on the top of the screen.

Turning 『Gain』 knob on the control panel can adjust B-mode and M-mode Gains simultaneously. You can also adjust M-mode Gain independently by using the「M Gain」 item in M MODE MENU. See figure below.

You cannot adjust the gain when the image is in frozen status.

M MODE MENU	
M Gain	16
M Speed	4
Dyn Rng	70
Edge	3
Smooth	3
M Soften	3
Post Proc	▶

11.2 Acoustic Power

Acoustic power refers to the power of the ultrasonic wave transmitted from the transducer. You must select proper acoustic power in application according to real situation and the rules of applying acoustic power.

Turn the knob to adjust the acoustic power. Its value is displayed in the Parameter Area on the top of the screen. See figure below.

You cannot adjust acoustic power when the image is in frozen status.

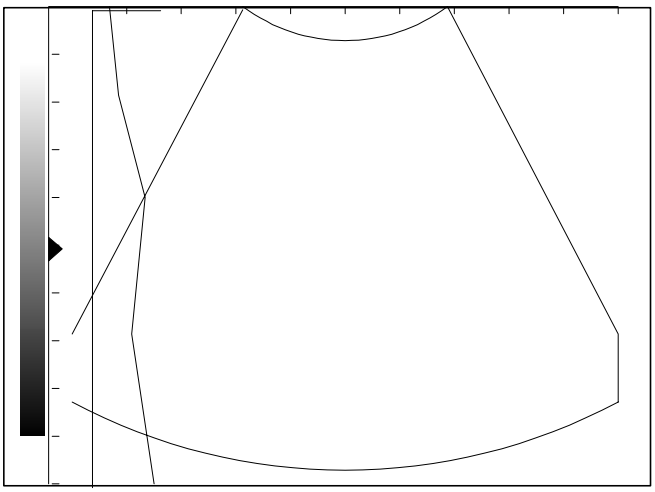
11.3 TGC

TGC, namely depth section gain compensation curve. Move the corresponding TGC slider on the control panel to adjust the TGC of the corresponding scanning depth.

When adjusting TGC, the TGC curve appears automatically on the left part of the screen, which will change as the slider moves. See figure below.

And 1.5 second after stop adjusting TGC, the TGC curve will disappear automatically.

TGC adjustment being made while the image is in frozen status is invalid temporarily, which however will become valid after the image is unfrozen.



11.4 IP, Focus number and Focus position

Image processing parameter (IP), Focus number (F. number) and Focus position (F.position) can be adjusted by parameter dial as follow. It shows to adjust the parameter when the parameter lamp is on.

11.4.1 IP

IP is a combination of image processing parameters, B IP includes dynamic range, edge enhancement, smooth, frame average, soften, B AGC and noise restraint; M IP includes dynamic range, edge enhancement, smooth, and M soften. It indicates an image processing effect.

IP ranges from 1 to 8, respectively indicating 8 types of image processing effects. The smaller the IP value is, the bigger the contrast is; the bigger IP value is, the softer the image is.

B IP value is valid for B image, M IP value is valid for M image, IP value cannot be changed while the image is frozen.

IP is adjusted by the parameter adjustment knob on control panel. After “IP” lamp lights up, turn the parameter adjustment knob to change IP combination, when IP changes, the parameter values contained in IP will change with it (determined by preset).

11.4.2 Adjusting the number of focuses

B-mode image can have 1～4 transmitting focuses. However, the number of focuses is also limited by scanning depth. M-mode image has only one focus; that is to say the number of focuses of M-mode image cannot be changed.

Press the parameter adjustment knob, “F.number” lamp will light up. Turn the knob to change the number of focuses.

The number of focuses cannot be changed when the image is in frozen status.

11.4.3 Adjusting the position of focus

Press the parameter adjustment knob, “F.position” lamp will light up. Turn the adjustment knob to change the focusing position. When adjusting focusing position, one or more

focuses move in the display range of the current image.

The focusing position cannot be adjusted when the image is in frozen status.

11.5 Transducer Frequency

Press 『Freq』 key to adjust the current transducer frequency, the value display on the right top of the screen,

Transducer	Central frequency(MHz)	Frequencies (MHz)		
35C50EA	3.5	6.0	3.5	2.0
65EC10EA	6.5	8.0	6.5	5.0
75L38EA	7.5	10	7.5	5.0
35C20EA	3.5	6.0	3.5	2.0
65C15EA	6.5	8.0	6.5	5.0
75L60EA	7.5	10	7.5	5.0

11.6 Image depth, Zoom and Rotation

Image depth (Depth), Zoom and Rotation can be adjusted by functional dial. It shows to adjust the parameter when the parameter lamp is on.

11.6.1 Depth

Confirm the ”Depth” lamp lights up and then turn the functional dial (see figure below) to change the imaging depth.

The image depth of low frequency transducer is 4.31 ～ 24.8cm.

The image depth of high frequency transducer is 2.16 ～ 11.9cm

The depth cannot be adjusted when the image is in frozen status.

11.6.2 Zoom

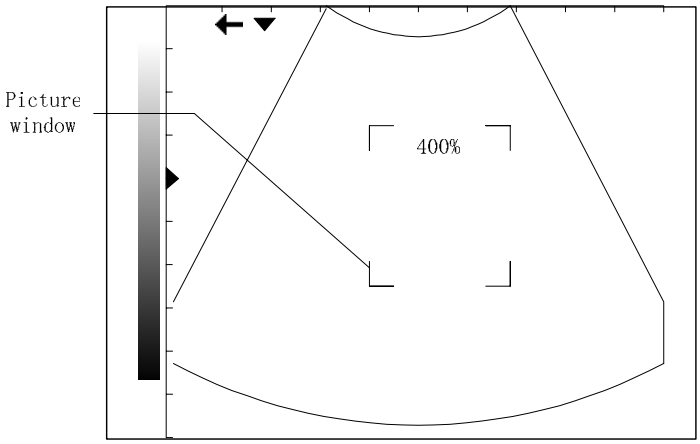
Image zooming is realized by the functional dial. The length of side multiple is 100%~200%, area multiple is 100%~400%.

Procedures for image zooming adjustment:

(1) Press the functional dial, “Zoom” lamp lights up, a view frame for image zooming appears in the center of image window, shown in figure below. If it is in dual B mode, there is only

zooming function of real-time response. “Zoom” lamp of 『Functional dial』 lights up, indicating 『Functional dial』is in the status of zooming multiple adjustment.

(2) Roll the trackball; use the view frame to select the center of image to be zoomed.



(3) Turn 『Functional dial』 to change the zooming multiple, the size of view frame will change with it. Turn it clockwise, the view frame will shrink, zooming multiple will increase; Turn it counter-clockwise, the view frame will expand, zooming multiple will decrease.

(4) Press 『Set』key, the view frame disappears, the zoomed image is displayed on the screen.

(5) Roll the trackball, the zoomed image will move inside the image window.

(6) Adjust 『Functional dial』 to change the zooming multiple.

(7) Press 『Set』key again, the position of zoomed image is fixed, the cursor appears.

(8) Adjust 『Functional dial』at this time, the zooming multiple can be changed too.

(9) Press『Functional dial』again, “Zoom” lamp lights off, image zooming status exits, image in normal scale is resumed to be displayed.

The real-time image, frozen image and CINE review image can all be zoomed, and the zoomed image can be measured, or inserted comment or Body Mark.

11.6.3 Rotation

Press 『Functional dial』, when “Rotation” lamp lights up, turn the functional dial (shown in figure below) to change the mark direction of transducer on Body Mark or the direction of comment arrow.

11.7 Dynamic Range

Dynamic range is provided to adjust the contrast resolution of B-mode or M-mode image, compress or enlarge gray display range. Dynamic range is 30dB～90dB with increment of 4dB.

The dynamic range of either B-mode image or M-mode image can be adjusted through「Dyn

Rng」menu item in their respective menus. The current value of dynamic range of B or M-mode image is displayed in the menu item.

Dynamic range cannot be adjusted dynamic range when the image is in frozen status.

11.8 Edge Enhancement

Edge enhancement is provided to highlight the image contour so that the user can identify the tissue structure more clearly. The range of edge enhancement is 0～3. 0 represents no edge enhancement while 3 the maximum.

The edge enhancement of either B-mode image or M-mode image can be adjusted through 「Edge」menu item in their respective menus. The current value of edge enhancement of B or M-mode image is displayed in the menu item.

Edge enhancement cannot be adjusted when the image is in frozen status.

11.9 Smooth

Smooth function is provided to suppress the image noise and apply axial smooth processing to the image in order to make the tissue look smoother. The adjusting range is 0～3. 0 represents minimum smooth while 3 the maximum.

The smooth of either B-mode image or M-mode image can be adjusted through 「Smooth」menu item in their respective menus. The current value of smooth of B or M-mode image is also displayed in the menu item.

Smooth cannot be adjusted when the image is in frozen status.

11.10 Frame Average

Frame average means to add up the adjacent B-mode images and calculate the average value in order to remove the noise on the image and make the image details clearer. Its range is 0～7. 0 represents no frame average has been adopted while 7 means to add up 8 continuous images and calculate the average.

Frame average is valid only on B-mode image. You can adjust it through「Frame Avg」 item in B MODE MENU.

Frame average cannot be adjusted when the image is in frozen status.

11.11 Soften

Soften function is provided to suppress image noise and apply lateral smooth processing to the image in order to make tissue look smoother. It is only valid for B image. The adjusting range is 0～3. 0 represents no soften processing while 3 the maximum.

You can adjust B-mode Soften through「Soften」item in B MODE MENU.

Soften cannot be adjusted when the image is in frozen status.

11.12 B AGC

The automatic gain of B-mode image can be independently adjusted by [B AGC] in B MODE MENU.

The range is 0～3, 0 represents minimum auto gain, 3 represents maximum auto gain.

B AGC cannot be adjusted when the image is in frozen status.

11.13 Noise Restraint

Noise Restraint can adjust the image noise of B image; it is only valid for B image.

The adjusting range is 0～3. 0 represents minimum restraint while 3 the maximum and best image.

11.14 M Speed

M Speed is provided to adjust the refresh speed of M-mode image.

Its range is 1～4. 1 indicates slowest scanning speed while 4 the fastest.

M Speed function is valid only on M-mode image. You can adjust it through「M Speed」 item in M MODE MENU. The current value of M Speed is also displayed in the menu item.

M Speed cannot be adjusted when the image is in frozen status.

11.15 M Soften

M Soften means to add up the scanning lines of M-mode image and calculate the average value in order to remove the noise on the image and make the image details clearer. Its range is 0～7. 0 represents no Soften has been done while 7 means to add up 8 continuous scanning lines and calculate the average.

M Soften is valid only on M-mode image. You can adjust it through 「M Soften」 item in M MODE MENU, its current value is displayed on the menu item.

M Soften cannot be adjusted when the image is in frozen status.

11.16 TSI

There are four type speeds of ultrasound waves to select: General, Muscle, Fatty, and Fluid. User can adjust TSI dial to select proper acoustic speed to acquire optimal image quality, based on the tissue characteristics.

Musculoskeletal: It is helpful to scan the muscle tissue or fibrous tissue, such as muscle, ligaments, tendon, etc.

General: It is helpful to scan the internal organs like liver, kidney, pancreas, thyroid, etc.

Fatty: It is helpful to scan tissue mainly composed of fat cell, such as lipoma, breast of old women.

Fluid: It is helpful to scan tissue mainly consist of liquid, such as gallbladder, cyst, vessels, etc.

11.17 Scan Mode

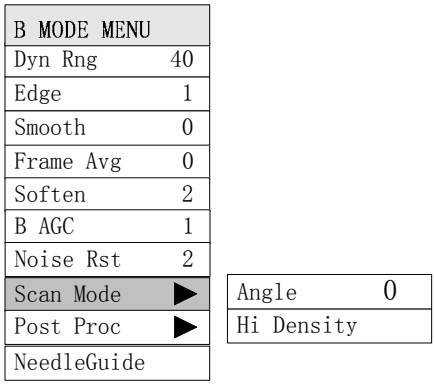
11.17.1 Scan Angle

This function is provided to change scanning angle and only valid on B-mode image. Scanning angle is related to frame frequency. The smaller the scanning angle is, the higher the frame frequency will be.

Its range is 0～3. 0 indicates the minimum scanning angle while 3 the maximum.

You can adjust the scanning angle through 「Angle」in 「Scan Mode」of B MODE MENU. The current value of scanning angle is displayed in the menu item.

The scanning angle cannot be adjusted when the image is in B/B mode or in frozen status.



11.17.2 Scan line density

Scan Line Density is provided to adjust the density of scanning lines on B-mode image; therefore this function is valid only on B-mode image. Density of scanning lines has two types: high density and high frame rate. The former is for better image quality and the latter for higher frame frequency image.

You can adjust Scan Line Density select「Hi Density」or 「Hi Frm Rate」 in 「Scan Mode」of B MODE MENU.

Line density cannot be adjusted when the image is in B/B mode or in frozen status.

11.18 Post process

Post process is to apply gray correction to the image in order to obtain the image with optimum vision.

You can select any one from five kinds of preset post process effects in Post Proc menu.

And you can adjust gray transform curve, gray rejection curve and γ correction, respectively. Post process operation is valid on real-time B-mode image, frozen B-mode image and CINE loop B-mode image.

Post Process is independent for B-mode image and M-mode image. You can adjust them independently through 「Post Proc」item in their respective menus.

11.18.1 Gray map

The system presets 5 kinds of Gray Map, namely Map1, Map2, Map3, Map4 and Map5. Each gray map is a combination of gray transform curve, gray rejection curve and γ correction.

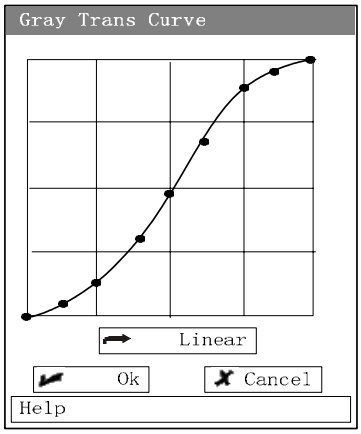
Gray Map1 is obtained by compressing lightness of components in low lightness and high lightness based on linear change. The contrast of the image increases gradually from Map1 to Map5.

You can select a Gray Map through 「Gray Map」in 「Post Proc」of B MODE MENU and M MODE MENU. The current value of Gray Map is displayed in this submenu item.

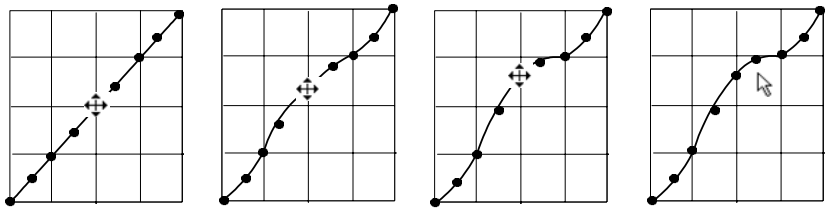
11.18.2 Gray transform curve

Adjusting method:

1. Select 「Curve」item in 「Post Proc」submenu to pop up “Gray Trans Curve” dialog;
2. Move the cursor onto a “ • ” dot, the cursor will turn into a “✣”. Press 『Set』 key and use the trackball to move “ • ” dot to adjust gray transform curve. You can see the image changing during adjustment;
3. Press 『Set』key again to fix the “ • ” dot to the new position; The cursor will return to a “↖”. Repeat above steps to adjust the next dot;
4. After step 2, press [Back] key to cancel the adjustment to the dot. The “ •” will return to its original position;
5. If press 『Set』 key on 「Linear」button, the gray transform curve will change into a straight line with 45° slope;
6. Press『Set』key on「√ OK」, the system will save the modification and exit the dialog; press 『Set』 key on「X Cancel」,the system will restore original curve and exit the dialog.



Figures below show the changes of gray transform curve during adjustment.

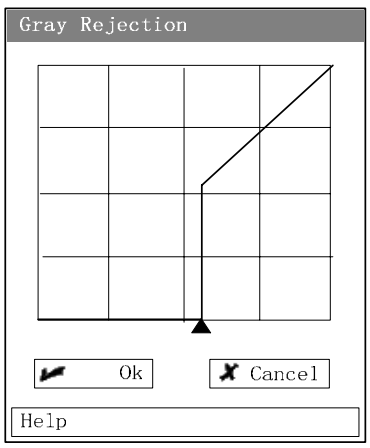


Move cursor to a adjusting node | Press [Set] to activate and adjust the node | Move the node to target position | Press [Set] to anchor the node

11.18.3 Gray rejection curve

Adjustment of gray rejection curve is to suppress the image signal below a certain gray scale.

（1） Select 「Rejection」item in 「Post Proc」submenu to pop up “Gray Rejection” dialog;



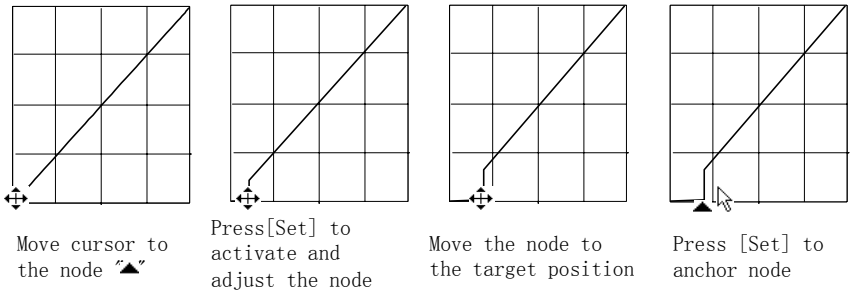
（2） Move the cursor onto the “▲” dot, the cursor will turn into a “✣”. Press 『Set』 key and use the trackball to move the dot so as to adjust the gray rejection curve. You can see the image changing during adjustment;

（3） After adjustment, press 『Set』 again, the cursor will return to a “↖”;

（4） After step 2, press [Back] key to cancel the modification. The “▲” will return to its original position;

（5） Press 『Set』 on 「√OK」, the system will save the modification and exit the dialog; press『Set』on「X Cancel」,the system will restore original curve and exit the dialog.

Figures below show the changes of gray rejection curve during adjustment.



11.18.4 γ Correction

γ Correction is provided to modify the nonlinear distortion of the image.

γ correction has four grades, 0, 1, 2 and 3 corresponding to γ correction coefficients 1.0, 1.1, 1.2 and 1.3, respectively.

You can adjust γ value through 「γ」in 「Post Proc」of B MODE MENU. γ correction is displayed in the submenu item.

11.19 Image Reverse

B-mode image can be reversed vertically and horizontally.

Press VRev key to reverse vertically;

Press HRev key to reverse horizontally.

The status symbols in the upper left corner of the image window have following meanings:

The "←" means that the first scanning line on the left is the start scanning point of the transducer; the "→" means that the first scanning line on the right is the start scanning point of the transducer.

12 Cine Review Function

12.1 Introduction

⚠CAUTION:	**When performing examination of a new patient, press 『Patient』 to delete the recorded data in the cine memory. Otherwise, the new data may be confused with the data of the previous patient.**

When an image is frozen, the images before freezing can be played back and edited immediately. This function is called Cine Review. The stored cine images can be cleared by turning OFF the power or unfreezing the frozen image.

In the high-density scan mode, the memory can store up to 128 B mode images. In the high frame rate scan mode, the memory can store up to 256 B mode images. Therefore, the 128th or the 256th image is always the latest image while the first image is always the earliest one.

12.2 Cine Review

12.2.1 Manual Review

Manual review is the default CINE review way of the system.

Press the 

key to freeze the image, the [Cine] lamp lights on and the B mode FREEZE MENU pops up.

FREEZE MENU	
Review/Stop	
Speed	15
Post Proc	▶
Print Report	

Roll the trackball to call up the stored CINE images on the screen in turn. Roll the trackball to the right and the images are displayed in the ascending order of the number of frames. Otherwise, the images are displayed in the descending order of the number of the frames.

The indicating bar of CINE review on the screen shows the CINE review, the serial number of the current frame, and the total number of frames. The arrow in the bar refers to the direction that the images are played.

60/256 

In Manual Review mode, press the [Cine] key, the [Cine] lamp is off and the system exits Manual Review mode.

12.2.2 Auto Review

After the system exits manual review status, click the [Review/Stop] item in the B mode FREEZE MENU, the system displays the stored images automatically in the ascending order of the number of frames.

Click the [Review/Stop] item again to stop Auto Review process.

Before or during the Auto Review, click the [Speed] item in the B mode FREEZE MENU to change the reviewing speed. The current reviewing speed is displayed in the menu item.

12.2.3 Others

The magnified images can also be stored in the CINE review memory, which can be reviewed after being frozen. The method to review the magnified images is the same as that to review ordinary CINE images.

The images in the CINE review memory can be magnified, whose gray map can be adjusted. Also the user can perform measurement, add annotation and Body Mark on the CINE review images.

13 Entry and Deletion of Comments

Text comments and arrows can be added to the image by typing character keys or by pressing the 『Set』 button. Text comments can also be inputted from the comment library.

⚠WARNING:	**Please ensure the correct comment is entered. Incorrect comment may cause misdiagnosis!**

13.1 Enter/exit Comment Status

Press 

key to enter the Comment status. The [Comment] lamp lights on. In the image window, the cursor changes into a “|”.

Press the [Comment] key again or other operating mode keys to exit the Comment status. Then the [Comment] lamp lights off.

13.2 Input Comments from the Keyboard

(1) Press [Comment] key to enter comment status.

(2) Confirm the position in which the comment is to be added. Roll the trackball to move the cursor to the position where comment is required.

(3) Enter the characters by keyboard. By pressing [CAPS] key, letters to be inputted can be switched between capital and lowercase.

(4) Line feed: Under comment edit status (background of character entering bar is white), press the [Enter] key, the cursor will go to the next line, and the initial position after the line feed is the longitudinal position of comment in the previous line.

(5) Press 『Set』key to confirm.

13.3 Input Comments from Comment Library

(1) In comment status, move cursor to the position where the comment is to be added in the image. Then press the [Change] key, the dialog box of Comment Library appears on the screen.

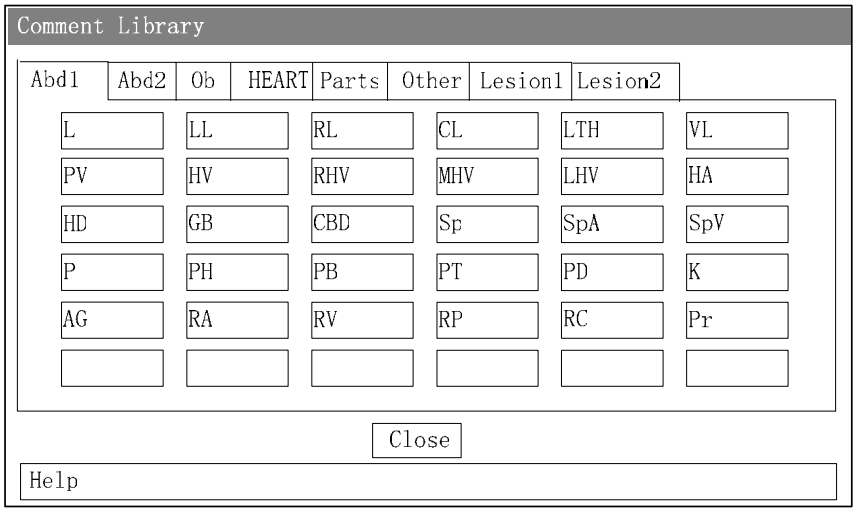
(2) Move the cursor to the desired item, if there isn't any item desired in the current page, move the cursor to other page button and press 『Set』key to look for the item. Press the 『Set』 key to close the dialog box. The system automatically adds the selected term to the specified position.

(3) At this time, the background of comment bar is white, indicating edit status; the user can still edit the comment added.

(4) Press 『Set』key to confirm and exit the comment edit status.

(5) When the Comment Library is open but no item is to be entered, position cursor on the [Cancel] item in the dialog box and press 『Set』 key to close the dialog box.

The dialogue of comment library is shown in the figure below:



13.4 Input Arrow Comment

Arrow is used to mark the special position on image where comments are required or the position should be stressed.

(1) In the comment status, roll the trackball to the position where an arrow is needed to be added.

(2) Press 『Set』key to add an arrow, there is a frame around the arrow, indicating selection status, in which orientation can be adjusted and arrow can be deleted.

(3) "Rotation" lamp of function knob lights up, turn the knob to change the orientation of the arrow; turn it once, angle will change 45°; the rotation of clockwise or counter clockwise is consistent with that of the function knob.

(4) Press 『Set』key to confirm the orientation of arrow and exit the arrow selection status.

(5) Repeat all the steps above to go on adding arrows.

13.5 Move Existing Comment Items

(1) Move the cursor on an existing comment item, that is, a text comment or an arrow.

(2) After the cursor changes into "✣", press 『Set』 ONCE to select it, the background of character bar changes into gray, indicating it is selected.

(3) Roll the track ball to move it. A frame in the same size as comment bar is moving on the screen as well.

(4) At the target position, press 『Set』 to freeze it.

(5) Press [Back] to undo moving.

13.6 Modifying the Comments

(1) Move the cursor on the comment to be modified.

(2) Press 『Set』 TWICE, the cursor will appear in the editing box. The background of comment bar changes to white.

(3) Using the [→], [←] keys on the keyboard, move the cursor to where needs to insert characters, then type or select the new comment from comment library and insert characters; move the cursor to the right side of characters to be deleted, press 『Del』key to delete the characters or comments.

(4) Press 『Set』key to exit the comment edit status.

(5) The method which is described above is invalid to arrow comment.

13.7 Deletion of Comment

13.7.1 Delete characters

In the Comment edit status, use [→], [←] key to anchor the cursor to the right side of the character to be deleted. Then press the 『Del』 key to delete the character.

13.7.2 Delete arrows

In the status of arrow selected (there is a frame), press 『Del』 or 『Back』 to delete it.

13.7.3 Delete all comments and arrows

In Comment status, i.e. the cursor is in the status of "|" but no comment item is activated (highlighted), pressing 『Del』 key can delete all the comment characters, comments and arrows.

13.7.4 Delete Items in Reverse Sequence

If there is more than one item on the screen, press 『Back』 repeatedly will delete the items in the reverse sequence of being created.

13.8 Comment library

User can select appropriate comment from library by referring to the list below. Help bar in dialogue box can be referred to as well.

13.8.1 Abdomen

Symbol on screen	Full description
L	Liver
LL	left lobe of liver
RL	right lobe of liver
CL	caudal lobe of liver
LTH	Ligament teres hepatis
VL	Venous Ligament
PV	Portal Vein
HV	Hepatic Vein
RHV	Right Hepatic Vein
MHV	Medium Hepatic Vein
LHV	Left Hepatic Vein
HA	Hepatic Artery
HD	Hepatic bile duct
GB	Gallbladder
CBD	Common Bile Duct
Sp	Spleen
SpA	Splenic Artery
SpV	Splenic Vein
P	Pancreas
PH	Pancreatic Head
PB	Pancreatic Body
PT	Pancreatic Tail
PD	Pancreatic Duct
K	Kidney
AG	Adrenal Gland
RA	Renal Artery
RV	Renal Vein
RP	Renal Pelvis
RC	Renal Calices
Pr	Pyramid
RCo	Renal Column
Ur	Ureter
Bl	Bladder
Pro	Prostate
SV	Seminal Vesicle
Sto	Stomach

Ca	Cardia
E	Esophagus
Bo	Bowel
Du	Duodenum
Co	Colon
Ap	Appendix
SMA	Superior Mesentery Artery
SMV	Superior Mesentery Vein
Ao	Abdominal Artery
IVC	Inferior Vena Cava

13.8.2 Obstetrics

Symbol on screen	Full description
Ut	Uterus
Ov	Ovary
Cx	Cervix
V	Vagina
En	Endometrium
IUD	Internal uterus Device
GS	Gestational Sac
Embryo	Embryo
YS	Yolk Sac
Am	Amnion
Pl	Placenta
UC	Umbilical Cord
AF	Amniotic Fluid
F	Fetus
FH	Fetal Head
F_Sp	Fetal Spine
F_Sto	Fetal Stomach
FK	Fetal Kidney
F_Lb	Fetal limbs

13.8.3 Cardiology

Symbol on screen	Full description
LV	Left Ventricle
RV	Right Ventricle
LA	Left Atrium
RA	Right Atrium
AAO	Ascending Aorta
PA	Pulmonary Aorta
MV	Mitral Valve
TV	Tricuspid Valve
AV	Aortic Valve

PV	Pulmonary Valve
IVS	Interventricular Septum
IAS	Interatrial Septum
LVPW	Left Ventricular Posterior Wall
CT	Tendinous Cords
PM	Papillary Muscle
CS	Coronary Sinus
CA	Coronary Artery
RVOT	Right Ventricular Outflow Tract
RVAW	Right Ventricular Anterior Wall

13.8.4 Small Parts

Symbol on screen	Full description
Thy	Thyroid
MG	Mammary Gland
Eye	Eye
Ts	Testicle
Ep	Epididymis
LyN	Lymph Node
CCA	Common Carotid Artery
IJV	Internal Jugular Vein
ICA	Internal Carotid Artery
ECA	External Carotid Artery
VA	Vertebral Artery
IIA	Internal Iliac Artery
IIV	Internal Iliac Vein
EIA	External Iliac Artery
EIV	External Iliac Vein
FA	Femoral Artery
FV	Femoral Vein
GSV	Great Saphenous Vein

13.8.5 Others

Symbol on screen	Full description
L	left
R	right
U	up
D	down
Anterior	anterior
Posterior	posterior
♂	male
♀	female

13.8.6 Lesion

Symbol on screen	Full description
M	Mass
T	Tumor
Sc	Scar
St	Stone
Cy	Cyst
Abs	Abscess
Hma	Hematoma
Eff	Effusion
Asc	Ascites
Nec	Necrosis
Sed	Sediment
Meta	Metastasis
Cal	Calcification
Hcc	Hepatocarcinoma
Ang	Angioma
Polyp	Polyp
As	Ascaris
FB	Foreign Body
Tb	Tuberculosis
Fe	Fecalith
Th	Thrombus
Plaque	Plaque
Myo	Myoma
HM	Hydatidiform Mole
Any	Anencephaly
Hyd	Hydrocephalus
SB	Spina Bifida
VSD	Ventricular Septal Defect
ASD	Atrial Septal Defect
PDA	Patent Arterial Duct
MS	Mitral Stenosis
MR	Mitral Regurgitation
MVP	Mitral valve prolapse
MVV	Mitral Valve Vegetation
LAM	Left Arterial Myxoma
Pe	Hydropericardium
AAn	Aortic Aneurysm
Asa	Aortic sinusal aneurysm
AS	Aortic Stenosis
PS	Pulmonic Stenosis

14 Body Mark

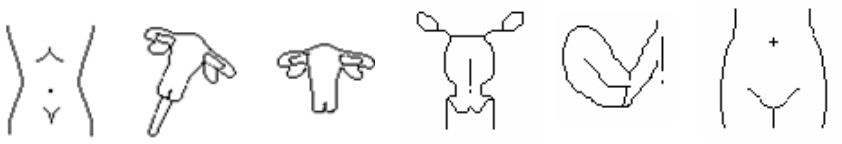
14.1 Introduction

Body Mark is used to point out the body part being examined and the detecting direction of the transducer. In fact the Body Mark acts as a comment on the image.

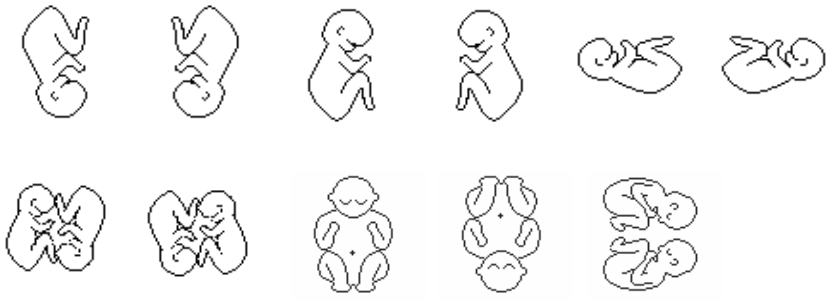
Classification of Body Marks:

Five categories are available: abdomen, gynecology， obstetrics, cardiac (or heart), small parts. Each category has some different Body Marks. See the following figures.

Abdomen Body Marks

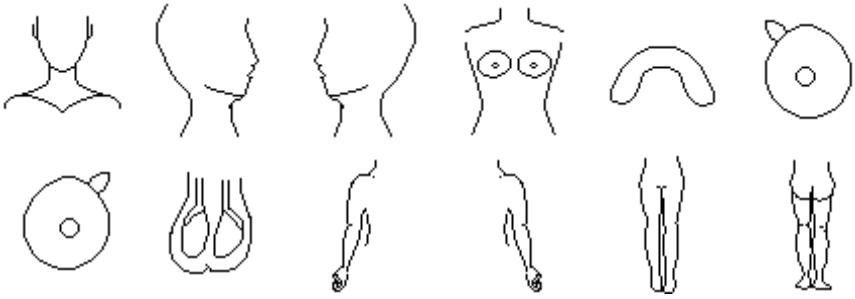


Gynecology Body Marks



Obstetric Body Marks

Cardiac Body Marks

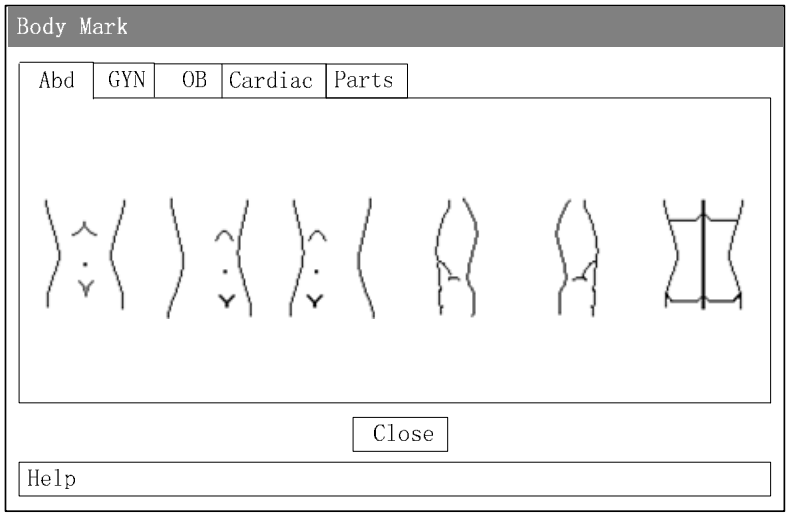


Small Part Body Marks

14.2 Enter/Exit the Body Mark mode

Enter the Body Mark:

Press BodyMark key to enter the Body Mark mode. The BodyMark lamp lights on. The system automatically pops up the Body Mark page consistent with the current exam mode.



Dialog Box of Body Mark

Exit the Body Mark mode:

After adding a Body Mark, the system will directly enter the adjustment mode of transducer position direction on the Body Mark, roll the trackball to the body's position where the transducer is placed during examination, turn the functional dial to correct direction, press 『Set』 key to confirm, and the system can exit Body Mark mode. In addition, user can press 

key again to exit the dialogue box.

14.3 Add Body Mark

(1) Press 『Body Mark』 key, Body Mark lamp lights up, the dialogue box of Body Mark pops up in the center of screen.

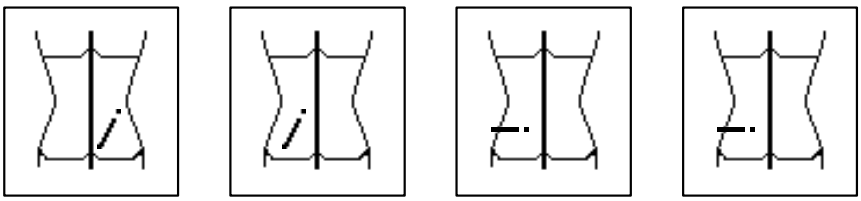
(2) Move the cursor to a Body Mark, there is "□" around it to highlight the display, press 『Set』 key, the dialogue box closes, a Body Mark is added in the left lower corner of the window. "Rotation" lamp of functional dial lights up, the knob is used to adjust the detection of transducer on the Body Mark.

(3) In the step 2, if there is no Body Mark needed in the current page, move the cursor to other page button, press 『Set』 key, open the page to look for the Body Mark needed, operation is the same as step 2;

(4) Roll the trackball, place the transducer of Body Mark in the correct detecting position;

(5) Turn functional dial to adjust the direction of detection;

(6) Press『Set』key, confirm the direction and position of the transducer, add the Body Mark, 『Body Mark』 lamp lights off, the system exits Body Mark mode.



locate body mark on the bottom left corner of image window

Roll TrackBall to change probe position

Turn multifunction knob to adjust detecting direction of probe

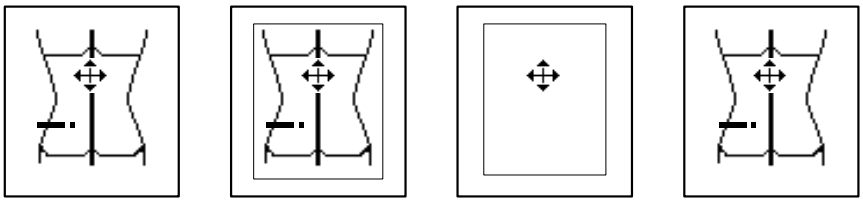
Press [SET] to confirm the probe's direction and position

(7) After the step 2 or step 3, if the direction and position of the transducer need not to modify, directly press『Body Mark』key or『Set』key to confirm the Body Mark,『Body Mark』 lamp lights off, the system exits the Body Mark mode.

Note:	In B/B-mode, the user can add Body Marks respectively on the two images.

14.4 Moving Body Mark

The Body Mark can be moved to other position of image area.



Move cursor to body mark

Press [Set] to select body mark

Roll TrackBall to control body mark

Press [Set] to confirm body mark end position

(1) Move the cursor onto the Body Mark. The cursor changes into a "✣". Press the 『Set』 key, the Body Mark is framed into a "□".

(2) Roll the trackball, the "□" frame is moving together. Move the "□" to the target position to which the Body Mark is to be moved.

(3) Press the 『Set』 key, the Body Mark is moved to the new position and the operation ends.

(4) In step (2), press [Back] key, the Body Mark resumes to previous position and operation ends.

14.5 Clearing Body Mark

(1) For the Body Mark that has been entered, press the [Body Mark] key for consecutive two times to clear the Body Mark.

(2) When the dialog box of [Body Mark] is open, if no Body Mark is to be added, just press the [Body Mark] key, or position the cursor to the [Close] key in the dialog box and then press the 『Set』 key.

15 Measurements and Calculations

This chapter briefly describes the measurement functions of the system. For detailed explanation of measurement and calculation, refer to Operator's Manual (Advanced Volume).

⚠WARNING: Be sure to measure the correct objects and image during measurement, or cause misdiagnosis.

⚠CAUTION:

1. **When open a CIN or FRM file, the current patient data and the measurements will be cleared up instead of the previous patient data in the CIN or FRM file.**
2. **After open a CIN or FRM file, unfreezing the image will clear up all comments, measurements, Body Marks and patient data.**
3. **During measurement, to unfreeze the image or change the exam mode will clear the basic measured data and measurement scale.**
4. **All the measured data will be lost when the system is turned OFF or 「Patient」 is pressed.**

15.1 Basic Operation

15.1.1 Enter Measurement Status

Press 

key to enter Measurement status. The [Measure] lamp is on. The menu on the right side of the screen switches to Measurement menu.

15.1.2 Measurement Menu

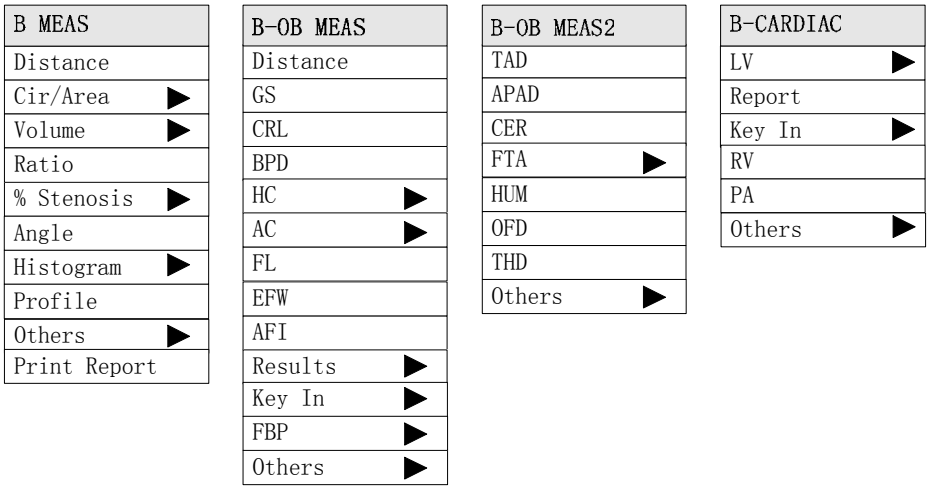
The measurement menu is displayed on the right part of the screen. If the menu is not displayed, press the [Menu] key.

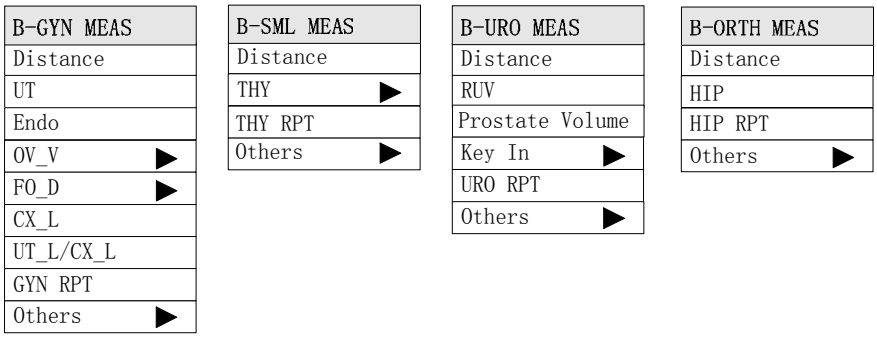
There are 7 menus for B mode measurements and calculations.

- B MEAS menu: used for general measurements and calculations of abdomen exam mode.

- B-OB MEAS menu (Including B-OB MEAS and B-OB MEAS2 menu): used for calculations of GA, fetal weight and EDC when the system is in obstetric exam mode.
- B-CARDIAC: used for left ventricular function, right ventricular internal diameter, pulmonary artery calculations of cardiac exam mode.
- B-GYN MEAS menu: used for uterine and ovary measurements & calculations in gynecology exam mode.
- B-SML MEAS menu: used for thyroid measurements in small part exam mode.
- B-URO MEAS menu: used for residual volume, PV and PSA measurements and calculations in urology exam mode.
- B-ORTH MEAS menu: used for HIP measurements in orthopedics exam.

All of the measurement menus in B mode as follows:





- M MEAS: used for the general measurements on the M mode image, such as distance, heart rate, time, and slope.
- M-CARDIAC: used for left ventricular function, mitral valve and aortic valve measurements and calculations.

M MEAS and M-CARDIAC measurement menus as follows:

M MEAS
Distance
Time
Slope
Heart Rate
Others ▶
Print Report

M-CARDIAC
LV ▶
Mitral Meas ▶
Aorta Meas ▶
Heart Rate
LVET
LVMW
Report
Key In ▶
Others ▶

Toggle among measurement menus:

- The user can enter exam mode selection menu through pressing [EXAM] key to select corresponding exam mode.
- The user can also switch to obstetric measurement menu by selecting the menu item in [Others] submenu.

15.1.3 Measured Result and Help Information

The system displays and updates measured and calculated results in the Result Area located in the right lower part.

The prompt information for each step in the process of measurement and calculation is displayed in the Help Bar located at the bottom of the screen.

15.1.4 Keys Used in Measurement

The keys used during measurement are shown in the figure, which are to be used in conjunction with the trackball.

『Set』:

Used to start or end the measurement, or to anchor the two point of line measuring scale. The function of the key is to be described detailed in following practice.

『Back』:

This key has two functions: to return to the previous step during measurement; to delete the previous measurement.

『Change』:

Used for switching the fixed end and the active end in measurements.

15.1.5 Classification of Measurements and Calculations

All examination items in the menu are divided into two major categories: measurement and calculation.

- Measurement is only active in the current image mode. Switching the image mode will clear all the measurements and the displayed results in the current image window.
- Calculation consists of some measurements, which are organized based on a certain steps. According to each measured result, the system determines the calculated results using specific formula. Calculations can be made in different image windows. As long as the current measuring step of the calculation can be done in the new image window, the current step of the calculation can be performed.

Lock the cursor into the image window:

During measurement, handlers can not move the cursor out of the image window until the completion of measurement.

Measurement can be performed on either the magnified image, or the CINE review image ， or the real-time image.

15.2 B-mode Measurements

The measurements listed below can be performed in B mode.

Measurement item	Description
Distance	The distance between two points is measured.
Area/circumference	The area/circumference can be measured by the following methods. (1) Ellipse (2) Trace
Volume	Measure the volume of the target object.
Ratio	Measure and calculate the ratio between two measured distance values.
% Stenosis	Measure and calculate the stenosis of the blood vessels. Distance stenosis Area stenosis
Angle	The angle between two lines is measured in addition to the distance between two points.
Histogram measurement	The distribution of the intensity of the B-mode echoes within the traced area can be displayed graphically.
Profile	Measure the gray distribution of the ultrasound signals on a profile in the vertical or horizontal direction.
Left ventricular function measurement	The left ventricular function can be measured and calculated. Single Plane Ellipse Biplane Ellipse Bullet

	Modified Simpson
OB measurement	Evaluate fetal growth.
GYN Measurement	Measure parameters of uterine, endometrium, ovary and FO-D in gynecology exam.
Small part measurement	Measure parameters of thyroid
Urology Measurement	Measure residual volume, and prostate parameters
Orthopedics measurement	Measure parameters of HIP

15.3 M-mode Measurements

The measurements listed below can be performed in M mode.

Measurement item	Description
Distance	The distance between two points vertically in the M mode is measured
Time	The elapsed time between two points is measured.
Slope	The slope between two points is measured.
Heart rate	Calculate the number of heart beats per minute on the cardiac image.
Left ventricular function measurement	The left ventricular function can be measured and calculated. Teichholz CUBE

16 File System

16.1 General

The file formats supported by the system:

- BMP
- JPG
- CIN
- FRM
- DCM (Only for DICOM optional unit)

Note: JPEG CODEC may result in the distortion of image.

The images need to be frozen before the FRM and CIN files are stored; however, other types of files can be stored in any status.

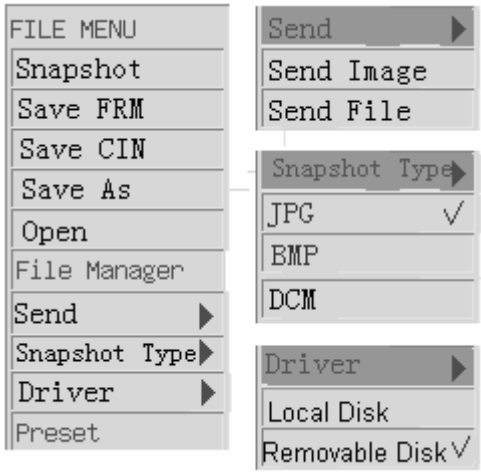
16.1.1 Storage Medium

Local disk: disk symbol B：.

Removable disk: U disk or portable hard disk connected through USB interface, display symbol C： and subsequent symbols.

16.1.2 File Menu

Enter or exit the file management system: press the『File』key to enter the file management, and the screen displays the file menu.



Press the 『File』key again, and the user can exit the file system.

16.2 Default Path and Default File Naming Rule

16.2.1 Setting the default path

The user can set the default paths for dialog boxes of storing files, opening files and file management.

The user can set the default type of storage media in the “General preset” dialog box(refer to section 1 in the Advanced volume),. Or the user can select the default type of storage media through [Driver] item of [File Menu].

If the default driver is the local disk, the default path is the root directory \B：of the local disk; if the default driver is a removable disk, the default path is the root directory \C：of the first logic driver.

16.2.2 Naming rule of default filename

The file naming rule: the last two bits of the year（yy）＋month（mm）＋4-bit number（xxxx）＋.extension name. The 4-bit number starts from 0000 and increases in the ascending order. The system searches all the preceding 4 bits of the filenames in the storage path and the maximum number consistent with the current date to determine the current filename (the maximum number plus 1). If the maximum number is 9999, the current number will become 0000 and jump over existing numbers. If the numbers from 0000 to 9999 have already existed, the system prompts that the file with the number 9999 will be overwritten.

The default filename is used for quick saving of a file.

16.3 Saving/Opening a File

16.3.1 Quick saving a file

The user can save an image file with the default filename in the default path quickly.

Snapshot

The user can acquire a single-frame image and save it in the default path and in the set file formats (JPG, BMP or DCM). The shortcut key is 『Shift＋S』.

The default file format setting: set it through the [Snapshot Type] preset item of the “General Preset” dialog box, or set it through the [Snapshot Type] item in [File Menu].

The the default path setting: set it through the [Driver] preset item of the “General Preset” dialog box, or set it through the [Driver] item in [File Menu].

1. Click [Snapshot] in the [File Menu] (or directly click the 『Shift＋S』key), and the current image will be saved in the default path and as the default format, the filename is the default one.

2. During the file storage, a processing bar appears at the bottom of the screen. When the storage operation finishes, the processing bar disappears automatically, and other operations are to be performed.

Saving a FRM/CIN file:

The images need to be frozen before the files are stored.

Click the [Save FRM] or [Save CIN] in the [File Menu], and the user can save the FRM or CIN files and other operations are similar to those of the Snapshot.

Shortcut key:

Saving FRM files: 『Shift＋F』.

Saving CIN files:『Shift＋C』.

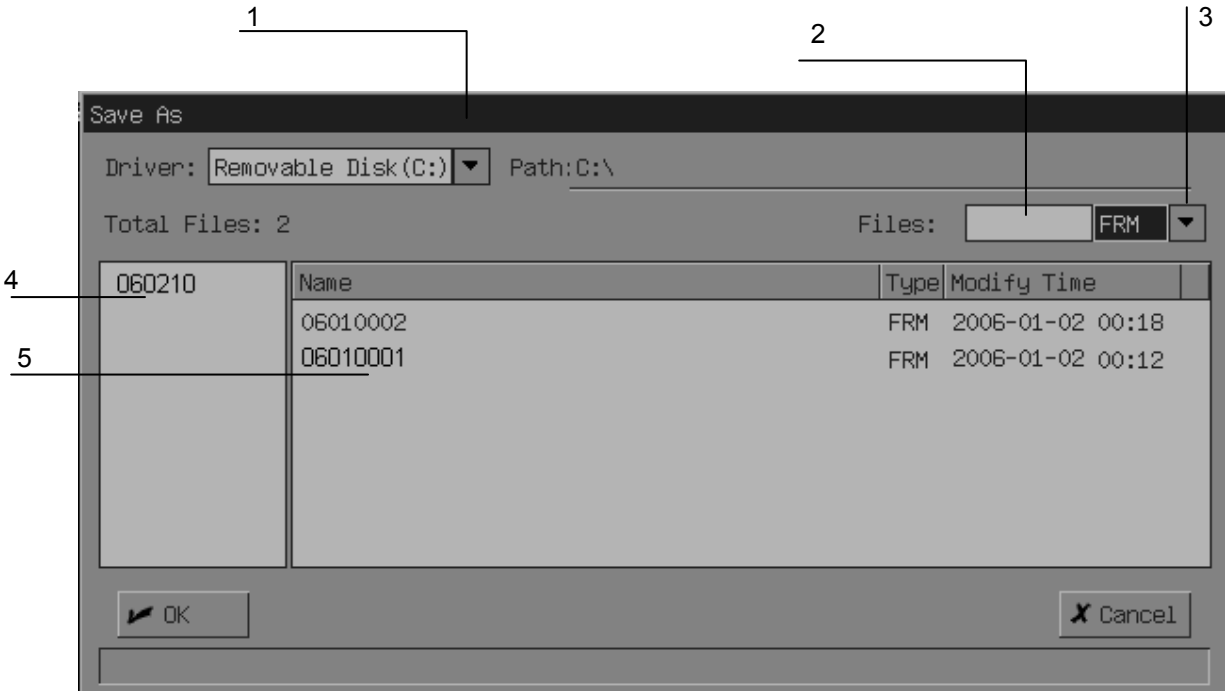
16.3.2 General saving a file

The user can modify the file storage path and the storage format，and name the filename through the dialog box.

The images need to be frozen before the FRM and CIN files are stored, however, other types of files can be stored in any status.

The methods for saving the JPG, BMP, CIN, FRM and DCM files are similar, so the method for saving the FRM files is taken as an example below.

1. Press the『Freeze』key to freeze the image.
2. Press the『File』key to open [File Menu], and click the [Save As], and the dialog box for file storage pops up.
3. The default storage path is displayed in the dialog box（Please refer to section 16.2 to set default storage path）, and the user can modify the storage path.



1——driver list　　2——filename

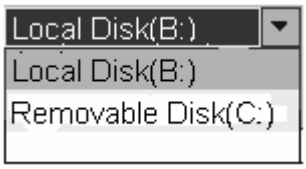
3——file format list　　4——directory list

5——file list

4. Selecting a driver

A driver is selected by means of a drop-down list box:

- Move the cursor onto the symbol "▼", at the right of the "Driver" and press the 『Set』key, and then a list box pops up as shown in the following figure. The drivers which are available for the system appear in the list box: local disk B and removable disk.
- Move the cursor to select the desired driver, and press the 『Set』key, and after the list box is closed, the selected driver becomes the current one.



5. Changing the disk path

Local disk: there is no subdirectory, so the files can only be stored under the root directory.

Removable disk: Subdirectories can be created in the removable disk, so the files can be stored under the subdirectories.

Move the cursor onto the desired directory in the directory list box, and continuously press the 『Set』key twice to enter the directory. To return to the previous level of the directory, move the cursor onto the [..] and continuously press the『Set』key twice.

6. Inputting a filename

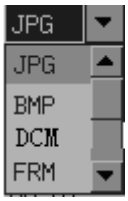
Anchor the cursor in the filename edit column, and press the 『Set』key, and input the filename of the file to be stored.

To replace an existing file, move the cursor onto the corresponding file in the file list box, and press the『Set』key.

7. Selecting the storage format

The user can select a storage format through a drop-down list box:

- Move the cursor onto the symbol " ▼ " at the right of the filename, and press the 『Set』 key, and a list box pops up. The available storage formats are displayed in the list box: JPG/BMP/DCM/FRM/CIN.
- Move the cursor to select a suitable file format, and press the『Set』key to close the list box.



8. Click『Set』on the「OK」button， and the dialog box closes, and then the system stores the current screen information to the specified file.

16.3.3 Opening a file

This function is used for reading and viewing the image files in a disk.

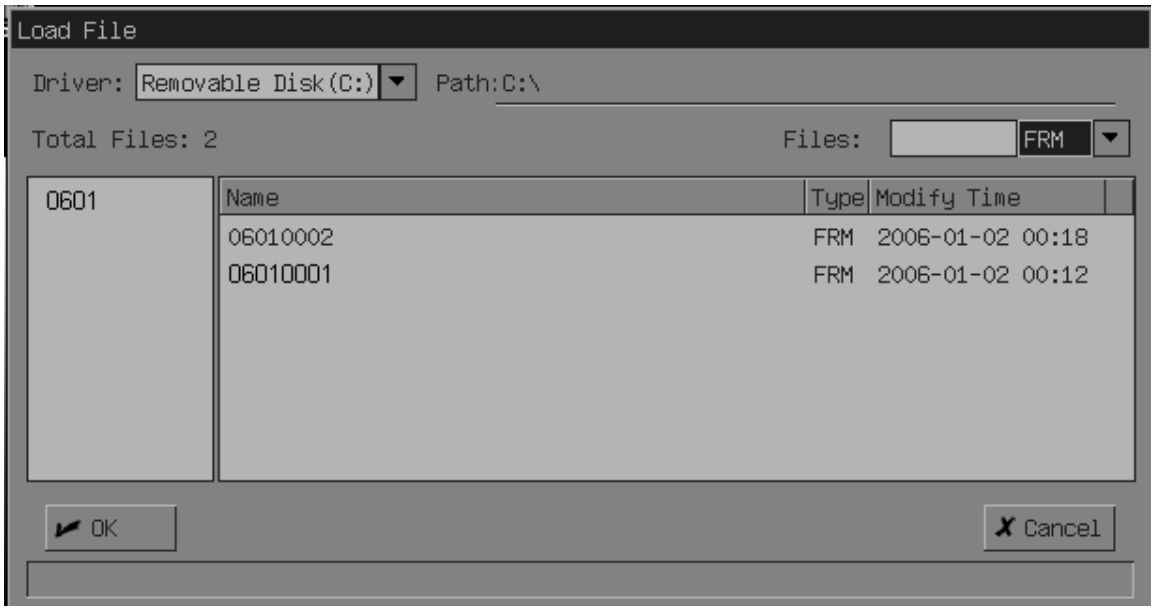
After the FRM/CIN files are opened, the user can perform measurements; add comments or body marks on the screen. To exit the status of opening the file, press the 『Freeze』key, and the system resumes the status prior to that of opening the file.

To exit the status of opening the JPG/BMP/DCM files, click the [Exit] button at the lower right corner of the screen, and the system resumes the status prior to that of opening the file.

NOTE: When the FRM or CIN files are opened, the operation may clear all information of the current patient, including measurement data, comments and body marks, etc. The patient information in the Cine file or single-frame image file is to be set to the current patient information.

The operation for opening a file is similar to that for storing an image file. Opening a FRM file is taken as an example:

1. Move the cursor onto the [Open] item and press the 『Set』 key. A dialog box for opening a file appears on the screen.
2. The files in the default format and in the default path appear in the dialog box. The user can modify the driver and file directory, and the method is similar to that for “general saving a file”. The user can select the format type in the drop-down list at the right of the filename, and the files of this format type are displayed in the file list. When the selected format type is “ALL”, all types of files under the current directory are displayed in the file list.
3. Click the [Filename] or [Modify Time] button in the dialog box, to arrange the order of the files in terms of filenames or modification time.



4. Double-click a file to be opened; or move the cursor onto the file to be opened and press the『Set』key, and the selected file is highlighted. Press the [OK] key again, and the corresponding file is opened and the dialog box is closed. The system displays the stored single-frame image on the screen.
5. Press the『Freeze』key, and the opened FRM image file is closed, and the system resumes the status prior to that of opening the file.

16.4 DICOM

If the system is configured with the DICOM unit, the [Send] item will appear in the [File Menu].

Refer to the section 16.3. for Storing and Opening the DCM Files.

16.4.1 Sending the DCM images

The images on the current screen can be sent to the current server.

1. Move the cursor onto the[Send Image] item in the [Send] submenu, and press the 『Set』key, and the system start to send image.
2. The prompt information at the bottom of the screen displays the working status of the system.

16.4.2 Sending the DCM files

The DCM files stored in the disk can be sent to the current server.

The operation procedures are described as follows:

1. Move the [Send File] item in the [Send] submenu, and press the 『Set』key. The screen displays the corresponding dialog box.
2. Refer to the section “Open File” for the subsequent procedures.
3. The prompt information at the bottom of the screen displays the working status of the system.

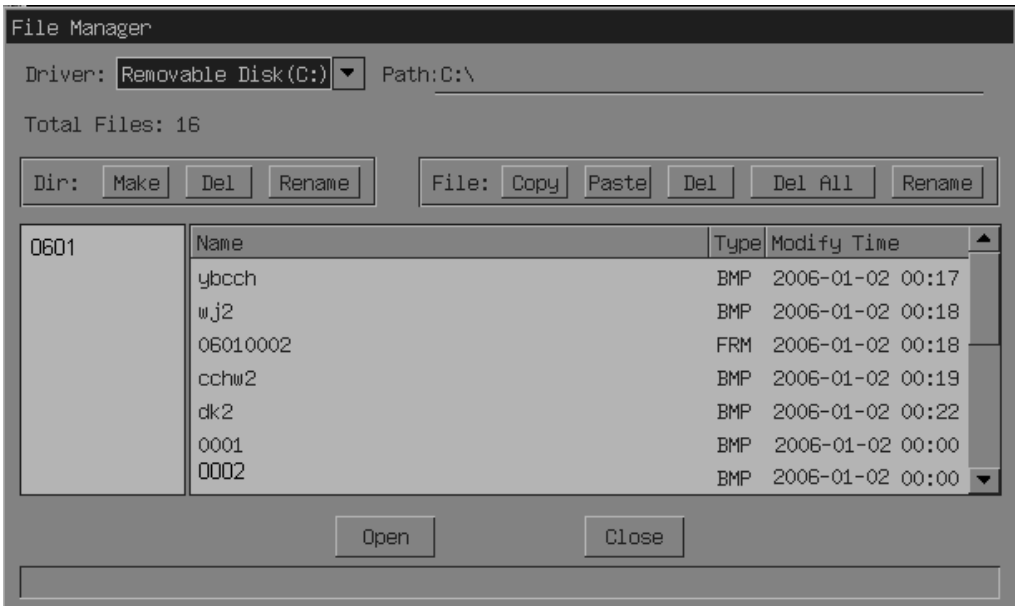
16.5 File Management

NOTE: The number of the partitions of a USB removable disk shall not exceed 6; otherwise, the files cannot be displayed normally.

Function: manage the directories and files stored onto the disk.

Move the cursor to the [File Manager] item of the File Menu and press the 『Set』key. The “File Manger” dialog box appears on the screen.

The dialog box displays the directories and files in the default storage path（Please refer to section 16.2 to set default storage path）.



16.5.1 Directory management

Managing directory includes making, renaming and deleting a directory.

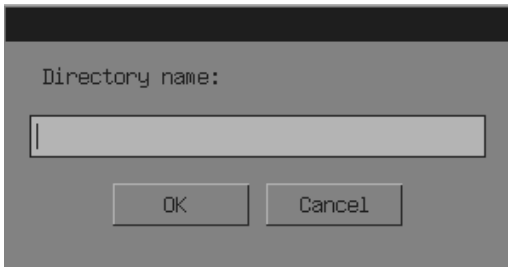
NOTE: Directory management is only valid for being operated on USB removable disk.

Make a directory:

1 First select the drive in which a directory is to be created in the pull-down list of drive. Then select the position at which the directory is to be created.

2 Move the cursor to the [Make] item in the dialog box and press the 『Set』 key. The “Info input” dialog box pops up.

3 Enter the directory name into the dialog box. And press the『Set』key on the [Ok] button to close the dialog box and the new created directory is added into the directory table. Or press the 『Set』 key on the [Cancel] button to cancel all operations.



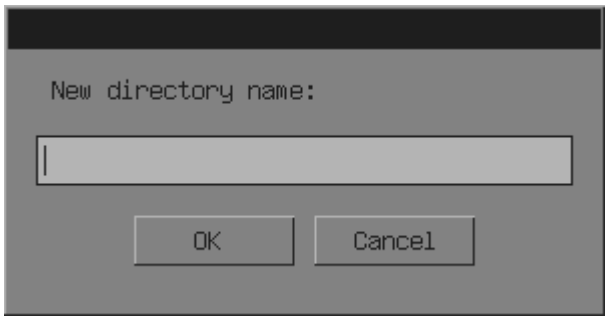
Rename a directory:

1 First select the drive in which a directory is to be created in the pull-down list of drive.

2 Then select the position at which the directory is to be created.

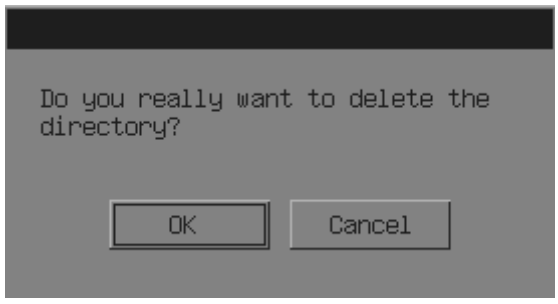
3 Press the 『Set』 key on the [Rename] button. The “Info input” dialog box pops up.

4 Enter the new directory name in the dialog box. Press the『Set』key on the [Ok] button to close the dialog box and the previous name in the directory table is updated to the new name. Or press the 『Set』 key on the [Cancel] button to cancel all operations.



Delete a directory:

1. First select the drive containing the directory to be deleted in the drive table.
2. Then select the directory to be deleted in the directory table.
3. Press the 『Set』 key on the [Del] button. A dialog box pops up.



4. Press the 『Set』 key on the [Ok] button to close the dialog box.
5. If the directory is not empty. A dialog pops up as follows.

6. If the directory is empty, the selected directory name is deleted. Or press the 『Set』 key on the [Cancel] button to cancel all operations.

16.5.2 File management

File management includes opening, renaming, deleting and copying a file as well as deleting all the files under the current directory.

Opening a file:

1. Open the dialog box for the file manager, and select the directory of the file(the operation is the same to the section16.3.3).)
2. The file list displays all the files under this directory. The user can click the[Name], [Type] or [Modify Time] button, to arrange the order of the files in terms of the filename, type or modification time.
3. To open a file, select the file and click the [Open] button; or double-click the file to be opened, and then the file is opened.

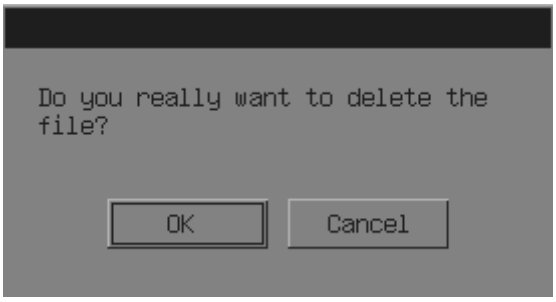
Rename a file:

1. Select the drive and the directory under which the file to be renamed exists.
2. Select the file to be renamed in the file table. Press the 『Set』 on the [Rename] button, the “Info input” dialog box pops up.
3. Enter the new file name into the dialog box and press the 『Set』 key on the [Ok] button for confirmation or on the [Cancel] button to cancel all operations.

Delete a file:

1. Select the drive and the directory under which the file to be deleted exists.
2. Select the file to be deleted in the file table and press the『Set』key on the [Del] button.

A dialog box pops up.



3. Press the 『Set』 key on the [Ok] button for confirmation or on the [Cancel] button to cancel all operations.

Delete All Files:

Delete all the files under the current directory. The operating method is the same as that to delete a single file but select [Del All] button.

Copy and Paste a file:

1. Select the file to be copied. Move the cursor to the [Copy] button and press the 『Set』 key.
2. Enter the directory under which the file is to be pasted. Move the cursor on the [Paste] button and press the『Set』 key to start the copying operation. After the pasting process being completed, the pasted file is displayed under the directory.
3. If there is a file of the same name with the file to be pasted under the directory. The system will pop up the dialog box to give the prompt like “The file existed, replace it or not?” Select [Ok] or [Cancel] button to determine whether to replace the original file or not.

16.6 Disconnect USB Storage Device Safely

1. When a USB storage device is connected to the ultrasound system through a USB port, the icon“ ”will appear at the bottom right corner of the screen.

2. If it needs to remove the USB storage device, move the trackball onto“ ”, press 『Set』key, a dialogue box below pops up.

3. Select the USB storage device to be removed, press [OK] to remove it safely. If there are two USB storage devices connected, the first connected memory is displayed on the upper row, and the second is displayed on the lower row.

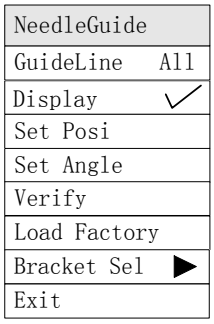
⚠WARNING: Do not remove the USB storage device directly from the ultrasound system without performing the prescribed procedures. Otherwise, it may damage the USB storage device and the ultrasound system.

17 Needle Guide

17.1 Enter/Exit Needle Guide Mode

Enter Needle Guide mode:

When B-mode image is in real-time status, select [NeedleGuide] item from B MODE MENU. If the transducer has no needle guide bracket, “This probe has no needle guide bracket!” will be displayed on the screen，which expresses the transducer couldn’t use to needle guide. Otherwise the information “Prior to each puncture, calibrate the needle guide line!” will display on the screen. After this dialog box is closed, the needle guide line displays in the Image area and the [NeedleGuide] menu is displayed on the upper right side of the screen. See the figure below.



⚠WARNING: Do not freeze image during needle guide.

Exit Needle Guide mode:

Select [Exit] in the menu when the system is in needle guide mode. Needle guide menu closes at the same time. The needle guide line in the Image area will also disappear.

17.2 Select the Angle of Needle Guide Line

If the needle guide bracket of the transducer has various needle guide line, you can let the system display different needle guide line by using the [GuideLine] item of the [NeedleGuide].

Click the [GuideLine] item, needle guide lines of different angles will be displayed circularly. The value of the current guide line will also be displayed on the menu item. The “All” option means to display all needle guide lines.

17.3 Hide/Display Needle Guide Lines

You can use the [Display] item of the [NeedleGuide] menu to let the system hide or display needle guide lines.

Click the [Display] item, needle guide lines will be displayed or hidden cyclically.

17.4 Adjust Needle Guide Line

Before leaving the factory, needle guide line has been correctly calibrated.

After being used for a period, the needle may bend lightly therefore requiring calibrating.

⚠WARNING:

1. **Prior to each puncture, calibrate the needle guide line.**
2. **If the positions of the needle and needle guide line are not consistent, do not execute needle guide operation.**

Calibrating method:

- Move needle guide line horizontally:

  Use the [Set Posi] item in the [NeedleGuide] menu to move the needle guide line horizontally.

  When the cursor is on the [Set Posi] item, press 『Set』 key to increase the position value or [Back] key to decrease it. The value of the current position is also displayed in this menu item.

- Trim needle guide line angle:

  Use the [Set Angle] item in the [NeedleGuide] menu to adjust needle guide line angle. The operating procedures are the same as [Set Posi].

- Restore factory value of the needle guide line

  Click the「Load Factory」item, the position and angle of the needle guide line will return to the factory setup value.

- Save calibrating value

  After calibrating the position and angle of the needle guide line, click on the「Verify」item, the system will then save the data of the current needle guide line. When starting up the system next time, the displayed position of the needle guide line will consequently be the position after calibrating.

- Needle-guided bracket selection

  If the transducer is equipped with several needle-guided brackets, which can be selected through 「Bracket Sel」 to execute needle guide.

18 Acoustic Power Principle

18.1 Concerns with Bioeffects

Diagnostic ultrasound is recognized as being safe. In fact, there have been no reports of injuries to patients caused by diagnostic ultrasound.

It cannot be stated categorically that ultrasound is 100% safe. Studies have revealed that ultrasound with extremely high intensity is harmful to body tissues.

Diagnostic ultrasound technology has made a great leap forward during the last several years. This rapid advance has generated concerns about the potential risk of bioeffects when new applications or diagnostic technologies become available.

18.2 Prudent Use Statement

Although there are no confirmed biological effects on patients caused by exposures from present diagnostic ultrasound instruments, the possibility exists that such biological effects may be identified in the future. Thus ultrasound should be used in a prudent manner to provide medical benefit to the patient. High exposure levels and long exposure times should be avoided while acquiring necessary clinical information.

18.3 ALARA (As Low As Reasonably Achievable)

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.

Users must take responsibility for the safety of patients and utilize ultrasound deliberately. Deliberate use of ultrasound means that output power of ultrasound must be selected based on ALARA.

18.4 Parameters Affecting Acoustic Power

Acoustic Power is affected by transmission conditions (focus, drive frequency, voltage applied to piezoelectric elements, etc.), scan conditions, and settings of the control panel, and preset menu.

18.5 Acoustic Power Setting

Turn the [ACOUSTIC POWER] to adjust the acoustic power, whose value is displayed in the Parameter area on the top part of the screen. To decrease acoustic power, turn the knob counterclockwise and to increase acoustic power, turn the knob clockwise.

Acoustic power can be set in the range from 0 to 15, where 0 represents minimum acoustic power and 15 represents maximum acoustic power.

When the image is frozen, the acoustic power cannot be adjusted.

18.6 Imaging functions that change acoustic output power

Changes of imaging mode and adjustments to controls also affect the acoustic output power. Specific information is provided in the following table.

Operation	Effect on the acoustic output power
Transducer change	The maximum acoustic output power of each transducer is optimized to produce the best image quality within FDA guidelines. Thus, the acoustic output power will change as the operator changes the active transducer.
Imaging Mode change	Since B and M modes use difference default imaging parameters, changing the mode will change the acoustic output power of the system. No changes occur when switching from B to B/B, since the basic imaging parameters remain the same. In most cases, the acoustic output power for M-mode is larger than in B-mode, however, it depends in the specific presets for B and M-mode.
Field of view(sector Angle or scan Width)	Change the sector angle or scan width may result in change to the frame rate, and thus change the acoustic output power.
Image depth change	Changing the image depth changes the PRF, and thus changes the acoustic output power.
Number of Focal Zones	Since the number of focal zones influences the frame rate and the actual position of the focal zones, changing the number of focal zones changes the acoustic output power.
Focus position	The transmit focus location change will cause the acoustic output power change, even though the transmitting electrical energy level and the aperture remains the same. In most cases, the acoustic output power will increase if the focal point is moved closer to the transducer.
Freeze	Active the freeze function stops the electrical energy transmit part of the system, thus disabling the system from generating ultrasound wave.

Transmit power	The transmit power level change will change the electrical output of the system to the transducer, and thus change the acoustic output power.
Frequency change	Changing the operating frequency changes the focal characteristics of the acoustic waves, thus changes the acoustic output power.
Line density	Changing the number of acoustic lines generated (line density) affects the acoustic output power.
Preset	Since the system and user presets contain all of the above imaging parameters, changing the preset will change the acoustic output power.
Reset or Power Off/On	Resetting or powering the system on or off causes the system to return to the default status thus may change the acoustic output power.

18.7 References for Acoustic Power and Safety

(1) “Bioeffects and Safety of Diagnostic Ultrasound” issued by AIUM in 1993

(2) “Medical Ultrasound Safety” issued by AIUM in 1994

(3) “Information for Manufacturers Seeking Marketing Clearance of Diagnostic Ultrasound Systems and Transducers” issued by FDA in 1997

19 Maintenance Check

The maintenance of the system is completed by customers and our service engineer. When the system gets to the customer, the customer should assume all the responsibility in maintenance.

⚠WARNING:	**Do maintenance except the contents appointed by this manual by professional training engineer or contact your MINDRAY service representative.**

19.1 Maintenance Checks to Be Carried Out by Customers

19.1.1 Cleaning the system

⚠WARNING:	**Before cleaning the system, be sure to turn off the power and disconnect the power cable from the outlet. Cleaning the machine when the power is "On" may result in electric shock.**

1. Cleaning the transducer

   Please refer to the operator's manual of corresponding transducer to do cleaning, disinfection and sterilization.

2. Cleaning the socket of transducer

   （a） Use soft dry cloth to erasure besmirch on connector.

   （b） If it is difficult to clean it thoroughly, the soft cloth dipping with mild cleanser can be used, and then make it air dried.

3. Cleaning the monitor

   User the soft cloth dipping with glass detergent to erasure monitor, and then make it air dried.

NOTE: Do not use hydrocarbon glass cleaner or cleaner for the OA equipment to clean the monitor. This substance may cause deterioration in the monitor.

4. Method to clean the control panel, shell and holder:

Use the dry soft cloth to clean the surface of the machine. If the machine is a bit dirty, moisten the soft cloth with the neutral detergent and wipe the machine to remove any stains. And then use the dry soft cloth to wipe the machine or make it air dried.

⚠CAUTION:

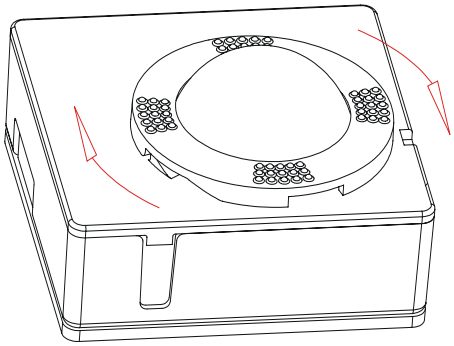
1.Be careful not to allow water or liquid to enter the system during cleaning to avoid malfunctions or electric shock.

2.To clean the connector, TGC controls and other connectors for the peripheral devices, contact the foreign sales distributor of Mindray. The cleaning by the user may cause the failure or lower the performance of the system.

5. Cleaning the trackball

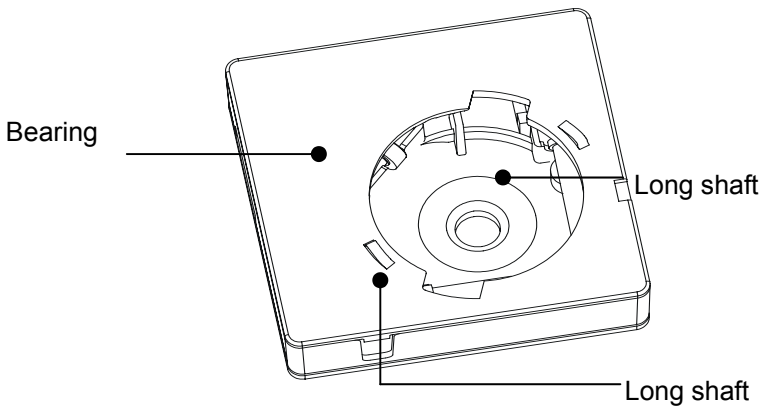
(a) Remove the ball

Press the bulges in the ring by both hands, and turn the ring 45° clockwise until the ring lifts; take out the ring and ball (careful not to drop the ball). See the figure below.



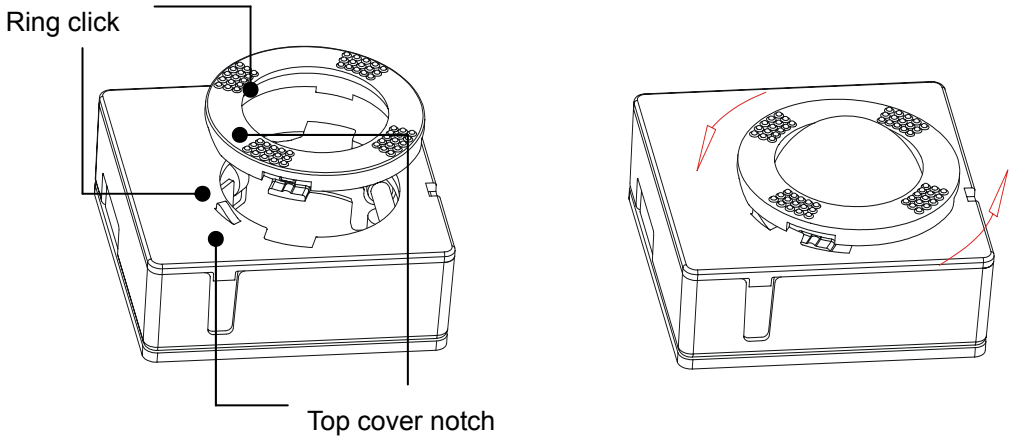
(b) Clean the trackball

Wipe the ball and the two long shafts and bearing using dry and soft cloth, as shown in the figure below.



(c) Install the ball

Put the ball and ring in place, and align the ring click with top cover notch; press the bulges in the ring by both hands, and turn the ring 45° counterclockwise until the ring clicks; the ring is secured and the bulges are flush with the top cover. See the figures below.



19.1.2 Creating a backup copy of the system

To take precautions for any deterioration or loss of data stored in the system create a backup copy of the data at appropriate times.

19.2 Maintenance Checks to Be Carried Out by Service

The following checks are required to ensure the performance and safety of the system. Contact your Mindray representative when carrying out these checks, because they require special techniques.

Check category	Check item
Cleaning	Interior of the system Peripheral units
Electric safety	Protective conductor resistance Ground line leakage current Enclosure leakage current Patient leakage current I Patient leakage current III
Mechanical safety	Check of the monitor mounting mechanism Operating panel Mounting mechanism for the peripheral devices Other mechanical parts External appearance of the transducer
Image recording	Images in each mode Image recording using the standard transducer

19.3 Consumable Parts and Parts Requiring Periodic Replacement

This system contains some parts requiring periodic replacement and some consumable parts. The consumable parts include, fuses etc. For replacement, special techniques are required. Contact your MINDRAY representative.

19.4 Troubleshooting

To ensure the normal operation of the machine, it is recommended to establish the maintenance and check plan to periodically check the safety of the machine. If any abnormity is detected, contact the foreign sales distributor of Mindray.

If some abnormal phenomena such as that after the start-up, there is no image, or there is menu but no image, please troubleshoot first by referring to the table below. If the failure keeps existence, please contact the distributor of Mindray.

Troubleshooting

No.	Failure	Cause	Measure
1	The power switch is turned on, but the power indicator does not light on.	Abnormal power system or incorrect connection of the power cable.	Check the power system and the power cable to ensure they are in normal status.
2	The power light is on but no image is displayed.	1. The time interval between shutdown and restart is too short. 2. The contrast or the brightness of the display is in abnormal status.	1. After shutdown, wait for 1 minute and then restart the machine. 2. Adjust the contrast or the brightness knob of the monitor.
3	The monitor shows the character but no image.	1. The emitting power, gain or TGC control is in abnormal condition. 2. No transducer is connected or the connection is not correct. 3. The machine is in Freeze mode.	1. Adjust the emitting power, gain or the TGC control. 2. Ensure correct connection. 3. Unfreeze the image.
4	The image quality is abnormal.	1. The exam mode is not correct. 2. The setup of the image post process is not correct.	1. Select the appropriate exam mode. 2. Adjust the setup of the image post process or set the post process to the default value.

20 Accuracy of Measurement

Table 20-1 Accuracy of measurement

Parameter	Value range	Error range
Range of display depth	2.16－24.8cm	≤±4% of full scale
Range of M-mode image time	1, 2, 4, 8 s	≤±0.3% of full scale

Table 20-2 Two-dimension Measurements

Parameter	Range	Error range
Distance/depth	Max. 248 mm	≤±4%; or <2mm if measured value is less than 40 mm
Area（Trace）	Max. 720 cm^2	≤±8%; or <130 mm^2 if measured value is less than 1600 mm^2
Area（ellipse, circle)	Max. 560cm^2	≤±8%; or <130 mm^2 if measured value is less than 1600 mm^2
Angle	0~180^o	≤±3%

Table 20-3 Time /Motion Measurements

Parameter	Value range	Error range
Distance	Max. 248mm	≤±4%; or <2mm if measured value is less than 40 mm
Time	Max. 8s	≤±1%
Heart Rate	15~999 beats/min.	≤±5%
Slope	Max. 999mm/s	≤±5%

Table 20-4 Volume Measurements

Parameter	Value range	Error
Volume	Max. 999cm^3	≤±12%; or < 8000 mm^3 if measured value is less than 64000 mm^3

NOTE: Measurements in any area of the selected viewing range can meet the required precisions. Precisions given above are based on the system under worst conditions, or on the actual tests of the system.

21 Safety Classification

(1) According to the type of protection against electric shock:

CLASS I EQUIPMENT

(2) According to the degree of protection against electric shock:

EQUIPMENT WITH TYPE-BF APPLIED PARTS

(3) According to the degree of protection against harmful ingress of water:

IPX0

(4) According to the degree of safety of application in the presence of a FLAMMABLE ANESTHETIC MIXTURE WITH AIR or WITH OXYGEN OR NITROUS OXIDE:

EQUIPMENT not suitable for use in the presence of a FLAMMABLE ANESTHETIC MIXTURE WITH AIR or WITH OXYGEN OR NITROUS OXIDE

(5) According to the mode of operation:

CONTINUOUS OPERATION

(6) According to the Degree of Mobility

PORTABLE EQUIPMENT

22 Guidance and Manufacturer's Declaration

The DP-6600/DP-6500 complies with the EMC standard IEC60601-1-2: 2001.

⚠WARNING: The use of unapproved accessories may diminish DP-6600/DP-6500 performance.

NOTE:
1. DP-6600/DP-6500 should not be used adjacent to or stacked with other equipment. If adjacent or tacked use is necessary, DP-6600/DP-6500 should be observed to verify normal operation in the configuration in which it will be used.
2. DP-6600/DP-6500 needs special precautions regarding EMC and needs to be installed and put into service according to the EMC information provided below.
3. Preventing conducted RF immunity. Due to technological limitations, the conducted RF immunity level are limited to 1Vrms level, conducted RF interference above 1Vrms may cause wrong diagnosis and measurements. We suggested that you position DP-6600/DP-6500 further from sources of conducted RF noise.
4. Portable and mobile RF communications equipment can affects DP-6600/DP-6500. See tables 1, 2, 3, and 4 below.

TABLE 1

GUIDANCE AND MINDRAY DECLARATION—ELECTROMAGNETIC EMISSIONS

DP-6600/DP-6500 is intended for use in the electromagnetic environment specified below. The customer or the user of DP-6600/DP-6500 should assure that it is used in such an environment.

EMISSIONS TEST	COMPLIANCE	ELECTROMAGNETIC ENVIROMENT—GUIDANCE
RF emissions CISPR 11	Group1	DP-6600/DP-6500 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	DP-6600/DP-6500 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 IEC61000-3-2	Class A	

Voltage Fluctuations/ Flicker Emissions IEC 61000-3-3	Compliance	

TABLE 2

GUIDANCE AND MINDRAY DECLARATION—ELECTROMAGNETIC IMMUNITY

DP-6600/DP-6500 is intended for use in the electromagnetic environment specified below.
The customer or the user of DP-6600/DP-6500 should assure that it is used in such an environment.

IMMUNITY TEST	**IEC 60601 TEST LEVER**	**COMPLIANCE LEVER**	**ELECTROMAGNETIC ENVIRONMENT-GUIDANCE**
Electrostatic Discharge(ESD) IEC 61000-4-2	±6 kV contact ±8 kV air	±6 kV contact ±8 kV air	Floors should be wood, concrete or ceramic tile. If floors are covered with synthetic material, the relative humidity should be at least 30%.
Electrical fast Transient/burst IEC 61000-4-4	±2 kV for power supply lines ±1 kV for input/output lines (>3m).	±2 kV for power supply lines ±1 kV for input/output lines (>3m).	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	±1 kV different mode ±2 kV common mode	Mains power quality should be that of a typical commercial or hospital environment.
Voltage dips, Short interruptions and voltage variation on power supply input lines IEC 61000-4-11	<5% U_T (>95% dip in U_T) for 0.5 cycle 40% U_T (60% dip in U_T) for 5 cycle 70% U_T (30% dip in U_T) for 25 cycle <5% U_T (>95% dip in U_T) for 5 sec	<5% U_T (>95% dip in U_T) for 0.5 cycle 40% U_T (60% dip in U_T) for 5 cycle 70% U_T (30% dip in U_T) for 25 cycle <5% U_T (>95% dip in U_T) for 5 sec	Mains power quality should be that of a typical commercial or hospital environment. If the user of our product requires continued operation during power mains interruptions, it is recommended that our product be powered from an uninterruptible power supply or a battery.
Power frequency (50/60 HZ) magnetic field IEC 61000-4-8	3 A/m	3 A/m	Power frequency magnetic fields should be at levels characteristic of a typical location in a typical commercial or hospital environment.

U_T is the A.C. mains voltage prior to application of the test level.

TABLE 3

<table>
<tr><th colspan="4">GUIDANCE AND MINDRAY DECLARATION—ELECTROMAGNETIC IMMUNITY</th></tr>
<tr><td colspan="4">DP-6600/DP-6500 is intended for use in the electromagnetic environment specified below. The customer or the user of DP-6600/DP-6500 should assure that it is used in such an environment</td></tr>
<tr><td>IMMUNITY
TEST</td><td>IEC 60601-1-2
TEST LEVEL</td><td>COMPLIANCE
LEVEL</td><td>ELECTROMAGNETIC
ENVIRONMENT-GUIDANCE</td></tr>
<tr><td>Conduced RF
IEC
61000-4-6</td><td>3 Vrms 150kHz to 80MHz</td><td>1 Vrms</td><td rowspan="2">Portable and mobile RF communications equipment should be used no closer to any part of DP-6600/DP-6500, including cables, than the recommended separation distance calculated from the equation applicable to the frequency of the transmitter.
Recommended separation distance
$d = 3.5 \times \sqrt{P}$
$d = 1.2 \times \sqrt{P}$ 80 MHz to 800 MHz
$d = 2.3 \times \sqrt{P}$ 800 MHz to 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).b
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:</td></tr>
<tr><td>Radiated RF
IEC
61000-4-3</td><td>3 V/m 80MHz to 2.5 GHz</td><td>3V/m</td></tr>
<tr><td colspan="4">Note
At 80 MHz and 800 MHz, the higher frequency range applies.
Note
These guidelines may not apply in all situations. Electromagnetic propagation is affected by absorption and reflection from structures, objects and people.</td></tr>
<tr><td colspan="4">● Field strengths from fixed transmitters, such as base stations for radio (cellular/cordless) telephones 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 DP-6600/DP-6500 is used exceeds the applicable RF compliance level above, DP-6600/DP-6500 should be observed to verify normal operation. If abnormal performance is observed, additional measures may be necessary, such as reorienting or relocating DP-6600/DP-6500.
● Over the frequency ranges 150kHz to 80MHz, field strengths should be less than 1V/m.</td></tr>
</table>

TABLE 4

RECOMMENDED SEPARATION DISTANCES BETWEEN PORTABLE AND MOBILE RF COMMUNICATION AND DP-6600/DP-6500

DP-6600/DP-6500 is intended for use in an electromagnetic environment in which radiated RF disturbance are controlled. The customer or the user of DP-6600/DP-6500 can help prevent electromagnetic interference by maintaining a minimum distance between portable and mobile RF communication equipment (transmitters) and DP-6600/DP-6500 as recommended below, according to the maximum output power of the communication equipment.

Rated Maximum Output power of Transmitter W (Watts)	**Separation Distance According to Frequency of Transmitter M (Meters)**		
	150kHz -80MHz $d = 3.5\sqrt{P}$	80MHz -800MHz $d = 1.2\sqrt{P}$	800MHz -2.5GHz $d = 2.3\sqrt{P}$
0.01	0.35	0.12	0.23
0.1	1.11	0.37	0.74
1	3.50	1.17	2.34
10	11.07	3.69	7.38
100	35.00	11.67	23.34

For transmitters at a maximum output power not listed above, the recommended separation distanced in meters (m) can be determined 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.

If DP-6600/DP-6500 image distortion occurs, it may be necessary to position DP-6600/DP-6500 further from sources of conducted RF noise or to install external power source filter to minimize RF noise to an acceptable level.

Note

At 80 MHz and 800 MHz, the separation distance for the higher frequency range applies.

Note

These guidelines may not apply in all situations. Electromagnetic propagation is affected by absorption and reflection from structures, objects and people.

23 Indication of Year of Manufacture

The year of manufacture is shown on the label attached on the system.