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DUS 60 VET

Veterinary Digital Ultrasonic Diagnostic Imaging System

Version 1.5

User Manual

CE

About this Manual

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Statement

This manual will help you understand the operation and maintenance of the product better. It is reminded that the product shall be used strictly complying with this manual. User's operation failing to comply with this manual may result in malfunction or accident for which the manufacturer can not be held liable.

Materials protected by the copyright law, including but not limited to confidential information such as technical information and patent information are contained in this manual, the user shall not disclose such information to any irrelevant third party.

The user shall understand that nothing in this manual grants him, expressly or implicitly, any right or license to use any of the intellectual properties of the manufacturer.

The manufacturer holds the rights to modify, update, and ultimately explain this manual.

Responsibility of the Manufacturer

The manufacturer only considers itself responsible for any effect on safety, reliability and performance of the equipment if:

Assembly operations, extensions, re-adjustments, modifications or repairs are carried out by persons authorized by the manufacturer, and

The electrical installation of the relevant room complies with national standards, and

The instrument is used in accordance with the instructions for use.

Terms Used in this Manual

This guide is designed to give key concepts on safety precautions.

WARNING

A **WARNING** label advises against certain actions or situations that could result in personal/animals injury or death.

CAUTION

A **CAUTION** label advises against actions or situations that could damage equipment, produce inaccurate data, or invalidate a procedure.

NOTE

A NOTE provides useful information regarding a function or a procedure.

The device is for veterinary use only, and the "**VETERINARY USE ONLY**" label is stuck to the device. Please follow the instruction.

Table of Contents

Chapter 1 Introduction

1.1. Features

The DUS 60 VET is a portable Veterinary Diagnostic Ultrasound System, which applies advanced technologies such as Phased Inversion Harmonic Compound Imaging (eHCI), Double-Beam-Forming (D Beam), Speckle Resistance Imaging (eSRI), Synthetic Receiving Aperture （SRA） and Spatial Compounding Imaging, etc. Various image parameter adjustments, 12.1 inch LCD and diverse probes are configured to provide clear and stable images.

Display modes:

B, 2B, 4B, B+M, M, and PW.

File management:

It supports local disk and removable disk storage. USB interface enables fast image uploading to your computer in the real-time mode. It has a 504 MB storage capacity.

Operation:

The folding keyboard designed with trackball is easy and convenient for various types of operation.

Generic Measurements and Calculations:

B Mode: Distance, Cir/Area (Ellipse/Trace), Volume, Ratio, % Stenosis, Angle, and Histogram.

M Mode: Distance, Time, Slope and Hear Rate.

PW Mode: Velocity, Heart Rate, Time, Acceleration, Resistance Index (RI), Auto (auto trace.

1.2. Intended Use/Indications for Use

The veterinary diagnostic ultrasound system (DUS 60 VET) is applicable for animal ultrasound evaluation in pet hospitals, veterinary clinics, animal farms, zoos, horse racing centers, and animal cultivation/breeding bases. It is intended for use by or on the order of a veterinarian or similarly qualified health care professional, in abdomen, obstetrics, muscle, tendon, cardiology, and vascular exams.

1.3. Model

DUS 60 VET

1.4. Contraindications

- The equipment is not applicable to the diagnosis of the pneumatic organs that contain gas such as lung, stomach, intestines, etc.
- It is recommended not to examine the parts with wounds or acute inflammation to avoid cross infection.
- The equipment is not intended for ophthalmic use or any use causing the acoustic beam to pass the eye.

1.5. General Safety Precaution Information

1.5.1. General Information

CAUTION

1. Federal (U.S.) law restricts this device to sale by or on the order of a veterinarian.
2. The pictures and interfaces in this manual are for reference only.

NOTE: This equipment is not intended for home use.

The reliability of the device and the safety of operators and patients are considered during product design and production. The following safety and preventive measures should be carried out:

WARNING

1. This equipment is not intended for treatment.
2. The diagnosis and examination function of the ultrasonic imaging management system should be integrated with clinical situation of animals, and the diagnostic results are only for veterinarian's reference.
3. The device should be operated by qualified operators or under their instructions.
4. The device should be operated appropriately to avoid mechanical damage to the transducer.
5. Do not alter parameters of the device at will. If it is necessary, please consult the manufacturer or authorized representatives for service.
6. The device has already been adjusted to its optimum performance. Do not adjust any presetting control or switch, unless it is listed in this manual.
7. If the device breaks down, please shut down the machine immediately and contact the manufacturer or authorized representatives.

8. Only accessories supplied or recommended by the manufacturer can be used, the battery and probes of the manufacturer can be only used on the manufacturer's systems. Otherwise, the performance and electric shock protection can not be guaranteed. If electrical or mechanical equipment from other companies need to be connected to the device, please contact the manufacturer or authorized representatives before connection.
9. EXPLOSION HAZARD-Equipment is not suitable for use in the presence of a flammable anesthetic mixture with air or with oxygen or nitrous oxide.
10. If the liquid crystal material leaks from the panel, it should be kept away from the eye or mouth. In case of contact with hands, skin or clothes, it has to be washed away thoroughly with soap.
11. Do not use in a wet environment or when the relative humidity exceeds 80%.
12. Use protective barriers (gloves and transducer sheaths) whenever possible. Follow sterile procedures when appropriate. Thoroughly clean Transducers and reusable accessories after each patient examination and disinfect or sterilize as needed. Refer to transducer use and care instructions. Follow all infection control policies established by your office, department or institution as they apply to personnel and equipment.
13. Not intended for Ophthalmic use.
14. If a sterile transducer cover becomes compromised during an intra-operative application involving a patient with transmissible spongiform encephalopathy, such as Creutzfeldt-Jakob disease, follow the guidelines of the U.S. Disease Control Center and this document from the World Health Organization: WHO/CDS/APH/2000/3, WHO Infection Control Guidelines for Transmissible Spongiform Encephalopathies. The transducers for your system cannot be decontaminated using a heat process.
15. Contact with natural rubber latex may lead to a severe anaphylactic reaction in persons sensitive to the natural latex protein, Sensitive users and patients must avoid contact with these items. The manufacturer strongly recommends that health-care professionals identify their latex-sensitive patients, and refer to the March 29, 1991 Medical Alert on Latex products. Be prepared to treat allergic reactions immediately.
16. This device is not suitable for intra-cardiac use or direct cardiac contact.
17. The system shall not be serviced or maintained while in use with a patient.
18. Install the system according the EMC guidance provided in Appendix IV.

19. The use of transducer and connecting cable not supplied by the manufacturer may result in increased emissions or decreased immunity of the equipment.
20. No modification of this equipment is allowed.
21. The system should be maintained regularly, at least annually, by a qualified technician who has adequate training, knowledge and experience. That person should be familiar with the Service Manual, available from representative of the manufacturer.
22. The appliance coupler or mains plug is used as isolation means from supply mains. Position the system in a location where the operator can easily access the disconnection device.
23. Do not use a battery that leaks, emits an odor, appears deformed, or discolored. Immediately replace it with a new manufacturer -supplied battery and dispose of the old battery according to local regulations. Replace a battery that has reached the end of its service life.

1.5.2. Biohazard Considerations

WARNING

1. This device is not suitable for intracardiac use or direct cardiac contact.
2. The manufacturer makes every effort to manufacture safe and effective probes. You must take all necessary precautions to eliminate the possibility of exposing patients, operators, or third parties to hazardous or infectious materials. These precautions should be considered in the use of any application that may indicate the need for such care, and during endocavity scanning.

Ultrasound may be harmful to human body. This device should be used for valid reasons, for the shortest period of time, and at the lowest mechanical and thermal indices necessary to produce clinically acceptable images. According to the ALARA (As Low As Reasonably Achievable) principles, acoustic output should be set to the lowest level required to satisfactorily perform the examination. Long time exposure should be avoided. For the parameters of sound output, please refer to appendix II.

The DUS 60 VET complies with the requirements of applicable International Electrotechnical Commission (IEC) standards in terms of safety and acoustic output levels.

1.5.3. Electrical Safety

WARNING

1. If you have any questions about the grounding connection, use the battery but not the AC power supply.
2. To ensure grounding reliability, only connect the system to a hospital-grade power receptacle.
3. The AC power connector plug for the ultrasound system is a three-prong grounded plug and should never be adapted to any two-prong (non-grounded) outlet, either by modifying the plug or by using an adapter.
4. To avoid electrical shock, never modify the ultrasound system's AC power circuits. To ensure grounding reliability, connect the system only to an equivalent outlet.
5. SHOCK HAZARD-Do not attempt to connect or disconnect a power cord with wet hands. Make certain that your hands are clean and dry before touching a power cord.
6. No user serviceable parts are inside the system. All repairs on the system must be performed by the manufacturer certified service personnel.
7. The equipment should be installed by a qualified service engineer. Do not try to access the interior of the main unit. Only authorized service personnel could remove the unit cover.
8. Before use, you must make sure that there is no visible evidence of damage on the equipment, cables and probes, which may affect patient safety or diagnostic capability. The recommended inspection interval is once per week or less. If damage is evident, replacement is recommended before use.
9. Equipment connected to the DUS 60 VET and located in the patient vicinity must be powered from a medically-isolated power source or must be a medically-isolated device. Equipment powered from a non-isolated source can cause your system to exceed leakage current limits. Enclosure leakage current created by an accessory or device connected to a non-isolated outlet may add to the enclosure leakage current of the imaging system.
10. Use an extension cord or multi-socket outlet setup to provide power to the ultrasound system or to the system's peripheral devices, may compromise the system grounding and cause your system to exceed leakage current limits.
11. To avoid electrical shock and damage to the system, turn off and disconnect the device from the AC power source before cleaning and disinfecting.

12. When more than one medical device is connected to the patient, leakage current of the devices is summed together. Take caution.
13. Don't touch the signal input or output connector and the patient simultaneously.
14. Periodically have the integrity of the system ground checked by a qualified service engineer.
15. To avoid the possibility of electrostatic shock and damage to the system, avoid using aerosol spray cleansers on the monitor screens.
16. Do not touch the connector pins on the transducer port.
17. Parts and accessories used must meet the requirements of the applicable IEC/EN60601 series safety standards, and/or the system configuration must meet the requirements of the IEC/EN60601-1.
18. Do not touch accessible parts of non-medical electrical equipment and the patient simultaneously.
19. Any non-medical equipment (such as the external printer) is not allowed to be used within the patient vicinity (1.5m/6ft.)
20. Use an extension cord or multi-socket outlet setup to provide power to the ultrasound system or to the system's peripheral devices, may compromise the system grounding and cause the system to exceed leakage current limits.
21. It is not suggested to use a multiple socket-outlet with the device, if have to, make sure that the multi-socket complies with the requirement specified in Chapter 16 of IEC 60601-1:2005, or the multi-socket is with an isolation transformer. And the multi-socket shall not be placed on the floor.
22. SHOCK HAZARD - Don't connect electrical equipment, which has not been supplied as a part of the system, to the multiple portable socket-outlet supplying the system.
23. SHOCK HAZARD - Don't connect electrical equipment, which has been supplied as a part of the system, directly to the wall outlet when the non-medical equipment is intended to be supplied by a multiple portable socket-outlet with an isolation transformer.

CAUTION

1. Do not spray cleansers on the system, as this may force cleaning fluid into the system and damage electronic components. It is also possible for the solvent fumes to build up and form flammable gases or damage internal components.
2. Do not use any fluid onto the system surface, as fluid seepage into the electrical

circuitry may cause excessive leakage current or system failure.

3. To ensure proper grounding and leakage current levels, it is the policy of the manufacturer to have an authorized representative or an approved third party to perform all on-board connections of documentation and storage devices to the DUS 60 VET.

4. The device and accessories are to be disposed of according to local regulations after their useful lives. Alternatively, they can be returned to the dealer or the manufacturer for recycling or proper disposal. Batteries are hazardous waste. Do not dispose them together with house-hold garbage. At the end of their life hand the batteries over to the applicable collection points for the recycling of waste batteries. For more detailed information about recycling of this product or battery, please contact your local Civic Office, or the shop where you purchased the product.

5. Please use the standard power cord as the input line of the network power supply for the adapter to reduce risk.

6. Excessive dust and dirt could clog internal airflow and cause overheating. Do not use in a dusty environment.

7. Do not use in locations subject to vibration.

8. The system generates radio frequency energy, which may cause interference with other devices in the vicinity. If interference is suspected, try re-orienting or relocating the equipment.

9. The use of electrosurgical units or other devices that generate radio frequency interference may cause image distortion or other malfunction.

10. Verify measurement results prior to entering them into a report.

11. Contact your local distributor or service of the manufacturer if there is excessive noise from the system speaker or fans.

12. Please read and understand cleaning instructions prior to use.

13. Please read and understand maintenance instructions prior to use.

14. Please read and understand instructions for system operation prior to use.

15. Ensure that the system vents are clear and unobstructed.

16. Confirm patient identification information prior to storing or printing any exam information.

17. If you have any questions about maintenance, technical specifications, or system functionality, please contact your local distributor or service of the manufacturer.

18. Ultrasound images occasionally have artifacts, and should only be used as one part of an overall clinical assessment.
19. To avoid electrical shock, turn off and disconnect the device from the AC power source before cleaning and disinfecting.

NOTE:

The probe stops transmission after freezing, disconnecting, falling off, or entering sleeping mode. Main control software checks the probe connection all the time, once probe disconnects from the probe socket, the system stops transmission.

Electromagnetic Compatibility (EMC)

Operating the DUS 60 VET in close proximity to sources of strong electromagnetic fields, such as radio transmitter stations or similar installations may lead to interference visible on the monitor screen. However, the device has been designed and tested to withstand such interference and will not be permanently damaged.

EMI Limitations

Ultrasound machines are susceptible to Electromagnetic Interference (EMI) from radio frequencies, magnetic fields, and transients in the air of wiring. Ultrasound machines also generate EMI. The DUS 60 VET complies with limits as stated on the EMC label. However, there is no guarantee that interference will not occur in a particular installation.

Possible EMI sources should be identified before the unit is installed.

Electrical and electronic equipment may produce EMI unintentionally due to one of the following defects:

- High frequency electrotome
- Transformer
- Defibrillator
- Wireless LAN equipment
- Medical lasers
- Scanners
- Cauterizing guns
- Computers
- Monitors
- Fans
- Gel warmers
- Microwave ovens

- Light dimmers
- Portable phones

The presence of a broadcast station or broadcast van may also cause interference.

If you find strong interference shows on the screen, please check the sources.

1.5.4. Battery Safety

To prevent the battery from igniting, emitting fumes, bursting, injuring personal, damaging equipment, pay attention to the following precautions.

WARNING

1. Do not expose the battery to temperatures above 60 °C, or leave the battery in strong and direct sunlight.
2. Do not charge the battery near heat sources, such as a fire, heater, or direct sunlight.
3. If the battery leaks or emits an odor, remove it from all possible flammable sources.
4. The battery has a safety device. Do not disassemble or alter the battery.
5. Do not heat the battery or discard it in fire.
6. Do not solder the battery.
7. The polarities of the battery terminals are marked near the connector, do not connect or storage them with a metal material.
8. Do not connect the battery to the electrical power outlet.
9. Keep the battery away from fire and other heat sources.
10. Do not use a damaged battery.
11. Do not put the battery into a microwave oven or pressurized containers.
12. If the battery emits heat or an odor, is deformed, or in any way appears abnormal during use, recharging or storage, immediately remove it and stop using it. If you have any questions about the battery, consult the manufacturer or your local representatives.
13. If the show date/time of the system is incorrect, or the show date/time needed to be reset every time after powering the system, please replace the battery. If the battery still can not work normally, contact the manufacturer for service.
14. Only use an manufacturer supplied battery. Read and understand the battery installation instructions prior to changing the battery.

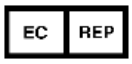
CAUTION

1. Do not force the battery into the system.
2. Do not immerse the battery into water or allow it get wet.
3. Please recharge the battery every month if the battery is to remain idle for a long time.
4. Do not pierce the battery with sharp objects, or hit it.
5. Charge the battery between 0 °C and 40 °C and store it between -20 °C and 60 °C, which affects battery life.
6. Only use the battery and charge the battery with the manufacturer's equipment, and charge the battery with the system.
7. To avoid the possibility of electrostatic shock and damage to the battery, avoid using the battery near the place where may cause static.
8. Prevent the battery from children.
9. Do not touch the battery's leaks that may make you uncomfortable. If the leaks go into eyes, do not knead eyes, but wash with clean water and send to hospital immediately.
10. Only use the battery with the DUS 60 VET system.

1.6. Labeling Symbols

Descriptions of symbols of the device are shown in table 1-1.

No.	Symbol	Definition
1	SN	Serial Number
2	P/N	Part Number
3		Date of Manufacture
4		Manufacturer
5		Operating instructions
6		Warning (Background: Yellow; Symbol & outline: Black)
7		Refer to User Manual (Background: Blue; Symbol: White)

8		Caution
9		Biological Risks
10		Disposal method. It indicates that the equipment should be sent to special agencies according to local regulations for separate collection after its useful life.
11		General Symbol for Recovery / Recyclable
12	Rx only	Caution: Federal (U.S.) law restricts this device to sale by or on the order of a veterinarian.
13		Authorized Representative in the European Community
14		CE marking
15		Type B Applied Part
16		Alternating Current (a.c.)
17		ON (AC power supply)
18		OFF (AC power supply)
19		Equipotentiality
20		VGA output, External Monitor
21		S-Video/ Video output port
22		Fuse
23		Probe socket
24		Computer network
25		Foots witch To identify a footswitch or the connection for a footswitch.
26		Protective earth (ground)
27		Recording on an information carrier
28		USB (Universal Serial Bus) Connection
29		Dangerous voltage
30		Variability, for rotating movement Rotate clockwise to increase the value, and counterclockwise to decrease.

31		Variability Adjust right to increase the value, and left to decrease.
32		Variation of ultrasound energy To adjust acoustic power(reserved)
33		Electric energy
34		Battery check
35	IPX7	Degree of protection provided by enclosures (IP Code): temporary immersion. For the probe but not including the probe connector.
36		Power off/on the system
37		Brightness
38		Contrast
39		Sound muting
40		Loudspeaker To adjust volume in PW mode

NOTE: The user manual is printed in black and white.

Table 1-1 Descriptions of Symbols

Chapter 2 System Overview

2.1. Appearance

2.1.1. Front View

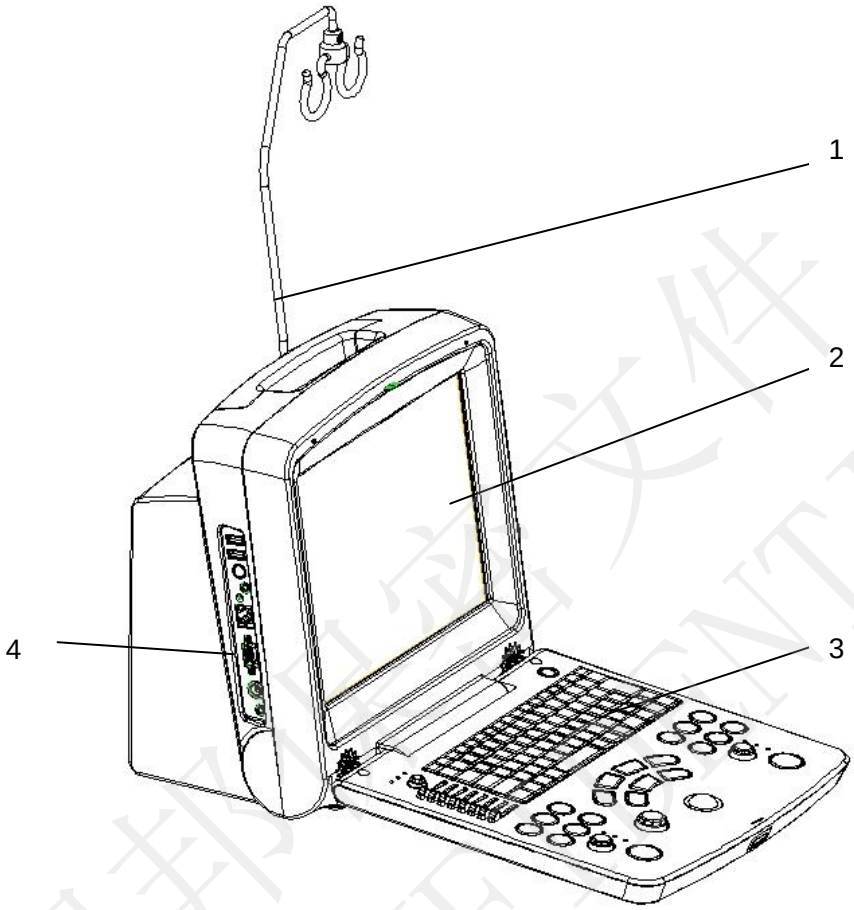


Figure 2-1 Front View

1. Cable holder
2. Display screen
3. Control panel
4. I/O ports

2.1.2. Rear View

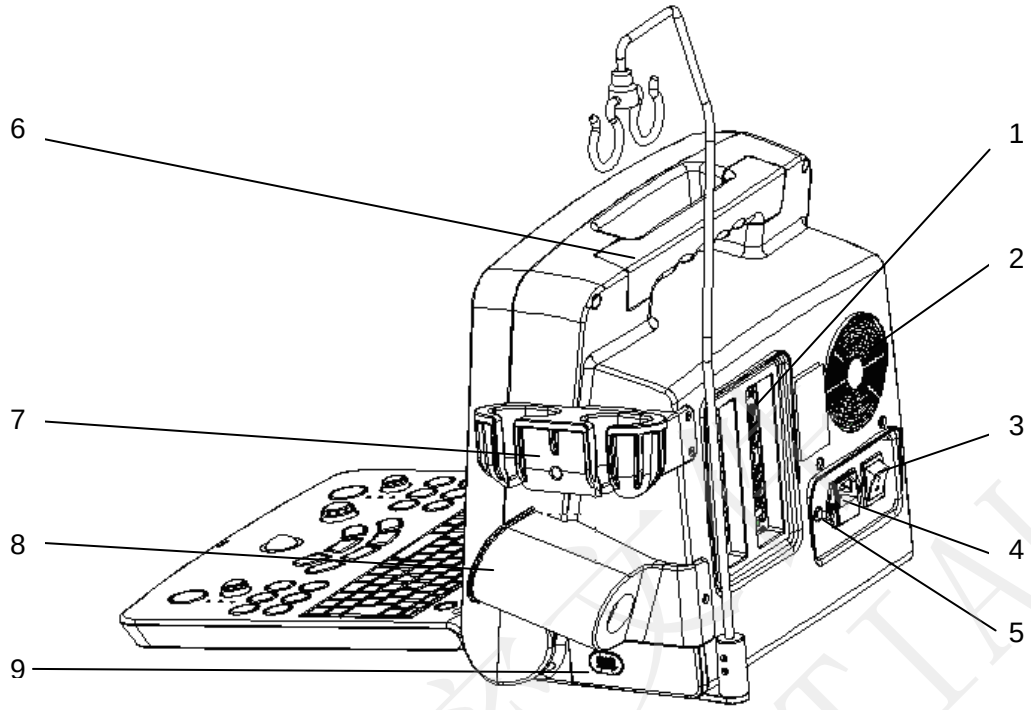


Figure 2-2 Rear View

1	Probe sockets
2	Air Fan
3	AC power switch
4	Appliance inlet
5	Equipotential terminal
6	Handle
7	Probe holder
8	Coupling gel trough
9	Rechargeable lithium battery

CAUTION

1. To have good aeration performance and be able to operate normally, please don't cover or plug the air fan or heat dissipation orifice partly or wholly by using any object.
2. For easy control, please don't cover or block the AC power switch using any object.

2.2. Configuration

2.2.1. Standard Configuration

- 1 DUS 60 VET main unit
- 1 power cord
- 1 potential equalization conductor
- 1 cable holder
- 2 pieces of fuse, φ5×20, T3.15AH250V
- 2 Netac U disks, U208 (4G)
- 1 bottle of coupling gel, 250 mL
- 1 Certificate of approval
- 1 Quick reference card
- 1 user manual
- 2 packing lists

2.2.2. Options

The Digital Ultrasonic Diagnostic Imaging System supports the following options:

- Linear array probe: L761-2, L743-2, VL8-3WD
- Convex probe: C361-2
- Endocavity probe: V563-2
- Micro Convex probe C321-2, C611-2
- Ultrasonic Imaging Management System UMS 100
- Printers are as shown below.

Printer Type	Interface	Recommended Models
Black /white Video Printer	Video	SONY UP-897MD, MITSUBISHI P93W_Z
	USB	SONY UP-D897, SONY Up-D898MD
	Video	SONY UP X898MD
Color Video Printer	S-Video	SONY UP-20
	USB	SONY UP-D25MD

Graph/text Report Printer	USB	Color Inkjet printer: HP2010, HP Deskjet 1010, HP Laserjet 1510 Color laserjet printer: HP CP1525n, HP Laserjet Pro 400 M401d, HP DeskJet lnk Advantage Ultra 2029, HP DeskJet 1112, HP M403D

Table 2-1 Printers

The video printer output:

Color: Paper size: 100mm*94mm; Print area: 96mm*72mm

B/W: Paper size(general display: only one page): 110mm*100mm； Print area 99mm*74mm

The USB printer output: A4 paper, 210 mm×297 mm;

Digital graphic printer110mm×18m

- Needle Guide Bracket Kit

Model	**Name**	**Description**
BGK-CR60	Needle Guide Bracket Kit	For C361-2, 4 vessels: 14G, 18G, 20G, 22G
BGK-LA43	Needle Guide Bracket Kit	For L743-2, 4 vessels: 14G, 18G, 20G, 22G
BGK-LA70	Needle Guide Bracket Kit	For L761-2, 4 vessels: 14G, 18G, 20G, 22G
BGK-MCR10	Needle Guide Bracket Kit	For C611-2, 4 vessels: 14G, 18G, 20G, 22G
BGK-CR20	Needle Guide Bracket Kit	For C321-2, 4 vessels: 14G, 18G, 20G, 22G

Table 2-2 Needle Guide Bracket Kit

- Freeze footswitch
- Mobile trolley MT-805
- Hand carried bag/Luxury hand carried bag
- Dustproof cloth
- Rechargeable lithium-Ion battery
- Hard disk kit
- DICOM 3.0
- USB mouse

Chapter 3 Transportation and Storage

3.1. Moving the System

The system is designed to be portable and easily transported. Power off the system and secure all accessories before moving it to another location.

CAUTION

1. Switch off the ultrasound system. Unplug the power cord from the power source and secure the power cable.
2. Put the probes in the probe holder, or remove them and place them in the protective carrying cases.
3. Disconnect and secure the footswitch and the connecting cable.
4. Raise the brakes away from the front and back caster wheels.
5. Push the handle to roll the system forward and maneuver it to its new location and lock the wheel caster brakes.
6. Connect optional system accessories, such as the single-pedal footswitch.
7. Secure the system and complete the system setup, and then perform all the daily checking before using it.

3.2. Storage

- Do not place the device near the ground, walls or the roof.
- Keep good indoor ventilation. Avoid strong and direct sunlight, and erosive gas.

3.3. Transportation

To prepare the system for shipment over long distances or rough terrain, repack the system in the factory packing

To prepare the system for transport over distances: load the system into a vehicle using a lift gate.

To prevent lateral movement of the system, secure the system with cargo straps. To prevent sudden jarring of the system during transport, provide anti-shock cushions beneath the system.

It is suitable for transportation by air, railway, highway and ship. Protect the system from inversion, collision, and splashing with rain and snow.

Chapter 4 Installation Instructions

4.1. Environmental Requirements

Keep the device away from equipment with strong electric field, strong magnetic and high voltage field, and protect the display screen from direct exposure to strong sunlight. Keep good ventilation.

4.2. Unpacking Inspection

Visually examine the package prior to unpacking. If any signs of mishandling or damage are detected, contact the carrier to claim for damage. After unpacking the device, you should follow the packing list to check the product carefully and to make sure that no damage has occurred during transportation. Then, install the device according to the installation requirements and methods.

WARNING

1. Do not use the device if it is found to be damaged or defective.
2. Do not drop or collide with the probe. Otherwise you shall give up using it.

4.3. Connecting Procedure

1. Take the main unit and accessories out from the package.
2. Connect the cable holder and battery (if it is configured) to the main unit correctly.
3. Connect the probes to the main unit correctly.
4. Connect the printer and load the recording paper.
5. Connect the power cable
   1) Connect the main unit and the common earth terminal firmly via a potential equalization conductor.
   2) Plug one end of the power cable to the power socket of the main unit, and the other end to the special power output socket of the hospital.
6. Switch on the main unit.

   Press power switch on the rear side of the main unit, and press the power on/off key on the top right of the control panel. You can operate the main unit after the main interface appears.

4.3.1. Installing and Uninstalling a Cable Holder

To install the cable holder:

1. Take out the cable holder, three screws (M3×12) and packing foam from the package.
2. To avoid scraping the main unit, put one piece of packing foam on a flat ground.
3. Carefully turn the main unit upside down and put it on the packing foam and assemble the screws to the main unit with a cross-head screw driver as shown in figure 4-1.
4. Carefully turn the main unit with a cable holder to the normal state as shown in figure 4-2.

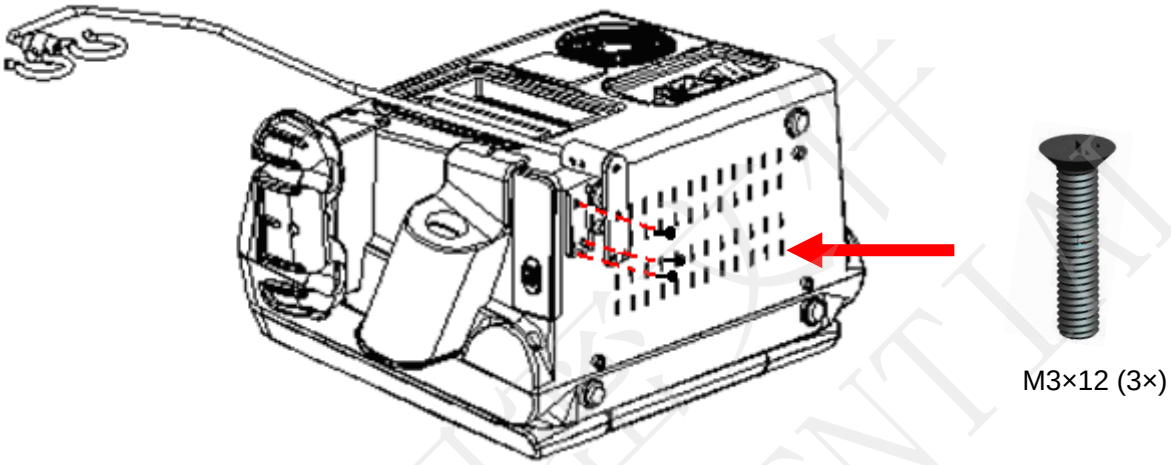


Figure 4-1 Assembling Cable Holder to Main Unit

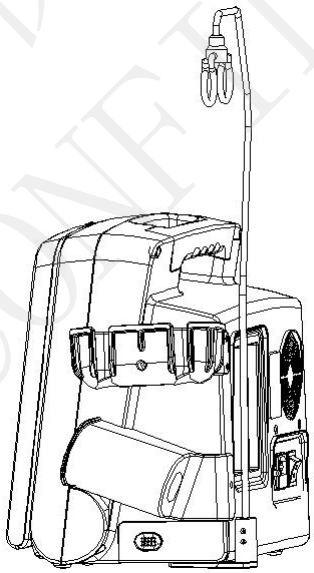


Figure 4-2 Main Unit with Cable Holder

To uninstall the cable holder:

Uninstall the cable holder in a reverse procedure.

4.3.2. Installing and Uninstalling a Battery

To install a battery (if necessary):

1. Take out the battery from the package.
2. Press the button on the battery cover and pull the cover out.
3. Turn the flicker counterclockwise to hide it and push the battery into place.
4. Turn the flicker clockwise to keep the battery in place.
5. Replace the battery cover.

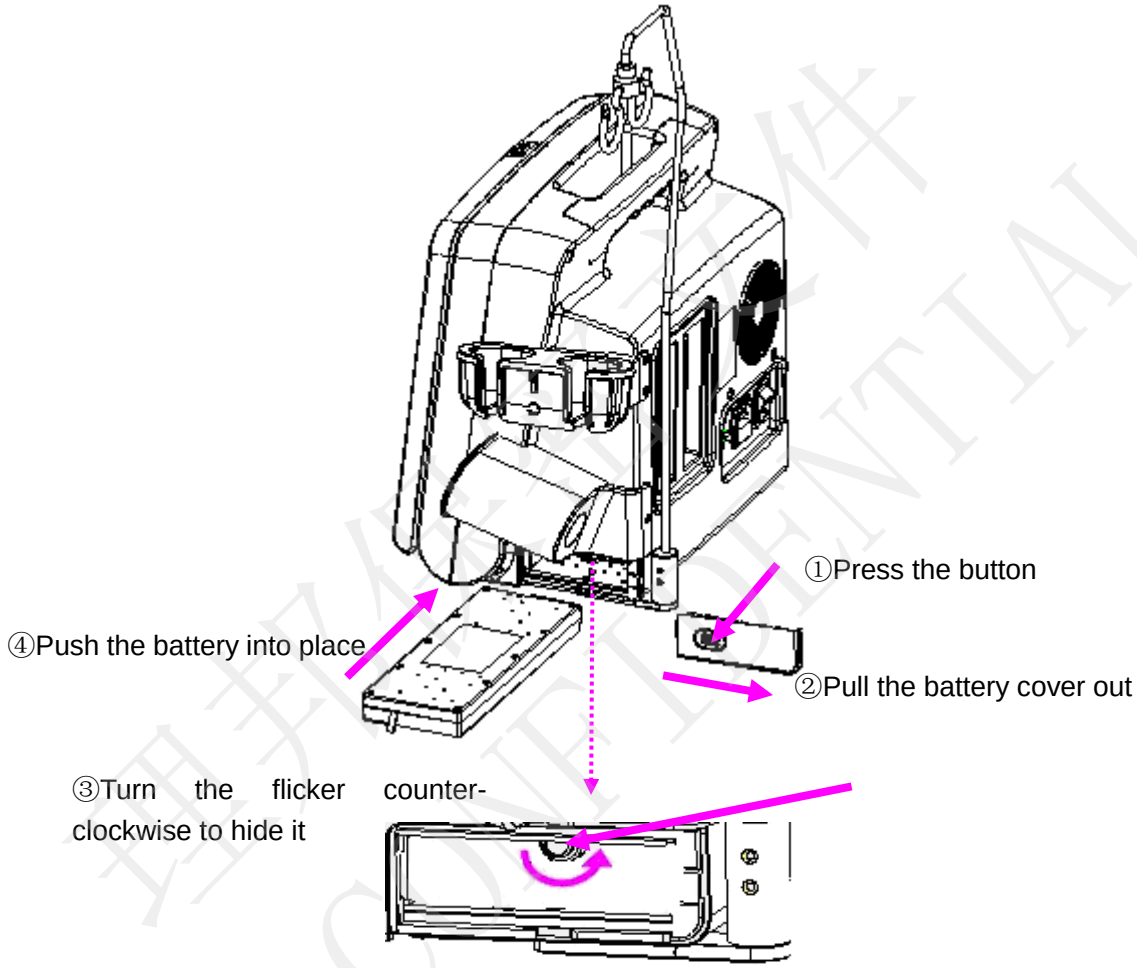


Figure 4-3 Installing Battery to Main Unit

To uninstall a battery:

1. Press the button on the battery cover and pull the cover out.
2. Pull the flicker counterclockwise to hide it.
3. Pull the battery out.
4. Replace the battery cover.

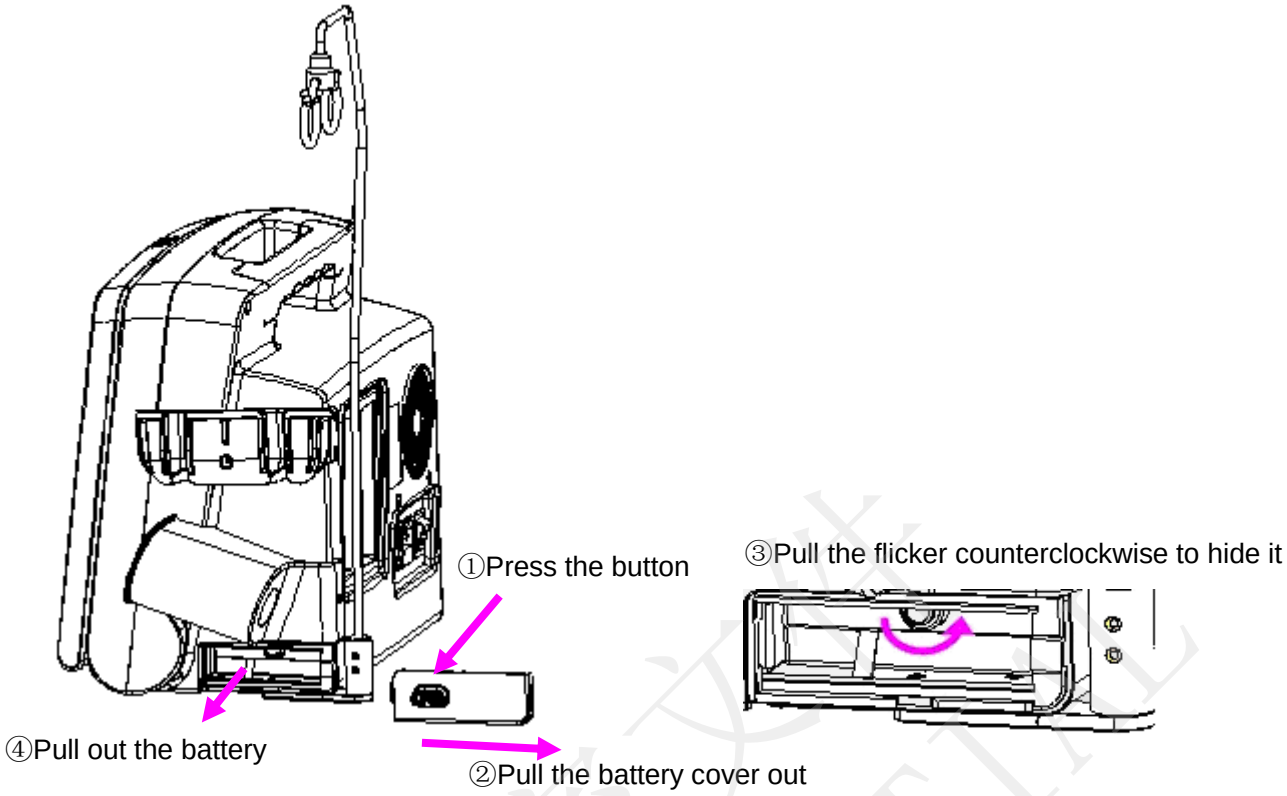


Figure 4-4 Uninstalling Battery from Main Unit

4.3.3. Connecting and Disconnecting Probes

NOTE:

Ensure that the system is shut down before connecting and disconnecting probes.

Flip images horizontally to change the scan direction or vertically to change the image orientation. The scan direction mark located at the side of probe indicates the beginning direction of scanning. The scan direction mark is shown below.

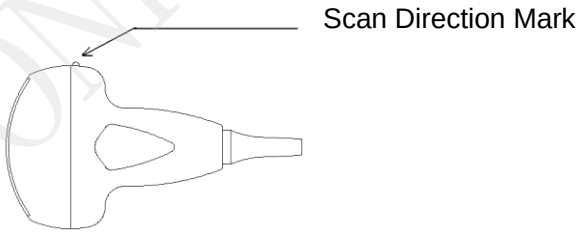


Figure 4-5 Probe Scan Direction Mark Schematic Diagram

There is information about Model and SN on the probe connector.

To connect a probe:

1. Place the probe's carrying case on a stable surface and open the case.
2. Carefully remove the probe and unwrap the probe cable.
3. Do not allow the probe head to hang free. Impact to the probe head could result in irreparable damage.

4. Turn the connector locking handle to the **OPEN** position.
5. Align the connector with the probe port and carefully push into place.
6. Turn the locking handle on the probe connector clockwise to **LOCK** position. This ensures the connector in position and ensures the best possible contact.
7. Place the probe in the probe holder.

To disconnect a probe:

1. Turn the locking handle on the connector housing counterclockwise to the **OPEN** position.
2. Firmly grasp the probe connector and carefully remove it from the system port.
3. Store each probe in its protective carrying case.

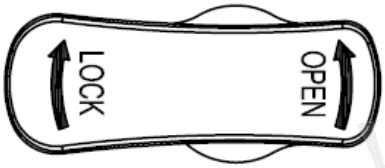


Figure 4-6 Lock and Open Marks on Probe Connectors

WARNING

Do not touch the pin of probe connector.

CAUTION

Do not plug in or pull out the connector when the device is activated. This is to avoid uncontrollable damage to the probe and the main unit.

NOTE:

Once the probe is connected to the main unit, please do not reinstall it frequently. This is to avoid poor contact between the probe and the main unit.

4.3.4. Peripheral Connections

Video connections are located on the left panel of the DUS 60 VET.

WARNING

Accessory equipment connected to the analog and digital interfaces must be certified according to the respective IEC/EN standards (e.g. IEC/EN 60950 for data processing equipment and IEC/EN 60601-1 for medical equipment). Furthermore, all configuration shall comply with the valid version of the standard IEC/EN 60601-1-1. Therefore, anybody, who connects additional equipment to the signal input or output connector to configure a medical system, must make sure that it complies with the requirements of the valid version of the system standard IEC/EN 60601-1-1. If in doubt, consult our technical service department or your local distributor.

CAUTION

To ensure proper grounding and leakage current levels, it is the policy of the manufacturer to have an authorized representative or approved third party perform all on-board connections of documentation and storage devices to the DUS 60 VET.

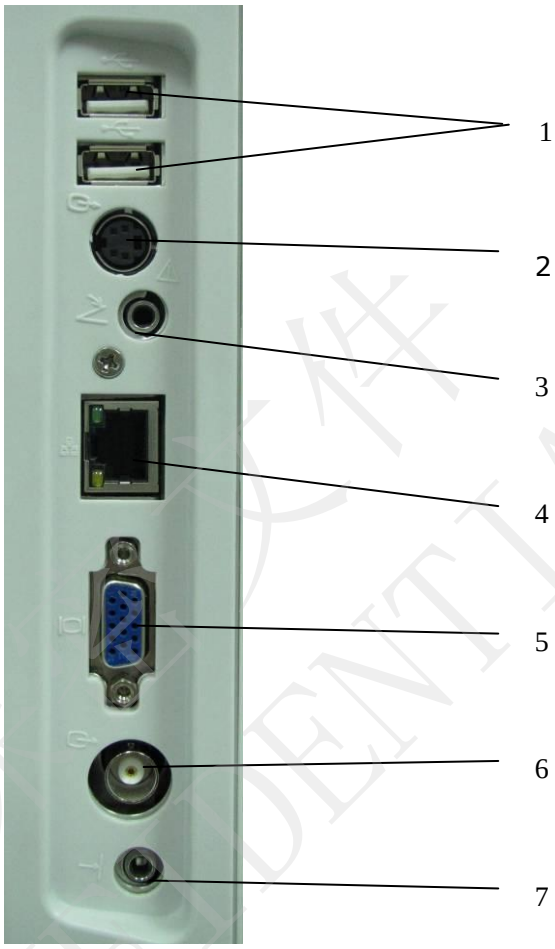


Figure 4-7 Ports on the Left Panel

Peripheral ports:

1	USB port	5	VGA output port（15pin）
2	S-Video output port	6	Video output port
3	Footswitch port	7	Video print control port
4	Network port（DICOM 3.0）		

4.3.5. Equipotential Bonding

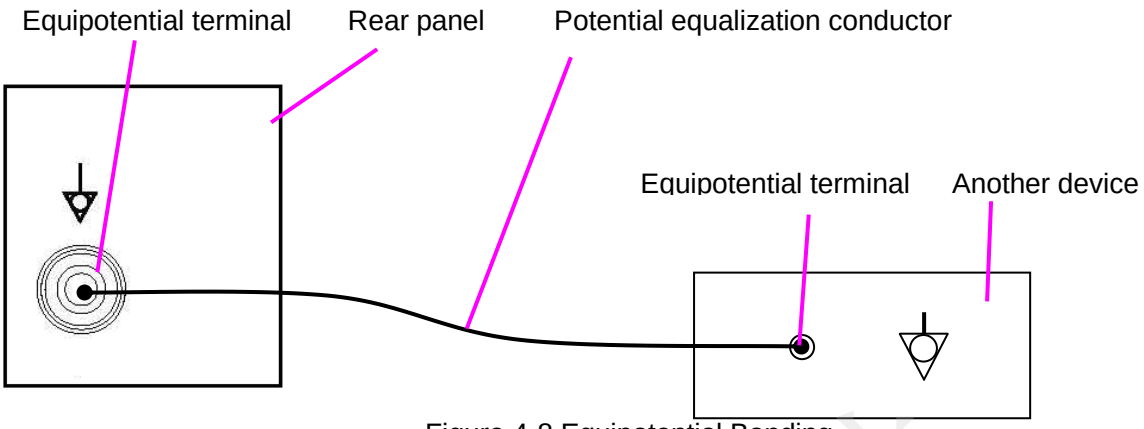


Figure 4-8 Equipotential Bonding

Any use of other devices with the system is at the user's risk and may void the system warranty. In order to fulfill IEC/EN 60601-1-1 requirements, connections of peripheral equipment to the DUS 60 VET must adhere to one of the following conditions:

- The peripheral equipment itself is a medical device approved according to IEC/EN 60601-1.
- Non-medical peripheral equipment approved according to any other EN or IEC standard must use the following setup for connection:
  - Connect the equipotential connector of DUS 60 VET to an independent protective earth terminal with a potential equalization conductor.
  - The peripheral equipment is located at least 1.5 meters (1.8 meters in Canada and the U.S.A) outside the patient environment. A patient environment is defined as the area in which medical examination, monitoring, or treatment of the patient takes place.
  - The peripheral equipment is connected to a main outlet outside the patient environment but still within the same room as the ultrasound system.

WARNING

1. Equipotential bonding: when the device is running with other instruments jointly, consideration should be given to equipotentiality.
2. Doctors and patients might be exposed to the hazardous and uncontrollable effects of compensating current caused by unbalanced equipotentiality between indoor medical device and touchable conducting parts. The safest solution is to build a unified equipotential network, to which the medical device is connected, using an angular plug.

4.3.6. Printer Installation

This system supports video printers and USB printers.

To install a video printer:

1. Power off the main unit and the printer.
2. Connect the VIDEO IN (video input) of the video printer with the VIDEO OUT (video output) of the main unit.
3. Connect the REMOTE of the video printer with the REMOTE of the main unit.

 Reference Figure 4-7 I/O Ports on the Left Panel

4. Power on the main unit and run the printer.

NOTE:
The video printers are used in patient vicinity.

To install an USB printer:

1. Power off the main unit and the printer.
2. Connect the printer with the main unit by using a USB cable.
3. Power on the main unit and run the printer.

If the printer can not work normally, check the printer presetting, see Section *5.7.3, General Presetting*.

NOTE:

1. Multiple portable socket-outlet is not intended for the device, anybody, who connects it to the signal input or output connector to configure a medical system, must make sure that it complies with the requirements of the valid version of the system standard IEC/EN 60601-1-1. If in doubt, consult our technical service department or your local distributor.
2. If you want to use a multiple portable socket-outlet to supply power to the whole DUS 60 VET system, you are suggested to calculate the system power consumption when building a DUS 60 VET system so as to match the system power consumption with the power sustained by a multiple portable socket-outlet.

4.3.7. Installing a Needle Guide

To install the needle guide of convex probes:

1. Align the locating pin of the needle guide with the locating groove of the probe, align the clamp of the needle guide with the locating groove of the probe to click.
2. Tighten the needle guide with the probe via the knob.
3. Insert the needle along the guide hole.

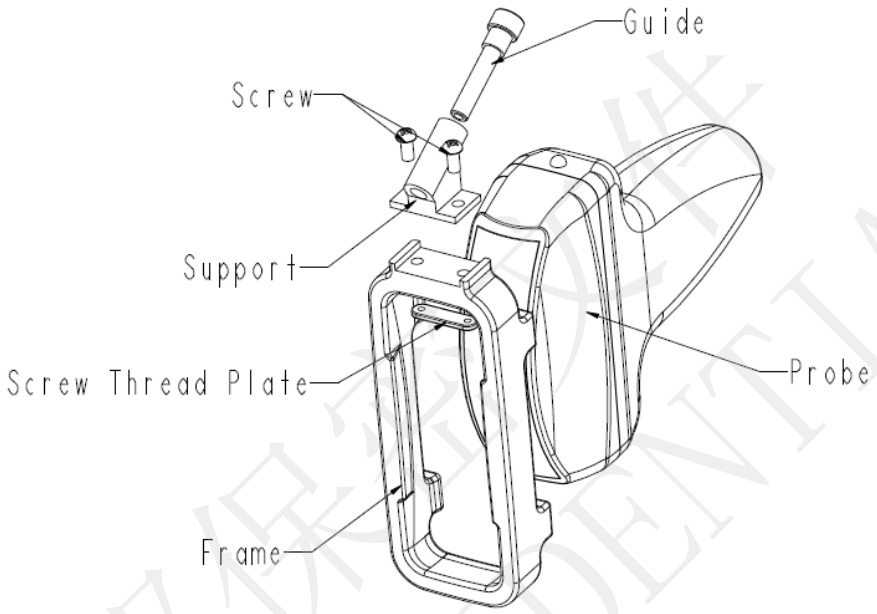


Figure 4-9 Parts of Needle Guide of Convex Probe

To install the needle guide of linear probes:

1. Align the locating pin of the needle guide with the locating groove of the probe, align the clamp of the needle guide with the locating groove of the probe to click.
2. Tighten the needle guide with the probe via the screws and the thread knob.
3. Insert the needle along the guide hole.

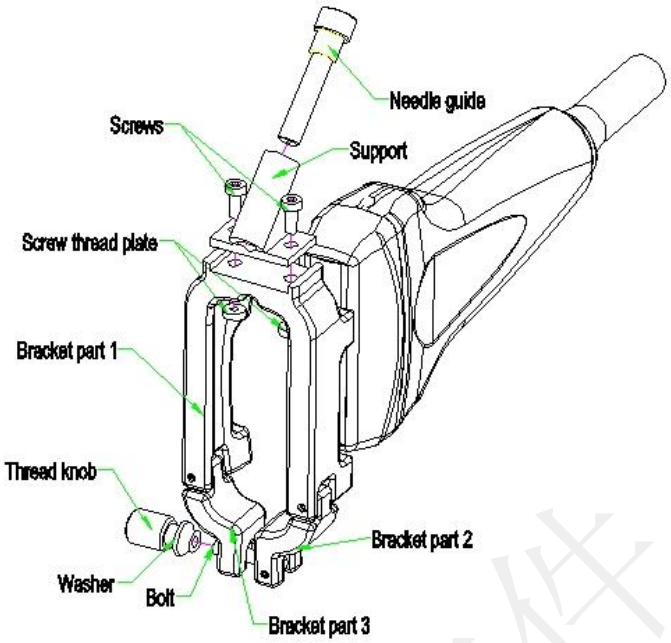


Figure 4-10 Parts of Needle Guide of Linear Probe

Chapter 5 System Control

5.1. Powering On/Off Device

◆ To power on the device

Before powering on this device, check as below:

1. Check the potential equalization conductor and make sure it is connected properly.
2. Check all the cables and make sure there is no scrape or crack.
3. Check the control panel and the monitor and make sure there is no crack.
4. Check the probe and the connection and make sure there is no scrape or crack.
5. Check the power socket and the switch and make sure there is no damage.

To power on:

1. Connect the device to a standard three-pin power supply socket via the power cable, switch on the AC power switch on the rear panel; Or

   Use the battery as the power supply.
2. Press the power on/off key on the top right control panel, and a startup interface appears.

◆ To shut down the device

1. Press the power on/off key on the keyboard and the system displays a confirm dialog box.
2. Select **Yes** to power off the system.

Or,

If the system breaks down, press the power on/off key on the keyboard for about six seconds to shut down the system directly.

NOTE:

Please unplug the AC power cord from the power socket and disconnect the battery if the device is to remain idle for a long time.

CAUTION

1. You are forbidden to unplug or plug the power cord before switching off the system.
2. Wait approximately five seconds between powering the system off and then on again. This allows the system to complete its shutdown process.

◆ To restart the device

If there is any trouble described as below, please press the power on/off key to switch off the device and then press it again to restart the device.

- The device displays wrong information and it lasts a long time.
- The device displays abnormally.
- The device can not execute an operation.

5.2. Examining

Apply an appropriate amount of coupling gel (medical ultrasound coupling agent) to the body area to be examined, and then contact the area with the acoustic window of the probe firmly. A cross-sectional image of tissues will be displayed on the screen. Adjust **brightness**, **contrast**, **gain**, **TGC**, **dynamic range**, **focus combination**, etc properly. Adjusting the monitor's contrast and brightness is one of the most important factors for best image quality. If theses controls are set incorrectly, the **gain**, **TGC**, **dynamic range**, **focus combination** may have to be changed more often than necessary to compensate. Meanwhile, properly move the probe to obtain an optimal image of the target area. Or if necessary, adjust **sweeping speed** to get satisfying images in the M mode, and adjust **D gain**, **sample line**, **sample volume**, **base line**, **PW angle**, **filter**, **steer**, **PRF**, etc in the PW mode.

CAUTION

1. Please be gentle when contacting the target area with a probe. This is to avoid making the probe damage or the animal disturbed.
2. Please choose a proper probe for the target area with an appropriate frequency to begin the diagnostic operation.
3. Adjust the gain knob slowly.

5.3. Screen Layout

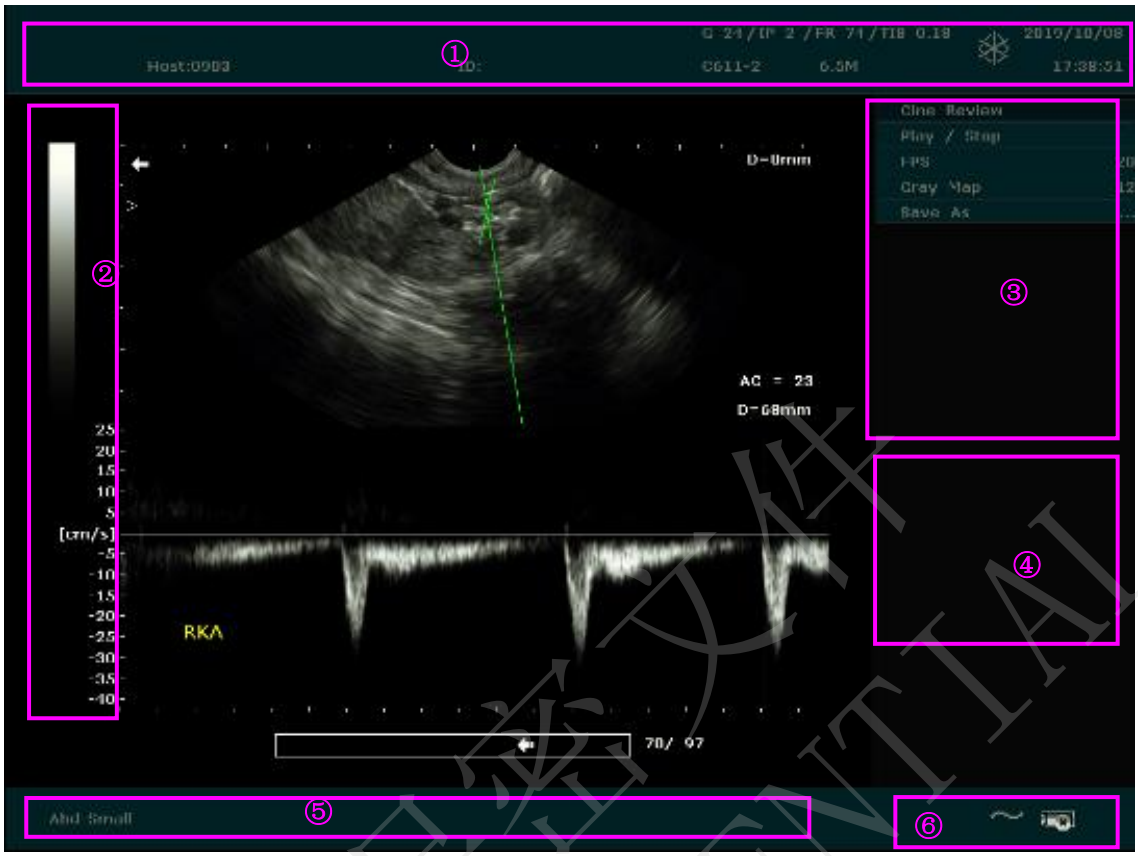


Figure 5-1 Typical Image Screen

①.Top status bar: logo image, hospital name, animal information, system date and time, major parameter such as, probe name, probe frequency, etc.
②.Gray map bar
③.System menu
④.Measurement result window
⑤.Bottom status bar: examination type, operation prompt, etc.
⑥.Bottom right corner: display the state of USB, input method, etc.

NOTE:

 : AC power supply, with battery connected;

 : AC power supply, without battery connected.

 : Battery power supply;

5.4. Control Panel

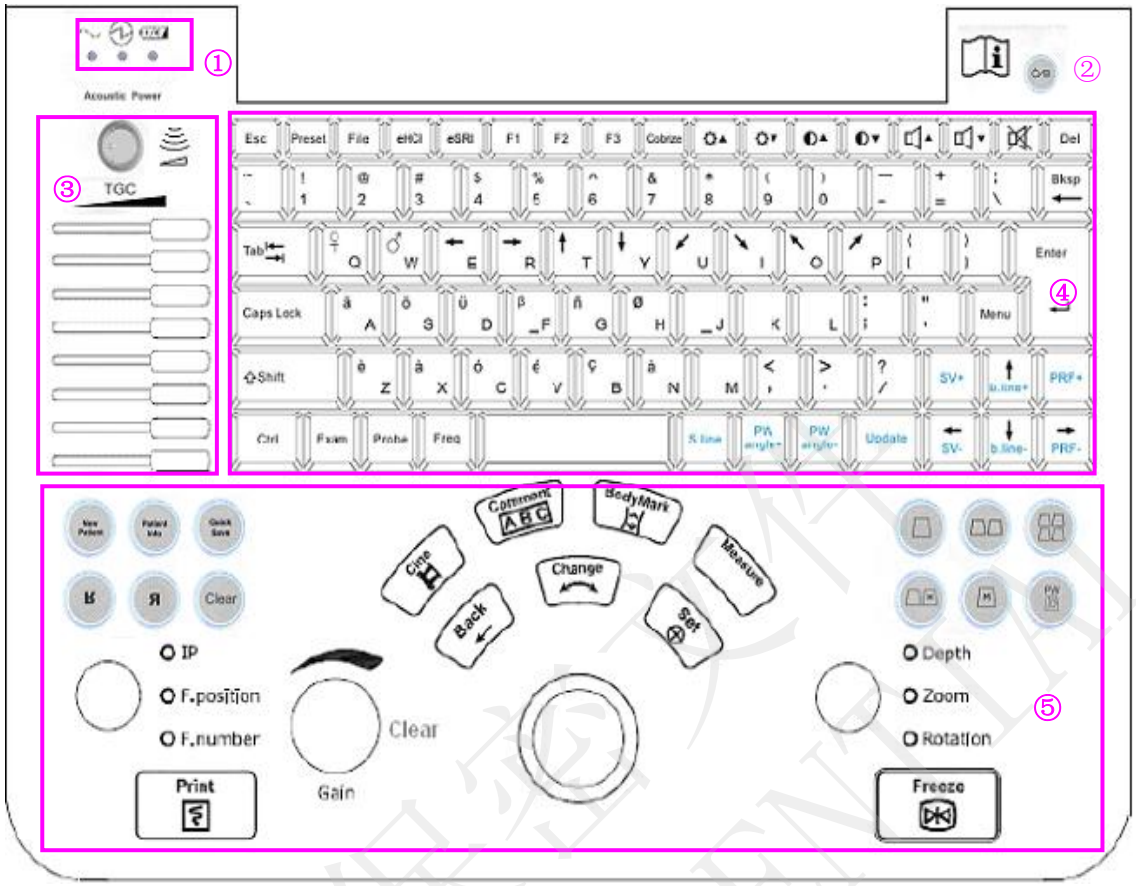


Figure 5-2 Control Panel

① Power/running indicator lights	② Power on/off key	③ Acoustic power adjusting knob(reserved) and TGC sliders
④ PC keyboard	⑤ Function controls	

5.4.1. Trackball

The trackball operation is easy and convenient. It can achieve the following functions:

- Move the measurement cursor during measurement.
- Move to select menu items in menu-based operations.
- Move the comment cursor in the comment status.
- Move the M Mark in the B/M mode.
- Move the sample line in the PW mode.
- Realize single frame playback in the frame-by-frame playback status.
- Move the zoomed window in the zoom status.

NOTE:

1. Please be gentle when running the trackball.
2. Please keep the surface of trackball clean.

5.4.2. "0~9" Numeric Keys

Numbers are used for time calibrating, data setting, age notating, and comment adding etc.

5.4.3. Alphabetic Keys

The system supports some language-specific characters through the use of SHIFT with a combination of keys on the keyboard. Press any of these keys in the annotation mode and the comment mode to display the corresponding character on the cursor position.

German Characters

Symbol	Key Combination
ä	SHIFT-A
ö	SHIFT-S
ü	SHIFT-D
β	SHIFT-F
ñ	SHIFT-G
ø	SHIFT-H

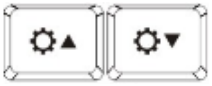
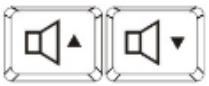
French Characters

Symbol	Key Combination
è	SHIFT-Z
à	SHIFT-X
ó	SHIFT-C
é	SHIFT-V
ç	SHIFT-B
å	SHIFT-N

Table 5-1 German and French Characters

5.4.4. Function Controls

Key	Description
TGC sliders	Glide the slide controls to adjust the TGC, glide the upper segments to adjust the near field gain, and the lower segments to adjust the far field gain; glide rightward to increase TGC, and glide leftward to decrease.
Esc	To escape
Preset	Preset key Press this to activate or to deactivate the preset function.  Reference Section *5.7, Presetting.*
File	File management key Press this key to enter or to exit the file management system.  Reference Section *6.8, File Management*.
eHCI	Phased Inversion Harmonic Compound Imaging Press this key to open the function of phased inversion harmonic

	compound imaging.
eSRI	Speckle Resistance Imaging Press this key to reduce noise and enhance image quality.
Colorize	Colorization key Press this key to colorize the image. Cobalt, Sage, Sepia, magenta, flame, tan, or gray.
	Brightness adjusting keys Press these two keys to adjust brightness. And the brightness symbol will be displayed at the bottom of the screen
	Contrast adjusting keys Press these two keys to adjust contrast. And the contrast symbol will be displayed at the bottom of the screen
	Volume adjusting keys Press these two keys to adjust volume in the PW mode. And the volume symbol will be displayed at the bottom of the screen
	Sound muting key Press this to close the loudspeaker in the PW mode. And the mute symbol will be displayed at the bottom of the screen
Space key	Space key Press this key in the annotation mode and comment mode to introduce a blank space on the cursor position.
Shift	Shift + Alphabetic key combination Press **SHIFT** and an alphabetic key corresponding to the language's special character.
Caps Lock	Alphabetic Shift key It is used to shift the characters between lowercase and uppercase.
Menu	Press this to display or to hide the menu.
Exam	Examine Menu key Press this key to display or to exit the examination type menu.
Probe	Probe Switch key Diverse probes are available for this device. Press this key to select a proper type of connected probe with the corresponding information in the top right corner.  Reference *Figure 5-1 Typical Image Screen*.
Freq	Frequency Shift Key Press this key to switch to the proper operating frequency for the activated probe. Three levels adjustable in basal wave, two levels adjustable in harmonious wave. When you change the frequency, the G (gain) will change simultaneously.

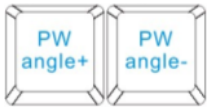
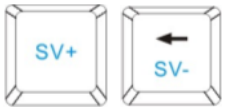
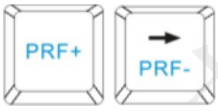
Enter	Entering key In annotation mode and comment mode, press this key to move the cursor to insert a blank line.
Del/Bksp	Delete key In annotation mode and comment mode, press one of these two keys to delete text word by word.
	Sample line adjusting key Press this to activate and adjust the sample line in the PW mode, and adjust M mark in the B+M mode.
	Angle adjusting keys Press these two keys to adjust the correction angle in the PW mode.
	In the PW mode, press this key to freeze or unfreeze the B mode image.
	Baseline adjusting keys Press these two keys to adjust the baseline in the PW mode.
	Sample volume adjusting keys Press these two keys to adjust the sample volume in the PW mode.
	PRF adjusting keys Press these two keys to adjust the PRF (Pulsed Repetition Frequency) in the PW mode.
New animal	New animal key Press this key to cancel all the recent animal data, comments, measurements, calculations and worksheet, except saved images.
Animal Info	Animal information annotation key Press this key to open or to close the Animal Data Input Dialog box.
Quick Save	Press this key to save the current image.  Reference Section *6.8.1, Saving Images*.
	Image up/down Flip key Press this key to flip the image vertically.

	Image left/right Flip key Press this key to flip the image horizontally.
Clear	Press this key to clear all the measurements, calculations, comments, and body marks displayed in the current image.
Cine	Cine key Press this key to enter or exit the frame-by-frame cine mode.
Comment	Comment key Press this key to activate or to exit annotation function.
BodyMark	Body Mark Key Press this key to activate or exit the body mark function. It is to indicate the examine position and the scan direction.
Measure	Measure key Press this key to activate or exit the measurement function.
Back	Back key In the measurement status, press this key to return to the previous operation. In comment mode, press the key to delete the entered text one by one. In parameter setting status, press the key to decrease the parameter value.
Change	Change key This key has dual functions. In measuring status, you can press **Change** once to change the settled point and the active point. In annotation status, press this key to display the comment library.
Set	Set key Press this key to confirm the selection of a specific function or command. Use this key to anchor calipers, select a menu item or image graphic. Or press it to increase the parameter value in parameter setting status.
Freeze	Freeze key Press this key to switch between the frozen and real-time states. When an image is frozen, the system inserts “ ❄ ” next to the system time clock and the clock pauses. When unfreezing the system, all the measurements, calculations, body marks, and comments will be erased.
Print	Print key Press this key to do the image printing by video printer or graph/text report printer. Go to **System Preset->Application Preset** page to set which kind of printer is used to print image.

	◆ Rotate it to adjust total gain in the B mode, 0 ~ 130, in increments of 2; ◆ Press it and then rotate it to adjust total gain in the PW mode. ◆ Gain can not be adjusted in freeze mode
	**Multi-function knob 1** Press this knob repeatedly to cycle among IP, F. position and F. number functions. When one of the functions is activated, rotate the knob to adjust the value. ◆ When the light of IP is on, rotate the knob to adjust the value of IP. ◆ In B, B/B, and 4B modes, 4 focuses and 16 segments of adjustable electronic focus are provided by the device. By adjusting focal point combination, a clear image can be obtained. The current focal point combination is shown in the FOCUS position on the left of the screen. ◆ When the light of focus position is on, rotate the knob to shift the position of the current focus, clockwise toward far field, and counterclockwise toward near field. ◆ When the light of focus number is on, rotate the knob clockwise to increase the focus number and counterclockwise to decrease the focus number.
	**Multi-function knob 2** Press this knob repeatedly to cycle between Depth and Zoom. When one of the functions is activated, rotate the knob to adjust the value. The rotation function is automatically activated when a body mark is added. ◆ When the light of Depth is on, rotate the knob to adjust scanning depth, and the current depth is displayed in the bottom right corner of the image. ◆ In real-time mode or frozen mode, press **Multi-function knob 2** till the zooming light is on, and the system displays a zooming window in the middle of the image; you can roll the trackball to move the zoom window to the desired area and rotate the zooming adjustment knob to adjust magnification of the zoom window. In frozen mode, 4 magnification levels are available. In real-time mode, 8 magnification

	levels are available: 100%，144%，196%, 256%, 400%, 576%, 900%, 1600%(in area). Press **Set** display the zoomed image, and then roll the trackball to move the zoomed image. **NOTE**: In real-time mode, magnification function is only available in B-mode and 2B-mode. In frozen mode, magnification function is only available in B-mode. ◆ When a body mark is added, the rotation function is automatically activated and the rotation light is on. You can rotate this button to adjust the scanning direction. ◆ When an arrow is added, the rotation function is automatically activated and the rotation light is on. You can rotate this button to adjust the arrow direction. ◆ In PW mode, after activating the PW angle adjustment function, the rotation function is automatically activated and the rotation light is on. You can rotate this button to adjust the arrow direction.
Footswitch	Pedaling on the footswitch is equivalent to pressing **Freeze**.

Table 5-2 Function Controls

5.4.5. Comment Function

The comment library is for positions and anatomical structures.

NOTE:

The entered text is in upper case by default.

To add a comment:

➢ **To add a comment by using the keyboard:**

1. Press **Comment**, and there is a cursor "l" displayed in the image area for annotating;
2. Enter text by using the keyboard;
3. Press **Set** to complete the comment.

➢ **To add a comment by using the comment library:**

1. Press **Comment**, and there is a cursor "l" displayed in the image area for annotating;
2. Press **Change** to display the comment library;
3. Highlight a comment in the comment library, and press **Set** to confirm the choice and complete the comment.

➢ **To add an arrow:**

1. Press **Comment**, and there is a cursor "l" displayed in the image area for annotating;
2. Press **Set** to display an arrow;
3. Move the trackball to move the position of the arrow; and the rotation function is automatically activated and the rotation light is on. You can rotate this button to adjust the arrow direction;
4. Press **Set** to set the position of the arrow.

To move a comment:

1. Move the cursor to a comment, and there is a pane around the comment;
2. Press **Set** and move the cursor to a new position;
3. Press **Set** to confirm the new position.

To delete a comment:

During commenting, you can use **Bksp** to cancel the undesired text word by word, or you can use **Back** to cancel the undesired text one by one.

The comment library is shown below:

L	R	U	D	Anterior	Posterior
♀	♂				

Generic

L	LL	RL	CL	LTH	VL
PV	HV	RHV	MHV	LHV	HA
HD	GB	CBD	Sp	SpA	SpV
P	PH	PB	PT	PD	K
AG	RA	RV	RP	RC	Pr

Abd 1

RCo	Ur	Bl	Pro	SV	Sto
Ca	E	Bo	Du	Co	Ap
SMA	SMV	AAO	IVC		

Abd 2

Ut	Ov	Cx	V	En	IUD
GS	Embryo	YS	Am	Pl	UC
AF	F	FH	F_Sp	F_Sto	FK
F_Lb					

OB

LV	RV	LA	RA	AAO	PA
MV	TV	AV	PV	IVS	IAS
LVPW	CT	PM	CS	CA	PVOT
RVAW					

Cardiac

Thy	MG	Eye	Ts	Ep	LyN
CCA	IJV	ICA	ECA	VA	IIA
IIV	EIA	EIV	FA	FV	GSV

Sml

M	T	Sc	St	Cy	Abs
Hma	Eff	Asc	Nec	Sed	Met
Cal	Hcc	Ang	Polyp	As	FB
Tb	Fe	Th	Plaque	Myo	HM
Any	Hyd	SB	VSD	ASD	PDA

Lesion 1

MS	MR	MVP	MVV	LAM	Pe
AAn	ASA	AS	PS		

Lesion 2

Figure 5-3 System-defined Comment Library

5.4.6. Body Mark Function

To add a body mark:

1. Press **Body Mark**, to display the body mark dialog box.
2. Highlight a body mark in the body mark dialog box, and press **Set** to confirm the choice to add the body mark. The selected body marks are displayed in the bottom left corner of the screen.

   Reference *Figure 5-1 Typical Image Screen.*
3. After adding a body mark, use the trackball to move the position of the probe; and the rotation function is automatically activated and the rotation light is on, you can rotate this button to adjust the probe scanning direction.
4. Press **Set** to complete adding the body mark.

To move a body mark:

1. Move the cursor to a body mark, Press **Set** button, and there is a pane around the body mark;
2. Press **Set** and move the cursor to a new position;
3. Press **Set** to confirm the new position.

Body marks are as shown below:

Abd-Large

Abd-Small

OB

Car

Limb

Figure 5-4 Body Marks

5.4.7. Imaging Functions

B mode Imaging Control

Press this key to enter the B mode. The system displays a single real-time B mode image.

B indicates brightness, or two-dimensional (2D) gray scale imaging.

NOTE:

To return to a real-time B mode image from any imaging mode, press B control. This also deletes all measurements, calculations, comments, or body marks that are displayed on the screen.

2B mode Imaging Control

This key has two functions:

- Press this key to enter the 2B mode.
- Press this key to activate one of the dual images. The probe direction of the activated image is brighter than that of the frozen image.

4B mode Imaging Control

Press this key to enter the 4B mode. The system divides the image area into four quadrants: the first quadrant is on the top left, the second on the top right, the third on the bottom left, and the fourth on the bottom right.

Press it repeatedly to active one of the four images. The probe direction of the activated image is brighter than the direction of the frozen images. The four images are obtained separately and only one image at a time is displayed in real time.

B/M mode Display Control

Press it to enter the B/M mode, the B mode and the M mode images are displayed on the screen at the same time (Abbreviated as B/M or B+M). There is a line on B mode image, which is called the M Mark. Roll the trackball to move the M Mark. Press **Set** to locate the M Mark.

M mode Display Control

Press this key to enter the M mode. It displays an M mode sweep. The slope of this mode has four levels.

Pulsed-Wave Doppler mode Display Control

Press this key to switch between the B mode the B+PW mode.

A pulsed-wave Doppler (PW) scan produces a series of pulses used to study the motion of blood flow in a small region along a desired scan line, called the sample volume.

The X-axis of the graph represents time, and the Y-axis represents Doppler frequency shift. The shift in frequency between successive ultrasound pulses, caused mainly by moving red blood cells, can be converted into velocity and flow if an appropriate angle between the insonating beam and blood flow is known.

Shades of gray in the spectral display represent the strength of the signal. The thickness of the spectral signal is indicative of laminar or turbulent flow (laminar flow typically shows a narrow band of blood flow information).

Pulsed-Wave Doppler mode and B mode are shown together in a mixed mode display. This combination lets you monitor the exact location of the sample volume on the B image in the B Image Display window, while acquiring Pulsed-Wave Doppler data in the Time Series window.

Operation:

In the B scan, the long line lets you adjust the sample line position, the two parallel lines (that look like =) let you adjust the sample volume (SV) size and depth, and the line that crosses them lets you adjust the correction angle (PW angle).

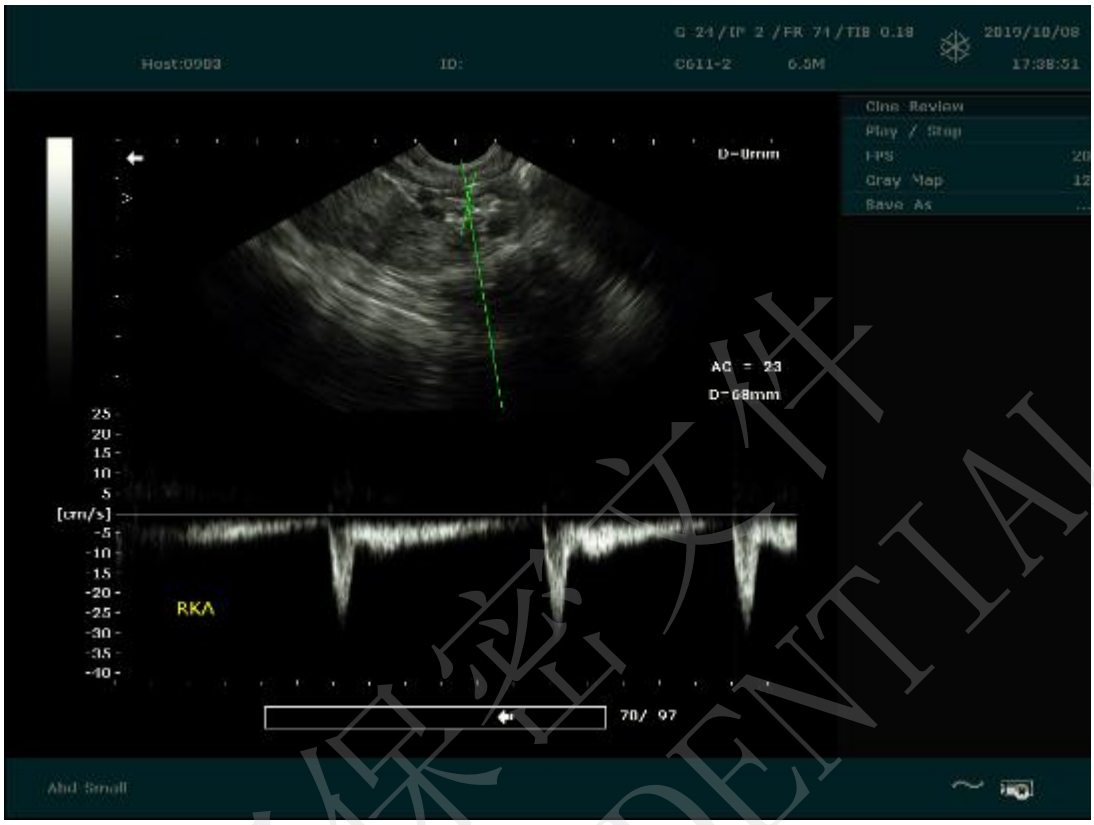


Figure 5-5 Example PW Scan

In PW mode, you can choose scanning in B mode or PW mode by pressing **Update**. When you are scanning in non-simultaneous mode either the B or the time series window receives data. This lets you independently change the PW PRF. When scanning in simultaneous mode, both the 2D and the time series window receive data. This feature lets you define which method is used, based on the exam type.

The sample volume indicator allows you to start a scan in a B scan mode, set the sample volume, and switch to Doppler mode. The sample volume locks in position.

1. Press **PW** to enter B mode and adjust all image control settings appropriate for the current exam.
2. Place the cursor inside the vessel of interest.
3. You can now adjust the sample line, SV size, or correction angle as needed for the scan: move the trackball to adjust the sample line, press **SV+**/**SV-** to adjust the sample volume, press **PW angle+**/**PW angle –** to adjust correction angle, etc.

4. Press **PW** again to enter B+PW mode. The system locks the sample volume indicator and adds the Time Series window.

5.4.8. Additional Control Functions

The DUS 60 VET also provides the following additional control functions, which are available through status menus.

Control function	Description
Scan Angle (sector angle/ scan width)	Adjusts the sector angle for curve probes, and the scan width for linear probes, providing a larger field of view in the far field.
Scan Density	Adjust the scan density, three level adjustable: high, middle, low
Dynamic Range	Controls the overall contrast resolution of B mode.
Frame Persist	Selects the number of frames for frame averaging to present a smoother, softer image.
Line Persist	Adjusts the line persist level.
Rejection	Adjusts the rejection level.
eSRI	Set image speckle reduction attribute.
SRA	Turn on or off the synthetic receiving aperture
GAC	Set the gray auto control
Gray Map	Selects the post-processing gray curve map.
B/W Invert	Set the color to black or white.
90° Rotate	Rotate the image by 90 degrees (in B mode).
Sweep Speed	Adjusts the scrolling speed level of the M mode and PW mode sweep.
Steer	Adjust the sample line position, linear probe only.
WallFilter	Adjust the filter wave. (0~3)
D Dynamic Range	Controls the overall contrast resolution of PW images
D Rejection	Adjusts the rejection level in PW mode.

PW Invert	Invert the PW wave. (Up or Down)
D gain	Adjust D gain in the PW mode
D Frequency	Set the probe frequency in PW mode
Sample Volume	Set the default sample volume
PRF	Set the pulse repetition frequency in PW mode
Needle guide	Adjust needle guide in the B, B+M, PW mode menus.

Table 5-3 Additional Control Functions

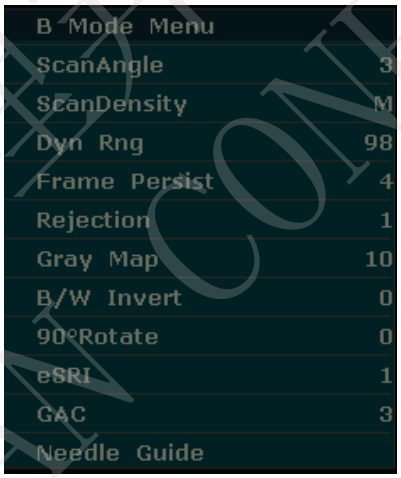
These functions can be set using the **Set** and the **Back** keys.

5.5. Menu

Menus are displayed on the right of the screen. Only one menu can be activated at a time. The types are shown as follows:

System status menu

In B mode or B/M mode, the system status menu provides information about the current imaging mode. In 2B and 4B modes, it indicates the status and parameters of the active image. In M mode, it indicates the status and parameters of M sweep. In the PW mode, it indicates the status and parameters of Doppler wave and 2D image. The following are the system status menus of B mode, B/M mode, M mode, and PW mode respectively.



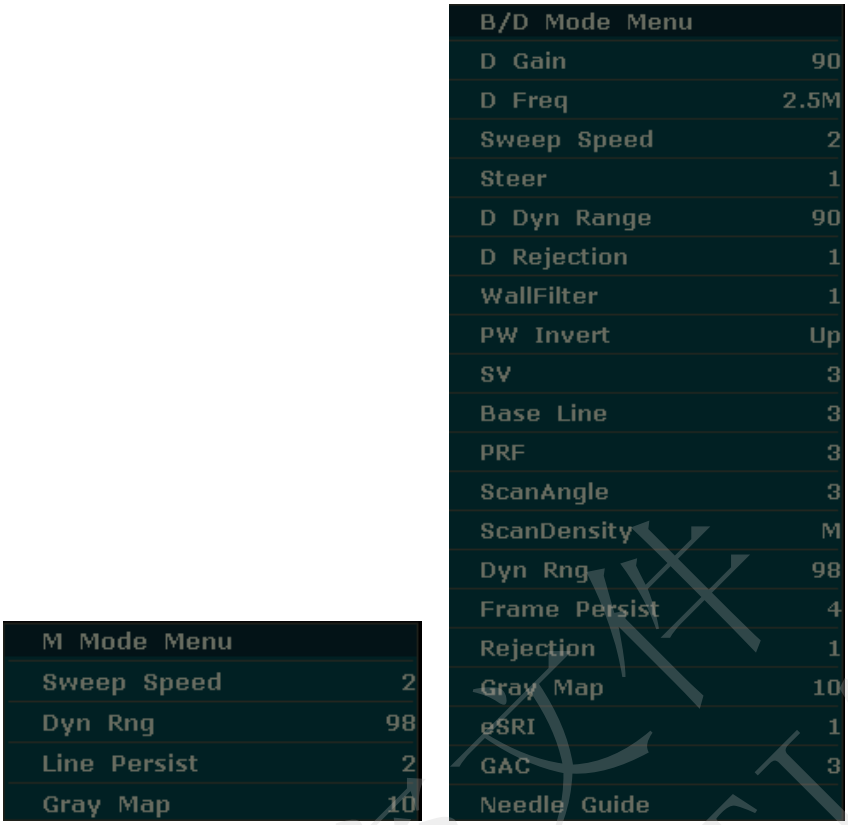


Figure 5-6 System Status Menu

Measurement and calculation menu

Perform an operation. For instance, begin a distance measurement, and then the corresponding measurement cursor is displayed.

After entering B mode, press **Measure** to display the menu below.

Figure 5-7 B Mode Generic Measurement and Calculation Menu

Secondary menu

The symbol "►" indicates that there is a secondary menu associated with the menu option. Roll the trackball to highlight the menu option with "►", the system displays a secondary menu for the selected option.

Example: The secondary menu of **Cir/Area** contains **Ellipse** and **Trace**, shown as below.

After entering B mode, press **Measure** to display the menu below, and highlight the option **Cir/Area**, the system will display the secondary menu **Ellipse** and **Trace**.

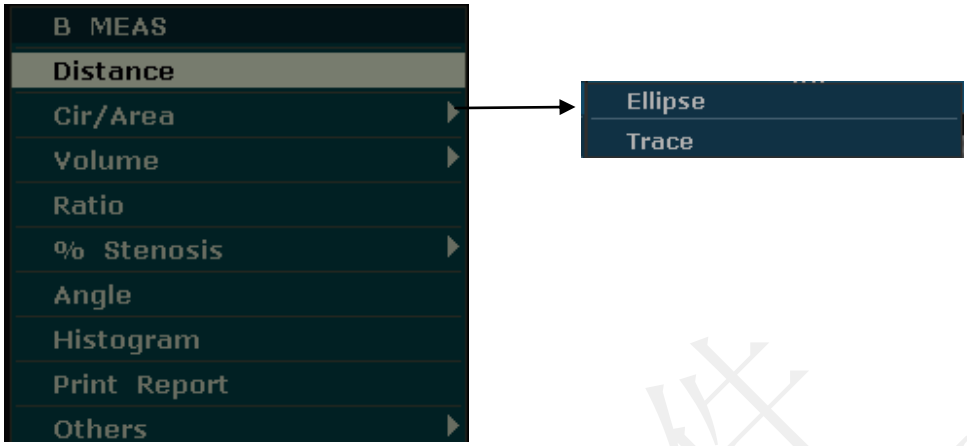


Figure 5-8 Secondary Menu

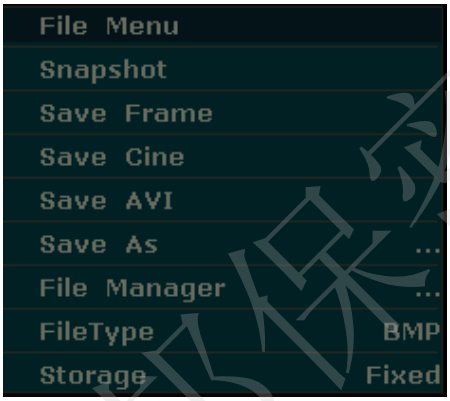


Figure 5-9 File Menu

Figure 5-10 Needle Guide Menu

5.6. Dialog Box Operation

The dialog box may have a few tabs, as shown below. You can select one tab at a time with trackball and **Set**. Also, you can modify the parameter following the prompt instruction, and then highlight **OK** and press **Set** to save the modified parameters and close the dialog box; or highlight **Cancel** to give up the modification and close the dialog box directly.

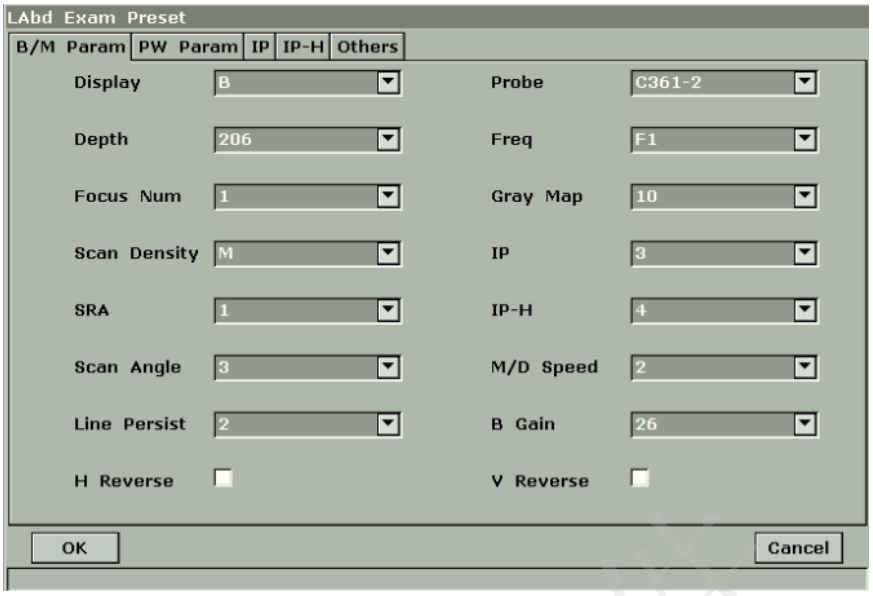


Figure 5-11 Labd Examination Presetting Dialog Box

5.7. Presetting

5.7.1. Entering and Exiting

To activate presetting function:

1. Press **Preset**, and the system displays the preset menu, as shown below.

Figure 5-12 Preset Menu (the left—with no DICOM installed, and the right—with DICOM installed)

2. Roll the trackball to highlight one of the options and then press **Set** to display the menu of the corresponding option.

To exit presetting:

Highlight **Return** and press **Set**. Then the system restarts automatically. The system runs with the new modified parameters after being restarted.

5.7.2. Displaying / Modifying Presetting Parameters

Select a type of preset and press **Set** to display the corresponding dialog box, and you can modify the parameter following the prompt instruction.

Reference Section *5.6, Dialog box operation.*

5.7.3. System Presetting

1. In preset menu, move the cursor to highlight System Preset and press **Set** to display general presetting dialog box, as shown below.
2. Roll the trackball to highlight an item and then press **Set**. Then use the keyboard to enter text.

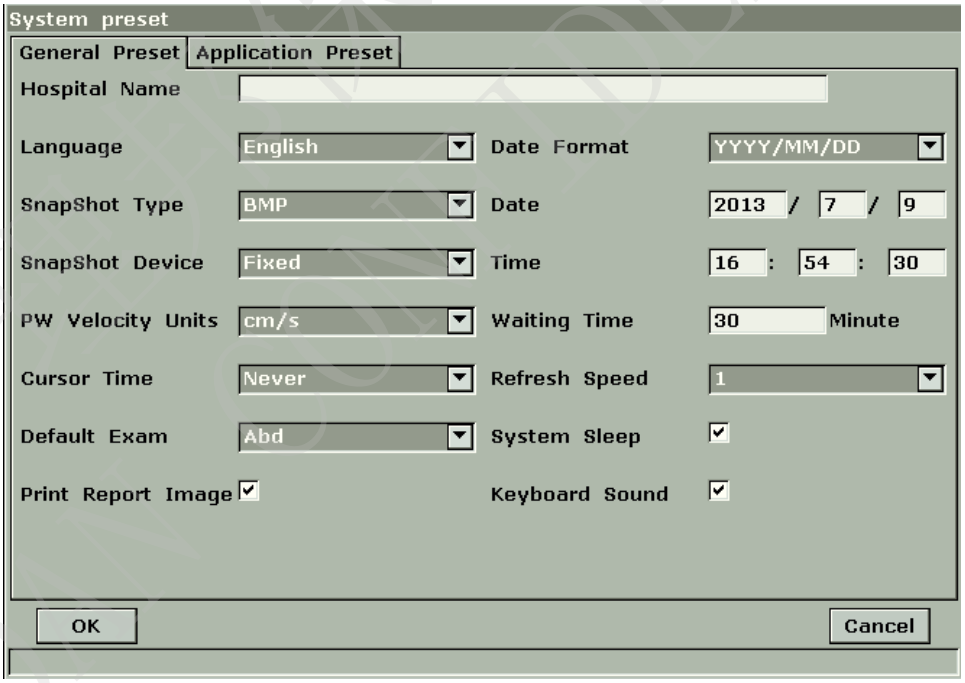


Figure 5-13 General Presetting Dialog Box

Item	Setting	Allows you to
Hospital Name	Input freely	Set hospital name displayed on the key top left of the screen and diagnosis report.
Language	Chinese, English, etc.（The language options vary with language software installed.）	Set the overlay language
SnapShot Type	BMP/JPG/FRM /DCM (if DICOM is installed)	Set the storage file format type of snap shot.
SnapShot Device	A:\/Fixed	Set the storage device of snap shot.
PW Velocity Units	Cm/s, KHz	Set the units of the PW velocity
Cursor Time	Never, 3s, 5s, 10s, 15s, 20s, 25s, 30s, 45s	Set the interval of the cursor auto hiding
Default Exam	LAbd, SAbd, OB_Cannine, OB_Feline, OB_Equine, OB_Bovine, OB_Ovine, OB_Other, Muc, Ten, Sml, Car, Vas, Back Fat.	Preset the examination type.
Default Species	Dog, Cat, Equine, Bovine, Ovine, Porcine, Others	Set the default species
Print Report Image	√ / Null	Select whether to print image in report when using USB printer.
Date	Set freely	Set the system date.
Time	Set freely	Set the system time, format: H/M/S.
Waiting time	5-60 min	Set the system waiting time to enter sleep mode (5-60 min).
Refresh Speed	1~10	Set the grade of glint speed of system dormancy.
System Sleep	√ / Null	Select whether the device enters sleep mode when no operation is performed for certain minutes.
Keyboard Sound	√ / Null	Turn on or off the keyboard sound.

Table 5-4 General Presetting Information

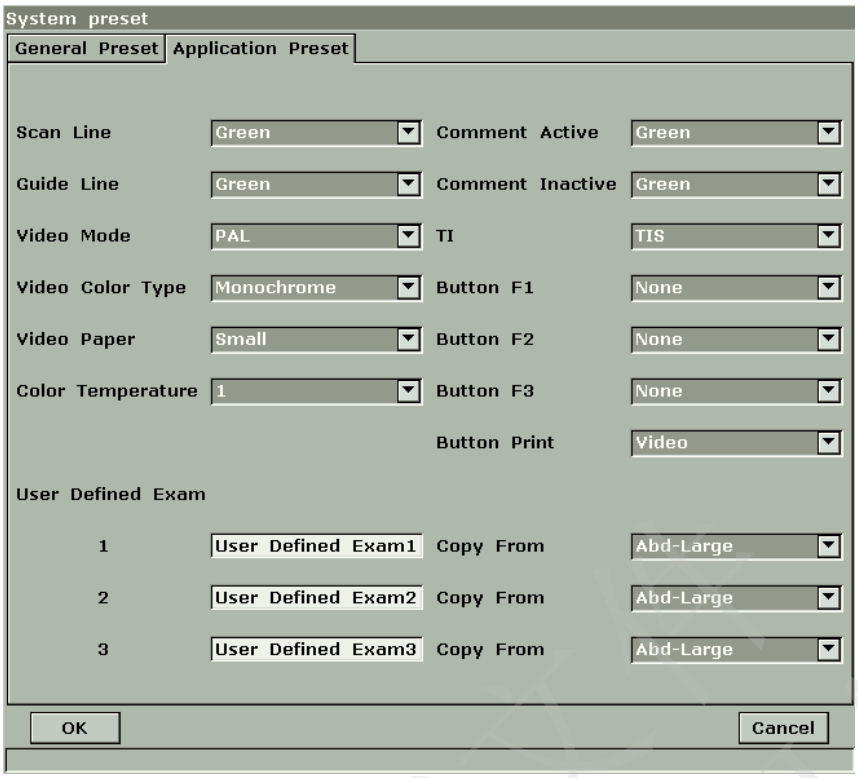


Figure 5-14 Application Presetting Dialog Box

Item	Setting	Allows you to
Scan Line	Green, Yellow, White, Red, Orange	Set the default color of the scan line
Guide Line	Green, Yellow, White, Red, Orange	Set the default color of the guide line
Video Mode	PAL/NTSC	Set the video mode
Video Color Type	Colorized/ Monochrome	Set the video color
Comment Active	Green, Yellow, White, Red, Orange	Set the default comment font color in active status.
Comment Inactive	Green, Yellow, White, Red, Orange	Set the default comment color in inactive status.
Button F1	None, save frame, save image parameters, save cine, save AVI image, file manager, sweep speed, PW invert, wall filter.	Define the F1 key, select one of the pull-down options.
Button F2	None, save frame, save image parameters, save cine, save AVI image, file manager, sweep speed, PW invert, wall filter.	Define the F2 key, select one of the pull-down options.
Button F3	None, save frame, save image parameters, save cine, save AVI image, file manager, sweep speed, PW invert, wall filter.	Define the F3 key, select one of the pull-down options.
TI	TIS, TIB, TIC	Select the application tissue of thermal index.
Color Temperature	0,1,2,3	Adjust the display effect .

Video Paper	Large, Small	Select the paper size.
Button Print	Video, Graphic/Text	Set whether video printer or graphic/text report printer is used to print image when pressing print button on the control panel. The selected printer type should be the same as that of the connected printer, otherwise the printer cannot work.
User Defined Exam 1/2/3	User Defined Exam 1, User Defined Exam 2, User Defined Exam 3	Edit the labeling of user defined exam.
	Copy from: Abd-Large, Abd-Small, Canine Obstetric, Feline Obstetric, Equine Obstetric, Bovine Obstetric, Ovine Obstetric, Other Obstetric, Small Parts, Muscle, Tendon, Cardiac, Vascular or Back Fat exam preset.	The default presets of the selected exam will be copied to user defined exam, fascinating to quickly edit the user defined exam presets.

Table 5-5 Application Preset Information

You must restart the system to validate the change, including **Language**, **Keyboard Sound**, **Cursor Time** and **Video Mode**. After you perform those presetting, and press **Return**, the system displays a confirm dialog box to prompt you whether to restart the system.

5.7.4. Presetting Examination

Examination types include LAbd, SAbd, OB_Cannine, OB_Feline, OB_Equine, OB_Bovine, OB_Ovine, OB_Other, Muc, Ten, Sml, Car, Vas and Back Fat. Also, three User Defined Exams are provided to allow users to create their own exam presets.

Take **Canine Ob** examination presetting for example, in the preset menu, move the cursor to highlight **Canine Obstetric** and press **Set** to display obstetric examination presetting dialog box.

B/M Parameter Tab

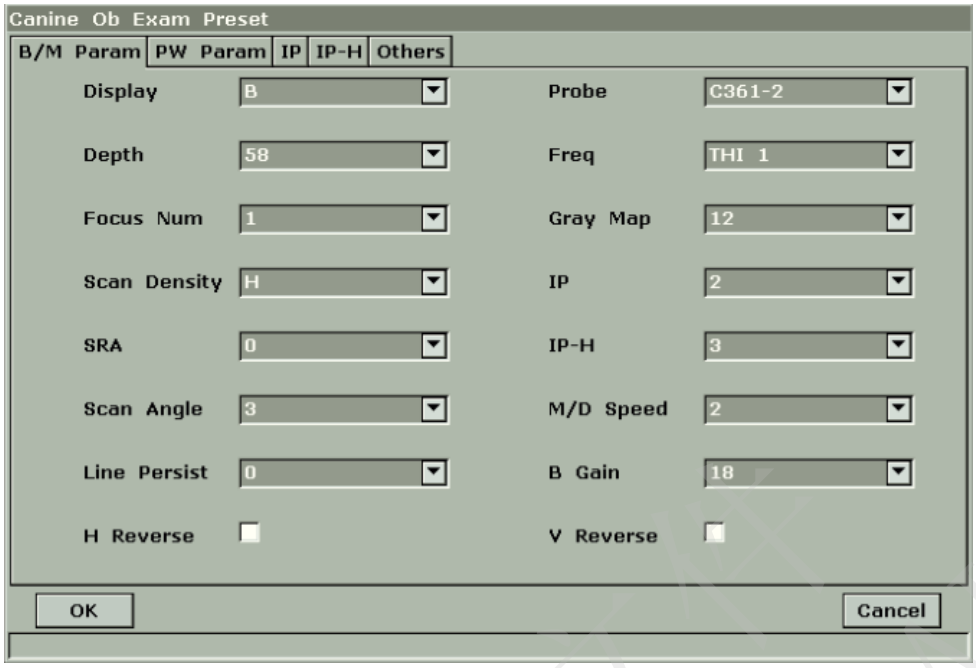


Figure 5-15 Obstetric Presetting -- B/M parameter Tab

Item	Setting	Description
Display	B, 2B, 4B, B/M, M, PW	Set display mode type.
Depth	19 mm ~ 324 mm (C361-2)	Set examine depth.
Focus Num	1/2/3/4	Set the number of focuses.
Scan Density	L/M/H	Set scanning density. Three levels adjustable: low, middle, high
SRA	0/1	Turn on or off the synthetic receiving aperture (SRA can be set only when the scan density is set as “M”).The purpose of SRA is to improve the lateral resolution and reduce the image noise. Synthesizing two receive apertures will improve the signal to noise ratio.
Line Persist	0~7	Set image line correlation.
Probe	Display all the probe type this device supports	Set the probe type to use.
Freq	F1/F2/F3/THI 1/THI 2	Set the frequency of probe.
Gray map	0~14	Select the default post-processing gray curve map
IP	0~7	Set the image parameter of the basal wave
IP-H	0~7	Set the image parameter of the harmonious wave
M/D speed	0/1/2/3	Set the M mode or D mode sweeping speed.
B Gain	0~130	Set the gain of 2D image, in 2 increments.
H Reverse	√ / Null	Set the attribute of Horizontal reversal.
V Reverse	√ / Null	Set the attribute of Vertical reversal.

Table 5-6 Obstetric Presetting Information – Parameter 1

PW Parameter Tab

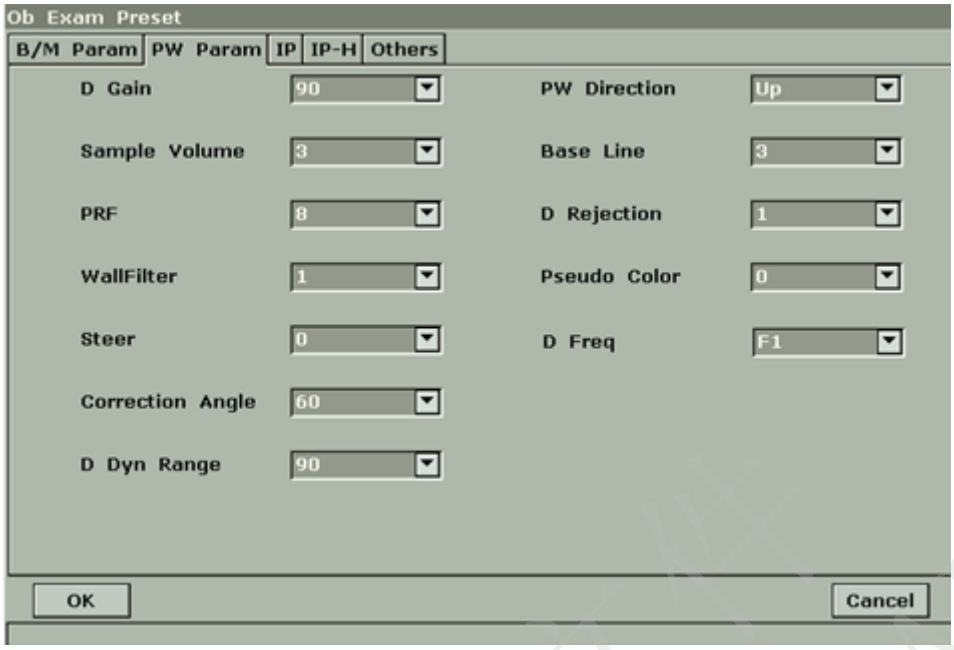


Figure 5-16 Obstetric Presetting – PW Parameter Tab

Item	Setting	Description
D gain	0~130	Set the gain of PW image, in 2 increments.
Sample volume	1~7	Set the size of the sample volume.
PRF	0~13	Set the level of PRF.
Wall filter	0~2	Set the level of wall filter.
PW direction	Up/down	Set the PW direction.
Steer	0/1/2	Set the position of the sample line (for linear probes).
Correction angle	15~165	Set the correction angle.
Base line	0~6	Set the base line position.
D rejection	0~7	Set the PW rejection.
Pseudo color	0~6	Set the colorization colors.
D Dyn Range	30~150	Set the dynamic range of the PW wave
D Freq	F1/F2	Set the probe frequency in the PW mode

Table 5-7 Obstetric Presetting Information – Parameter 2

IP Tab

NOTE: IP ----Image Parameter

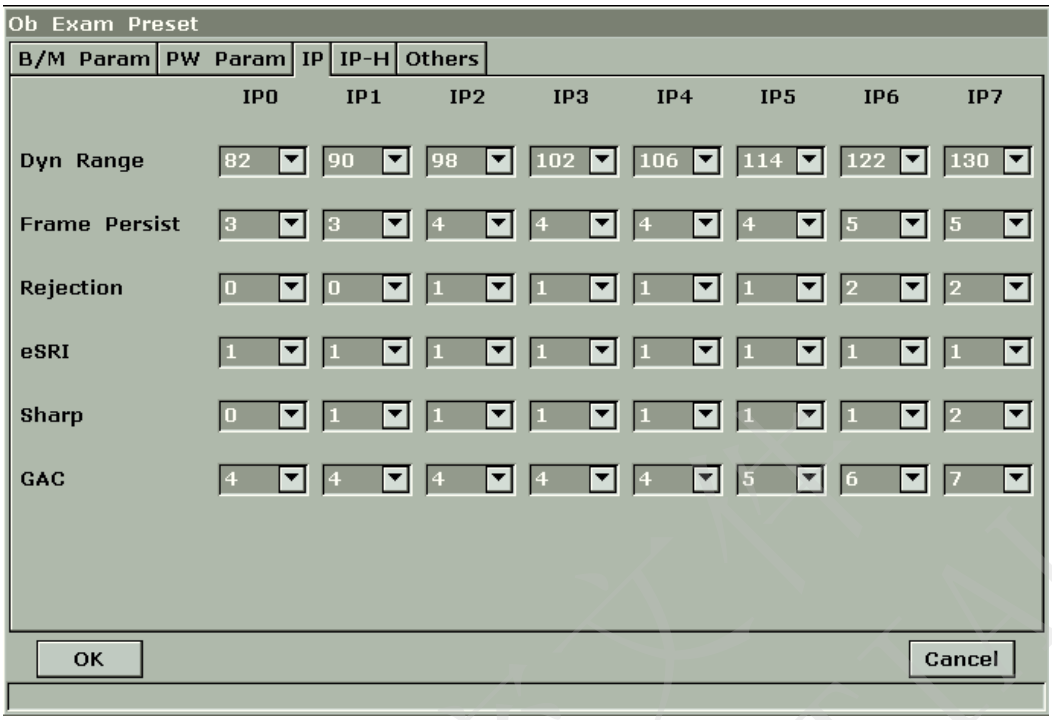


Figure 5-17 Obstetric Presetting – IP Tab

Item	Setting	Description
Dynamic Range	30~150	Select the default dynamic range for the examination, in decibels (dB). During imaging, the dynamic range can be adjusted in 4 increments.
Frame Persist	0~7	Set image frame correlation.
Rejection	0~7	Eliminates from the image of low level echoes resulting from flicker noise. 0 represents no Rejection. The bigger the value, the stronger the effect.
ESRI(Speckle Resistance Imaging)	0~7	Eliminates from the image of low level echoes resulting from speckle noise. Thin image granules, enhance the image boundary layers, and reserve more details of the image.
eSharp	0~7	Set the parameter of the image sharp processing
GAC	0~7	Gray Auto Control, Adjust the image penetrability. The purpose of GAC is to eliminate the high echo saturation in order to show clear clinical information.

Table 5-8 Obstetric Presetting Information – IP 1

NOTE: The presetting information of IP-H is all the same as IP.

Others

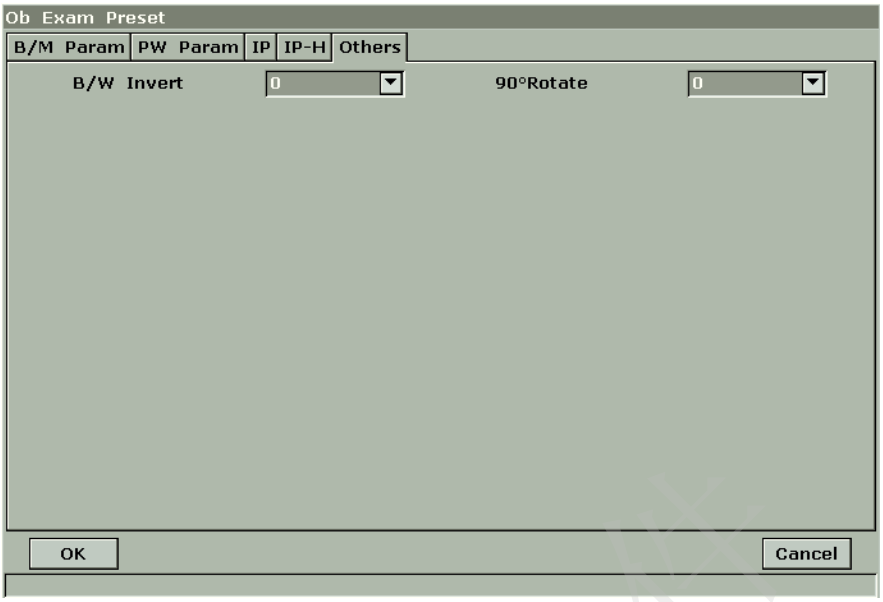


Figure 5-18 Obstetric Presetting –Others Tab

Item	Setting	Description
B/W Invert	0/1	Set the color to black or white.
90° Rotate	0/1/2/3	Rotate the image by 90 degrees (in B mode).

Table 5-9 Obstetric Presetting Information – Others

Presetting User Defined Exam:

The default user defined exam presets are Large Abdominal exam presets. Edit the user defined exam presets by doing the following:

1. Move the cursor to highlight **System Preset** in preset menu and press **Set** to open **System Preset** dialog box.
2. Open **Application Preset** page. Select **User Defined Exam 1/2/3** and edit the labeling of user defined exam by using the keyboard**.**
3. Select one exam preset for **User Defined Exam 1/2/3** and press **OK** to copy the default presets of the selected exam to User Defined Exam 1/2/3. See section 5.7.3 System Presetting.
4. Move the cursor to highlight **User Defined Exam 1/2/3** in preset menu and press **Set** to open **User Defined Exam 1/2/3** dialog box.
5. Modify the presets as needed.

5.7.5. Editing Comment Library

There are eight tabs of comment library: generic, abdomen 1, abdomen 2, obstetric, cardiac, small parts, lesion 1 and lesion 2. Each tab has a few sets of comments defined at factory, and you can create up to 6 user-defined comments for each tab. Creating a comment library for a patient report saves your time, especially for recurring examinations. You can quickly add a comment by using the comment library.

Operation procedure:

1. Press **Preset** on the keyboard to activate the presetting function.
2. Roll the trackball to highlight **Comment** and then press **Set**. Then the Comment Preset dialog box is displayed, as shown below:

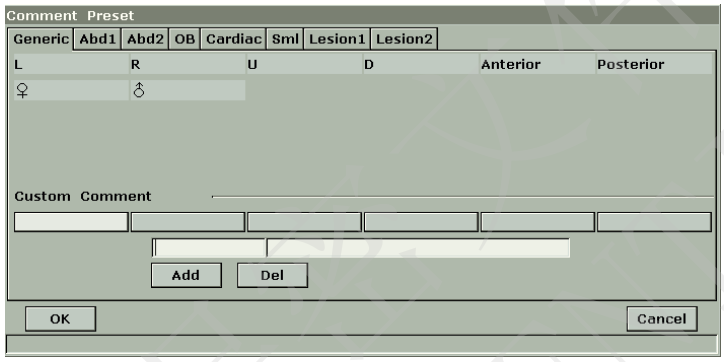


Figure 5-19 Comment Library Presetting

To create text for text list:

Take **Generic** for instance:

1. Press **Generic** to open the **Generic comment library**.
2. Roll the trackball to highlight one of the custom comments, and press **Set**.
3. Roll the trackball to highlight the left side frame of User-defined, and press **Set**. Then the cursor turns to "I", as shown below. You can enter comment with the keyboard.

Figure 5-20 User-defined Comment Library

4. Roll the trackball to highlight the right side frame of User-defined, and press **Set**. Then the cursor turns to "I", as shown below. You can enter some detailed help information about the new created comment with the keyboard.

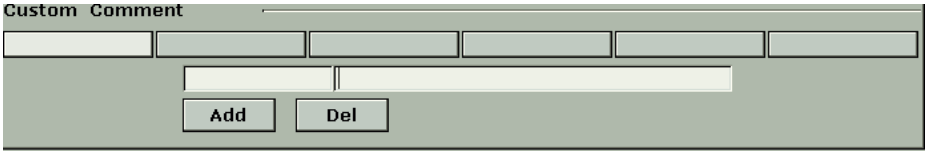


Figure 5-21 User-defined Detailed Information of Comment Library

5. Roll the trackball to highlight **Add** to add the new created comment to Generic.
6. Press **OK** to save the modification, or press **Cancel** to give up and close the dialog box.

To delete text from text list:

1. Press **Generic** to open the **Generic**.
2. Roll the trackball to highlight the created comment, and press **Set**.
3. Press **Del** to delete the created comment.
4. Press **OK** to save the modification, or press **Cancel** to give up and close the dialog box.

5.7.6. Factory Default

In preset menu, move the cursor to highlight **Factory Default** and press **Set**, a dialog of "Restore the Data" pops up, select **Yes** to restore the data or select **No** to cancel the operation.

5.7.7. Presetting DICOM

If you have installed the DICOM software, perform the DICOM presetting as shown below.

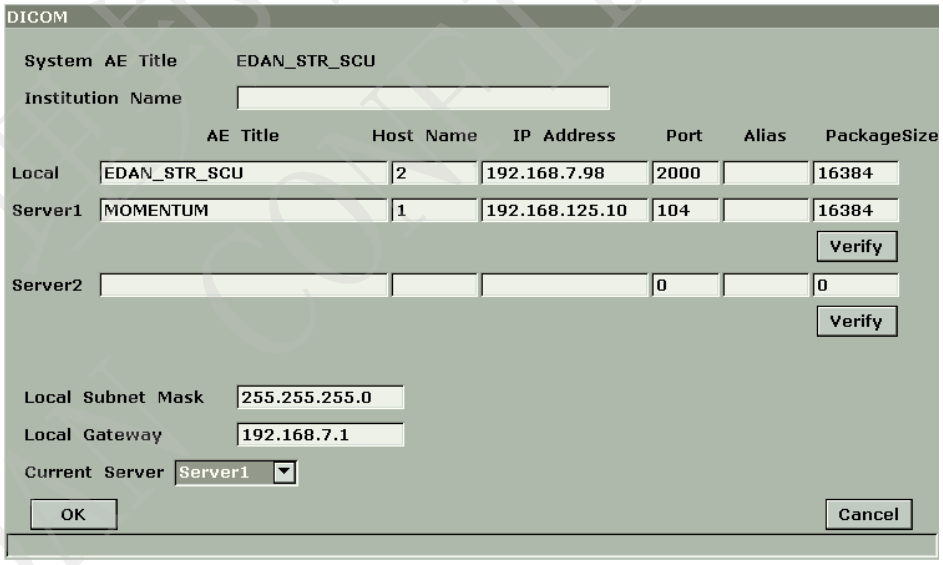


Figure 5-22 DICOM Presetting

Item	Description	
System AE Title	The same as the title set in the **AE Title** of **Local**	
Institution Name	Set the name of the institution	
Local	AE Title	Set the local AE title
	Host Name	Set the local host name
	IP Address	Set the local IP address
	Port	Set the local port
	Alias	Set the alias of the local system
	Package Size	Set the PDU transmission package size, from 4K to 64K, and the default value is **16K**.
Server 1/2	AE Title	Set the server AE title, the same as the **System AE Title** displays
	Host Name	Set the server host name
	IP Address	Set the server IP address
	Port	Set the server port
	Alias	Set the alias of the server
	Package Size	Set the PDU receiving package size, from 4K to 64K, and the default value is **16K**.
Verify	After presetting the server information, press **Verify** to verify the server's connection.	
Local Subnet Mask	Set the local subnet mask	
Local Gateway	Set the local gateway	
Current Server	To choose the current server that is connected to the system.	

Table 5-10 DICOM Presetting Information

Press **OK** to save the presetting and exit, or **Cancel** to exit without saving the presetting.

NOTE:

1. Do not set a same IP Address for the local system and the server.
2. Ensure that you have turned on the server before verifying it.

5.7.8. Maintenance

The maintenance can be only done by authorized personnel of the manufacturer.

5.7.9. System Information

In preset menu, move the cursor to highlight System Info and press **Set** to get the system information dialog, which shows the basic configuration information of the system.

5.8. Printing

To connect a video printer:

1. Connect **VIDEO IN** (video input) of the video printer to **VIDEO OUT** (video output) of the main unit.
2. Connect **REMOTE** of the video printer to **REMOTE** of the main unit.
3. Check the printer, referring to the printer user manual.
4. Make sure the **Report Printer** and **Print Report Image** options in the **General Presetting** window are set correctly.
5. Run the printer.

Video printing:

Press **Print** on the control panel to print the image currently displayed.

To connect a USB printer:

1. Connect the USB printer via the USB port.
2. Check the printer, referring to the printer user manual.
3. Check the **Report Printer** and **Print Report Image** in general preset.
4. Enter the desired worksheet to edit the examination and diagnosis information.
5. Run the printer.

USB printing:

Press **Print** of the worksheet dialog box. Printer begins to print.

Digital graphic printer:

1. Connect the Digital graphic printer via the USB port.
2. Check the printer, referring to the printer user manual.
3. Run the printer.
4. Press **Print** key on the control panel. Printer begins to print.

NOTE:

1. Before printing, make sure there is enough paper for printing.
2. Before printing, make sure the presetting printer type is correct.
3. Before printing, make sure the printer power cord and the USB cable are connected well.
4. Do not cut off the printer power supply or the USB cable during printing.
5. If the printer can not work normally, please restart the printer and the DUS 60 VET.

Chapter 6 Operation

6.1. Entering New Patient

Press **New Patient** to clear all the information displayed on the screen, and then begin a new patient examination.

NOTE:

When you press **New Patient**, the system clears all the recent patient data, comments, measurements, calculations and worksheets, except saved images.

6.2. Entering or Editing Patient Information

Press **Patient Info.** to activate the patient data annotation function, and then enter or edit the patient data, as shown below:

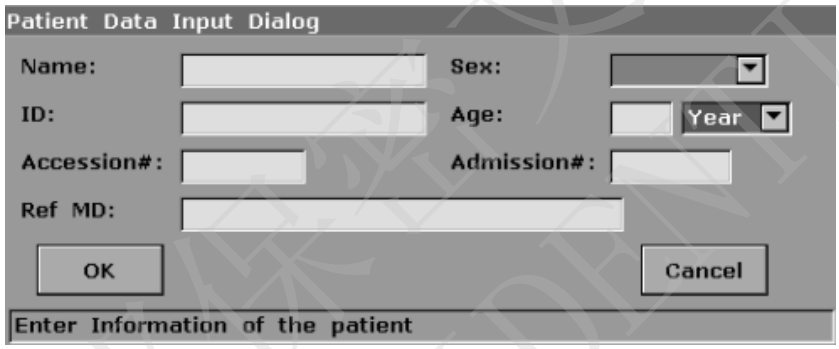


Figure 6-1 Patient Data Input Dialog Box

To close the input text box, press **Enter**;

To switch the input text box: press**Tab**;

To enter the patient information, use the keyboard;

To exit: select **OK** or **Cancel**, and then press **Enter** or **Set**.

6.3. Selecting an Examination Type

Press **Exam** to select an examination type. You can change the examination type at any time by making a selection from the Exam Type menu list, as shown below. Roll the trackball to highlight an examination type and press **Set** to select.

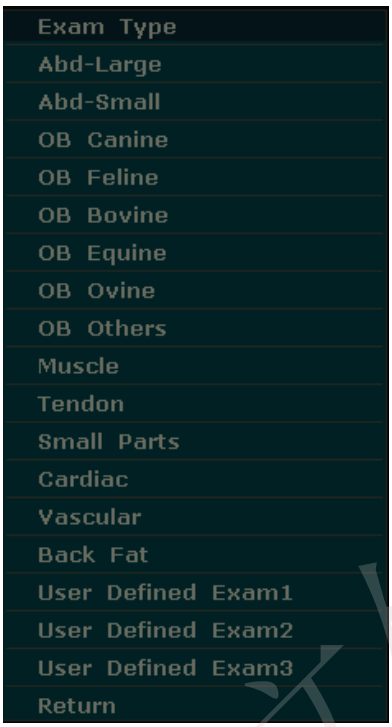


Figure 6-2 Examination Type Menu

6.4. Activating and Deactivating a Probe

While multiple probes are connected to the ultrasound system, only one can be activated at a time.

Press **Probe** repeatedly to cycle through the probes currently connected to the system. The model of the activated probe is displayed in the top right corner of the screen.

Press **Freeze** to activate or deactivate a probe.

WARNING

DO NOT activate intra-corporeal transducers outside the patient's body (such as V563-2). Otherwise, EMC requirements will not be met and harmful interference to other devices in the environment may be caused.

Do not disconnect the probe in the unfreeze status.

The system limits patient contact temperature to 43℃, and the acoustic output below the maximum acoustic output limits for track 3. A power-protection circuit is used to prevent over-current conditions. If the power monitor protection circuit detects an over-current condition, then the drive current to the probe is cut off promptly, preventing overheating of the probe surface and limiting acoustic output. Validation of the power protection circuit is performed during normal operation.

NOTE:

1. In simulative operation, the final radiating surface temperature of probe C361-2 is

42.29℃.

2. In simulative operation, the final radiating surface temperature of probe C611-2 is 41.9℃.
3. In simulative operation, the final radiating surface temperature of probe L743-2 is 41.41℃.
4. In simulative operation, the final radiating surface temperature of probe C361-2 is 41.7℃.

6.5. Selecting an Imaging Mode

You can select an imaging mode by pressing  ,  ,  ,  ,  , or 

, and then begin an examination.

Reference Section *5.4.7, Imaging functions* and section *5.2, Examining*.

6.6. Measurements and Calculations

Measurement and calculation functions are contained in each examination type and imaging mode. Distance and circumference will be presented in mm; area, in mm^2, cm^2, or dm^2; volume, in mm^3, cm^3, dm^3, mL or L; time in ms or s, and heart rate in bpm, etc.

To activate the measurement function, press **Measure**, and the light will be on.

There is one type of mark in B mode measurement: “+”.

There are three types of marks in M mode measurement: “+”, big “+”, and a line.

The measurement results will be displayed in real-time. After measurement, the outcome is displayed in measurement result window with a serial number. You can measure one to four groups of data. If you continue to measure, the earliest group will be automatically covered by the newest one.

NOTE:

1. If you perform the measurements in the frozen status, all the measurements will be cleared when you unfreeze the image.
2. During measurement, press **Back** to delete the previous operation.
3. After a complete measurement, press **Back** to erase a measurement at a time.

The generic measurements and calculations include four sets of measurement calipers, four sets

of ellipses, four sets of measurement results at most.

The examination labels and results are shown in table 6-1.

Examination	Application measurement & calculation items	Result
Abdomen	Gallbladder:CBD, Gallbladder, Kidney: Left Kidney, Right Kidney, Bladder	Abdominal worksheet
Obstetric	CRL, GSD, HD, BD, HD&BD, GSD-H, GSD-V, TD, and BPD NOTE: Different measurement labels depend on different examination species.	Obstetric worksheet
Cardiology	LV, RV, Mitral, Aorta, etc.	Cardiac worksheet
Vascular	PW mode: CCA, ICA, ECA, Vert A	Vascular worksheet
Small Parts	None	General report
Muscle	None	General report
Tendon	None	General report

Table 6-1 Examination Items and Results

6.6.1. Generic Measurements in B Mode

In B mode, highlight others and select OB MEAS CAN, the default measurement of B mode is distance measurement. B mode measurement menus are shown as follows:

Figure 6-3 B Mode Generic Measurement and Calculation Menu

Distance

To measure distance:

1. Press **Measure** to activate measurement function.
2. Roll the trackball to highlight **Distance**, press **Set** to activate a measurement cursor "+" on the screen.
3. Roll the trackball and press **Set** to anchor the start point.
4. Roll the trackball and press **Set** to anchor the end point.
5. Roll the trackball and press **Set** to begin a new distance measurement. You can measure a maximum of four groups of data. The outcome will be displayed in the measurement result window, as shown below.
6. Press **Measure** to finish and exit.

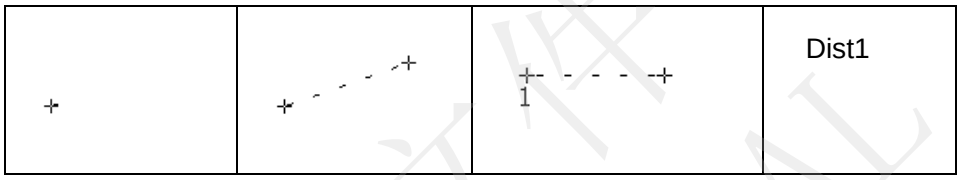


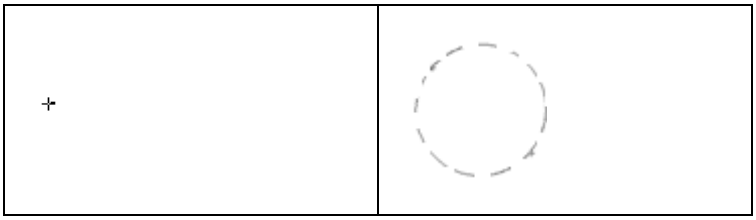
Figure 6-4 Distance Measurement and the Results

Circumference/Area

- **Ellipse Method**

To measure Circumference / Area:

1. Press **Measure** to activate measurement function.
2. Roll the trackball to highlight **Cir/Area**. Then select **Ellipse**, and press **Set** to activate a measurement cursor "+" on the screen.
3. Roll the trackball and press **Set** to anchor the start point of fixed axis of ellipse.
4. Roll the trackball and press **Set** to anchor the end point of fixed axis of ellipse.
5. Roll the trackball, and press **Set** to define the size of the ellipse.
6. Roll the trackball and press **Set** to begin a new circumference/area measurement. You can measure a maximum of four groups of data. The outcome will be displayed in the measurement result window, as shown below.
7. Press **Measure** to finish and exit.



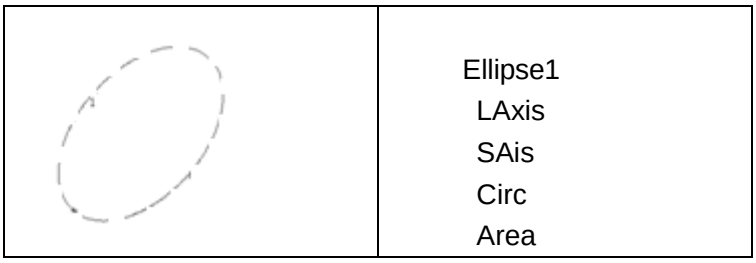


Figure 6-5 Ellipse Circumference/Area Method and the Results

- **Trace Method**

To measure Circumference / Area:

1. Press **Measure** to activate measurement function.
2. Roll the trackball to highlight **Cir/Area**. Then select **Trace**, and press **Set** to activate a measurement cursor on the screen.
3. Roll the trackball and press **Set** to anchor the start point.
4. Roll the trackball to outline the region of interest. As you move the trackball, the system displays dots to outline the structure. To correct an error in the trace, press **Back** to move in reverse along the traced outline. Roll the trackball to move forward again. The system automatically closes the loop when the last measurement marker is moved very near to the start point. Or press **Set** to close the loop. The system draws a line from the position of the active measurement marker to the beginning of the loop.
5. Roll the trackball and press **Set** to begin a new circumference/area measurement. You can measure a maximum of four groups of data. The outcome will be displayed in the measurement result window, as shown below.
6. Press **Measure** to finish and exit.

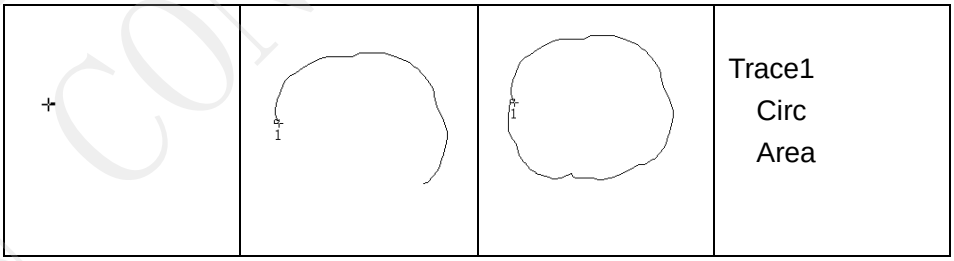


Figure 6-6 Trace Circumference/Area Method and the Results

Volume

- **2-Axis volume method**

$V= (\pi/6) \times A \times B^2$, (A: the length of major axis. B: the length of minor axis)

Two-axis volume method can be used to perform volume measurement by

calculating only one set of measured data.

Operating Method:

The two-axis volume method is similar to the generic B mode Cir/Area measurement ellipse method. You can measure a maximum of four groups of data.

- **3-Axis method**

$V = (\pi/6) \times A \times B \times M$,

(A: the length of major axis. B: the length of minor axis. M: the length of the third axis.)

Three-axis method can be used to perform volume measurement by calculating two sets of measured data, EA and the length of the third axis. To complete volume measurement, first measure EA by ellipse method, and then measure the length of the third axis with the distance measurement method, and the value of volume will be displayed automatically.

To measure volume:

In the **B mode**

1. Obtain a cross-section image and freeze the system.
2. Measure the lengths of the major axis and the minor axis of the cross section with the ellipse method.
3. Unfreeze the system to acquire a new image (vertical-section image), and then freeze it.
4. Measure the length of the third axis in the vertical section image with the distance measurement method. You can measure a maximum of one group of data. The outcome will be displayed in the measurement result window.

In the **2B mode** or **4B mode**

To measure volume:

1. Obtain the cross-section image and the vertical-section image.
2. Measure the length of the major axis and the minor axis of the cross section with the ellipse method.
3. Roll the trackball to the next image, vertical section image, measure the length of the third axis with the distance measurement method. The outcome will be displayed in the measurement result window, as shown below.
4. Press **Measure** to finish and exit.

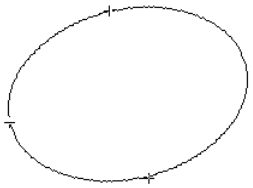
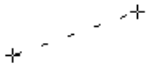
	
	LAxis SAxis 3rdAxis Volume

Figure 6-7 3-Axis Volume Method and the Results

- **3-Axis (LWH) method**

V= (π/6) × L ×W ×H,

(L: the length. W: the width. H: the height.)

Three-axis (LWH) method can be used to perform volume measurement by calculating 3 sets of distance data, L, W, and H. Measure the three pieces of data in the method of B mode generic distance measurement, and then the value of volume will be displayed automatically.

To measure volume:

In the **B mode**

1. Obtain a cross-section image and freeze the system.

2. Measure the length and the width.

3. Unfreeze the system to acquire a new image (vertical-section image), and then freeze it.

4. Measure the height. You can measure a maximum of one group of data. The outcome will be displayed in the measurement result window.

In the **2B mode** or **4B mode**

1. Obtain the cross-section image and the vertical-section image.

2. Measure the length and the width.

3. Roll the trackball to the next image, vertical section image, measure the height. The outcome will be displayed in the measurement result window, as shown below.

4. Press **Measure** to finish and exit.

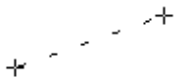
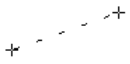
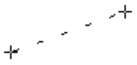
	
	Length Width Height Volume

Figure 6-8 3-Axis (LWH) Volume Method and the Results

Ratio

To determine the ratio, take two measurements: A and B. The system calculates the ratio: A/B or B/A.

To measure ratio:

1. Press **Measure** to activate measurement function.
2. Roll the trackball to highlight **Ratio**, press **Set** to activate a measurement cursor on the screen.
3. Measure the first distance A with the distance measurement method.
4. Measure the second distance B, move the cursor and press **Set** to anchor the start point, and the mark "+" appears. Move the cursor with trackball, Measurement Results displays the real time measurement value and calculation result.
5. During measurement, you can press **Change** once to change the settled point and the active point; if you press **Change** a second time, the system interchanges the numerator and denominator.
6. Roll the trackball and press **Set** to complete the measurement, and the calculation result will be displayed in the measurement result window.
7. Roll the trackball and press **Set** to begin a new ratio measurement. You can measure a maximum of four groups of data. The outcome will be displayed in the measurement result window.
8. Press **Measure** to finish and exit.

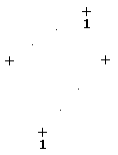
	
	Dist11 Dist12 Ratio1

Figure 6-9 Ratio Measurement and the Results

% Stenosis

- **Distance stenosis**

To determine the distance stenosis, take two distance measurements: A and B. The system calculates the stenosis: (A-B)/A * 100%.

To measure distance stenosis:

1. Press **Measure** to activate measurement function.
2. Roll the trackball to highlight **% Stenosis**, and select **Distance**, and then press **Set** to activate a measurement cursor on the screen.
3. Measure the first distance with the distance measurement method.
4. Measure the second distance, move the cursor and press **Set** to anchor the start point, and the mark "+" appears. Move the cursor with trackball, Measurement Results displays the real time measurement value and calculation result.
5. During measurement, you can press **Change** to change the start point and the end point; if you press **Change** again, the system interchanges the numerator and denominator.
6. Roll the trackball and press **Set** to complete the measurement, and the calculation result will be displayed in the measurement result window.
7. Roll the trackball and press **Set** to begin a new stenosis measurement. You can measure a maximum of four groups of data. The outcome will be displayed in the measurement result window.
8. Press **Measure** to finish and exit.

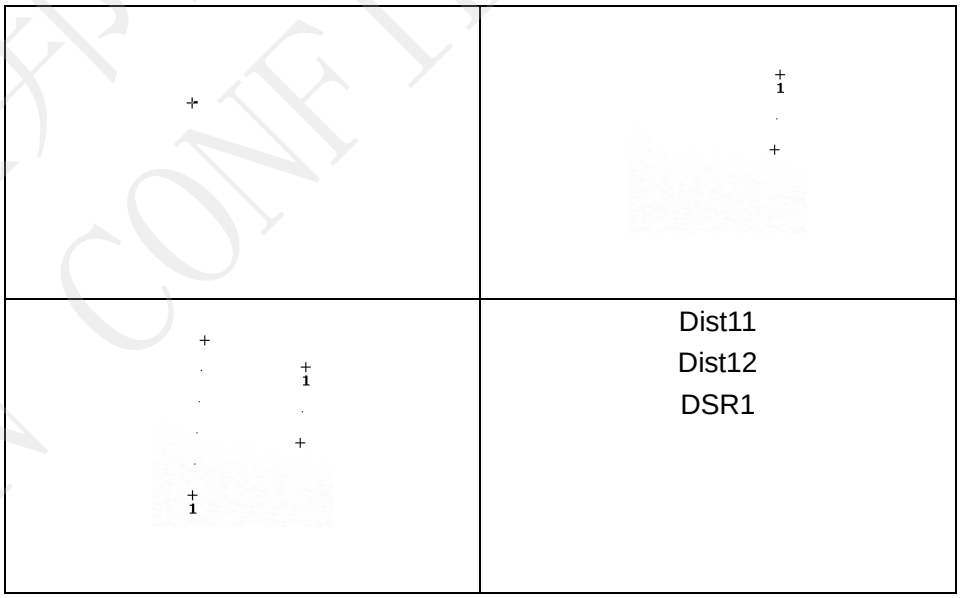


Figure 6-10 Distance Stenosis Measurement and the Results

- **Area stenosis**

To determine the area stenosis, take two area measurements: A and B. The system calculates the stenosis: (A-B)/A * 100%.

To measure area stenosis:

1. Press **Measure** to activate measurement function.
2. Roll the trackball to highlight **% Stenosis**, and select **Area**, and then press **Set** to activate a measurement cursor on the screen.
3. Measure the first area with the ellipse method.
4. Measure the second area, move the cursor and press **Set** to anchor the start point, and the mark "+" appears. Move the cursor with trackball, Measurement Results displays the real time measurement value and calculation result.
5. During measurement, you can press **Change** to change the start point and the end point.
6. Roll the trackball and press **Set** to complete the measurement. You can measure a maximum of one group of data. The outcome will be displayed in the measurement result window.
7. Press **Measure** to finish and exit.

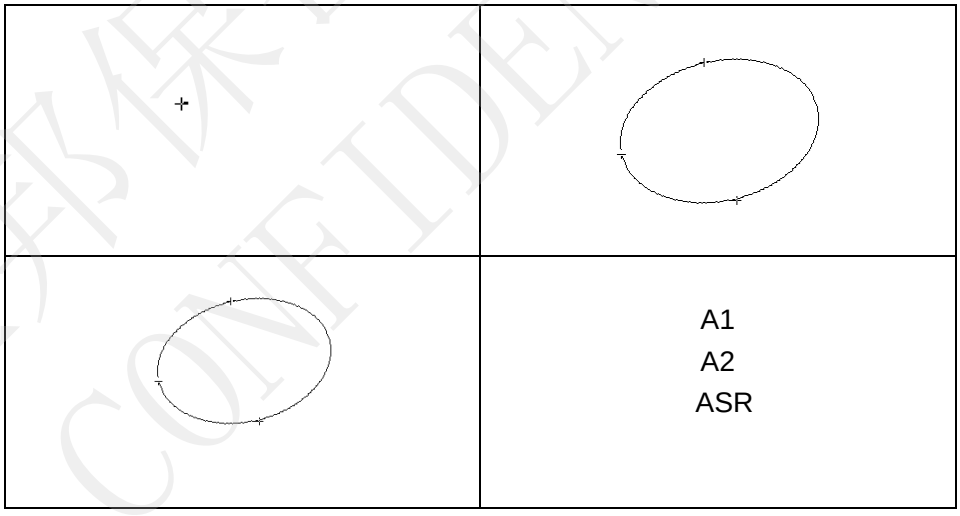


Figure 6-11 Area Stenosis Measurement and the Results

Angle

To determine an angle, draw two lines: A and B. The system calculates the angle.

To measure angle:

1. Press **Measure** to activate measurement function.
2. Roll the trackball to highlight **Angle**, and then press **Set** to activate a measurement cursor on the screen.

3. Draw the first line A with the distance measurement method.
4. Draw the second line B, move the cursor and press **Set** to anchor the start point, and the mark "+" appears. Move the cursor with trackball, Measurement Results displays the real time measurement value and calculation result.
5. During measurement, you can press **Change** to change the start point and the end point; if you press **Change** again, the system interchanges line A and line B.
6. Roll the trackball and press **Set** to complete this measurement.
7. Roll the trackball and press **Set** again to begin a new angle measurement. You can measure a maximum of four groups of data. The angles formed by the two lines are displayed in measurement result window, in units of degrees. The outcome will be displayed in the measurement result window.
8. Press **Measure** to finish and exit.

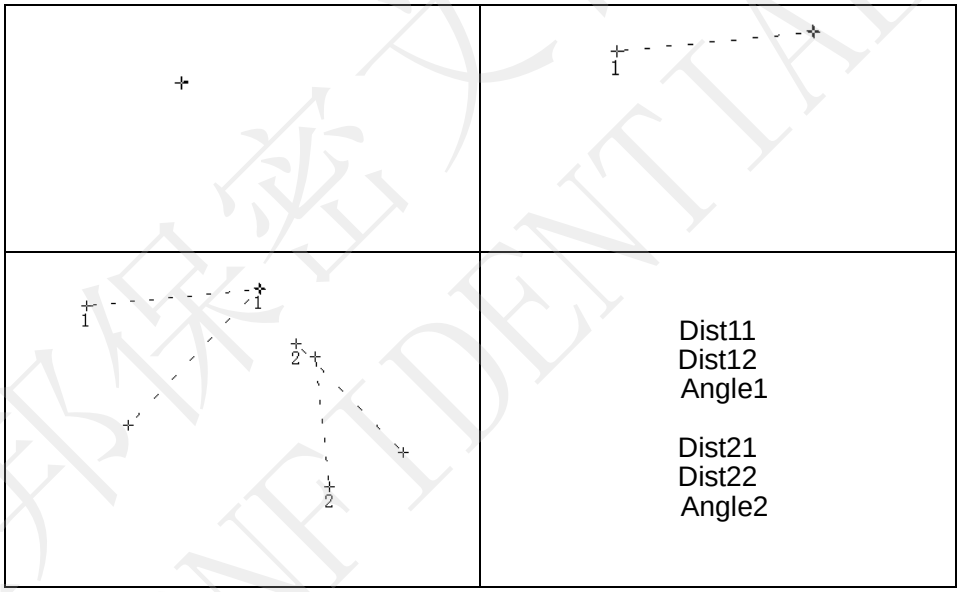


Figure 6-12 Angle measurement

Histogram

Freeze the image first before histogram measurement, otherwise the prompt "Image is not frozen, please freeze and retry!" will pop up.

1. Press **Measure** to activate measurement function.
2. Roll the trackball to highlight menu **Histogram**, and then press **Set** to activate a measurement cursor on the screen.
3. Roll the trackball, press **Set** to anchor the start point.
4. Roll the trackball, adjust the position and size of the histogram, and then press **Set** to anchor the end point.
5. During measurement, you can press **Change** to change the start point and the end point.
6. Roll the trackball and press **Set** again to begin a new histogram

measurement. You can measure a maximum of four groups of data. The outcome is displayed in Measured Results.

7. Press **Measure** to finish and exit.

Others

Roll the trackball to highlight **Others** to select the desired measurements and calculations.

6.6.2. Generic Measurements in M Mode

M mode measurements and calculations include distance, time, slope and heart rate (2 cycles). These are for B/M and M display modes only. The default measurement of B/M and M mode is heart rate measurement. M mode measurement menus are shown as follows:

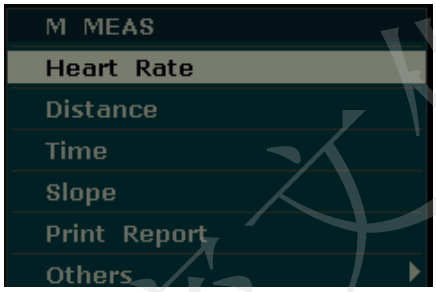


Figure 6-13 M Mode Generic Measurement and Calculation Menu

Distance To measure distance:

1. Press **Measure** to activate a measurement cursor "+".
2. Roll the trackball to highlight **Distance** and press **Set**.
3. Roll the trackball and press **Set** to anchor the start point, and a big "+" is displayed.
4. Roll the trackball and press **Set** to anchor the end point.
5. Roll the trackball and press **Set** to begin a new distance measurement. You can measure a maximum of four groups of data. The outcome will be displayed in the measurement result window, as shown below.
6. Press **Measure** to finish and exit.

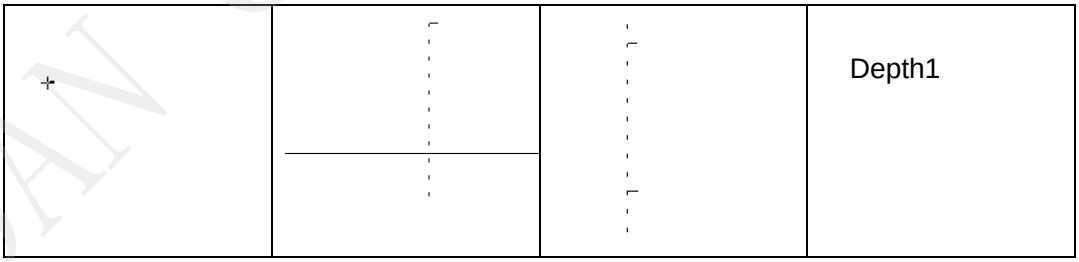


Figure 6-14 Distance Measurement and the Results

Time To measure time:

1. Press **Measure** to activate a measurement cursor "+".
2. Roll the trackball to highlight **Time** and press **Set**.
3. Roll the trackball to move the first measurement cursor at the beginning of the time interval and then press **Set**, and the measurement mark turns to a vertical line.
4. Roll the trackball to move the first measurement cursor at the end of the time interval and then press **Set**.
5. Roll the trackball and press **Set** to begin a new time measurement. You can measure a maximum of four groups of data. The outcome will be displayed in the measurement result window, as shown below.
6. Press **Measure** to finish and exit.

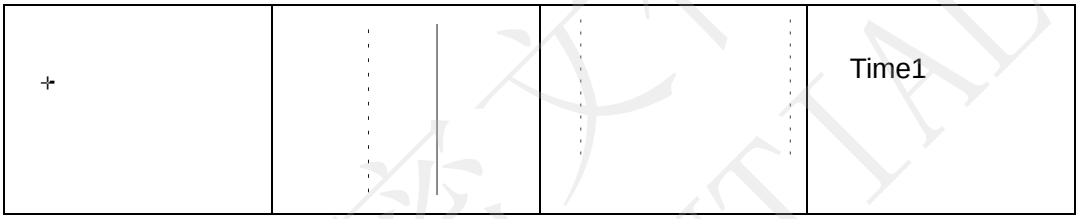


Figure 6-15 Time Measurement

Slope To measure slope:

1. Press **Measure** to activate a measurement cursor "+".
2. Roll the trackball to highlight **Slope** and press **Set** and a big "+" is displayed.
3. Roll the trackball and press **Set** to anchor the start point, and displays a big "+".
4. Roll the trackball and press **Set** to anchor the end point.
5. Roll the trackball and press **Set** to begin a new slope measurement. You can measure a maximum of four groups of data. The outcome will be displayed in the measurement result window, as shown below.
6. Press **Measure** to finish and exit.

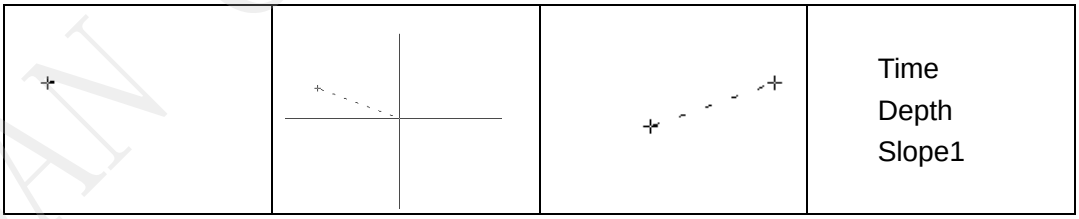


Figure 6-16 Slope Measurement and the Results

Heart Rate To measure heart rate:

1. In the **B/M mode**, roll the trackball to change the position of the M Mark and press **Set** to obtain a satisfying electrocardiogram, and then freeze it.
2. In the **M mode**, freeze the desired image.

Measure the distance between two peaks of cardiac cycles with the time measurement method.

1. Press **Measure** to activate a measurement cursor "+".
2. Roll the trackball to highlight **Heart Rate** and press **Set** and a "+" is displayed.
3. Roll the trackball to move the first measurement maker on the first peak systole and then press **Set** to anchor start position, and the measurement mark turns to a vertical line.
4. Roll the trackball to move the second measurement maker on the peak systole following two complete cycles and then press **Set** to anchor end position.
5. Roll the trackball and press **Set** to begin a new heart rate measurement. You can measure a maximum of four groups of data. The outcome will be displayed in the measurement result window.
6. Press **Measure** to finish and exit.

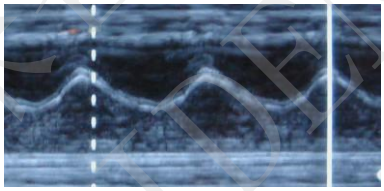


Figure 6-17 Heart Rate Measurement

NOTE:

In **B/M/PW mode**, you should define the M Mark position, and then begin the measurement.

6.6.3. Generic Measurements in PW Mode

PW mode measurements and calculations include velocity, heart rate, time, acceleration, RI, and D trace. The default measurement is velocity measurement. The measurement menu is shown below.

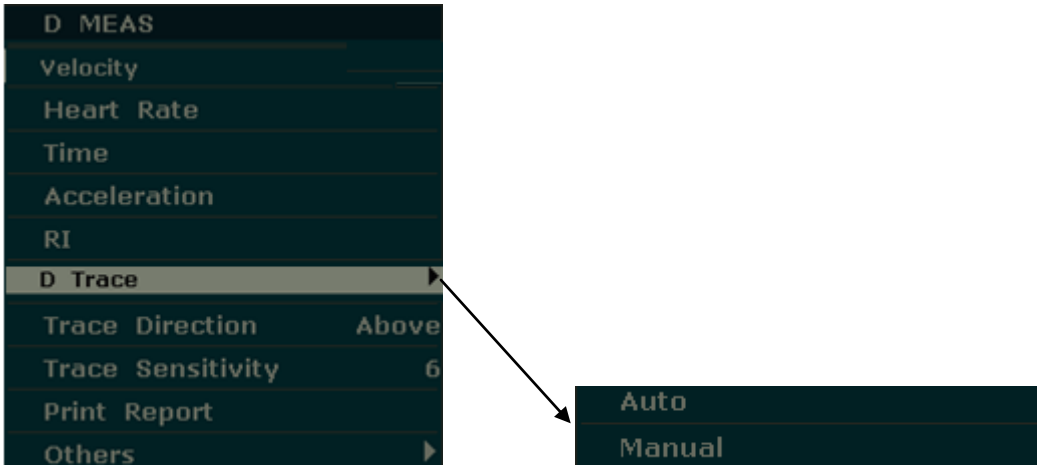


Figure 6-18 PW Mode Generic Measurement and Calculation Menu

NOTE:

Heart rate and time measurement methods are the same as those in the M mode.

Reference Section *6.6.2 Generic Measurements in M Mode.*

Velocity To measure velocity of a point on the Doppler wave:

1. Press **Measure** to activate a measurement cursor "+".
2. Roll the trackball to highlight **Velocity** and press **Set** and a "+" is displayed.
3. Roll the trackball and press **Set** to anchor the point, measuring velocity.
4. Roll the trackball and press **Set** to begin a new velocity measurement. You can measure a maximum of four groups of data. The outcome will be displayed in the measurement result window, as shown below.
5. Press **Measure** to finish and exit.

Heart Rate Refer to the heart rate measurement in 6.6.2 Generic Measurement in M mode.

Acceleration To measure velocities of two points on the Doppler wave, and calculate the acceleration:

Acceleration = (Vel1－Vel2) / Interval

1. Press **Measure** to activate a measurement cursor "+".
2. Roll the trackball to highlight **Acceleration** and press **Set** and a "+" is displayed.
3. Roll the trackball and press **Set** to anchor the first point, measuring **Vel1**.
4. Roll the trackball and press **Set** to anchor the second point, measuring **Vel2**

and **Interval**, and calculating **Acceleration**.

5. Roll the trackball and press **Set** to begin a new acceleration measurement. You can measure a maximum of four groups of data. The outcome will be displayed in the measurement result window, as shown below.
6. Press **Measure** to finish and exit.

RI (Resistance Index)

To measure velocities of two peak points on the Doppler wave, and calculate RI and S/D:

RI = (Vel1－Vel2)/Vel1

1. Press **Measure** to activate a measurement cursor "+".
2. Roll the trackball to highlight **RI** and press **Set** and a "+" is displayed.
3. Roll the trackball and press **Set** to anchor the first peak point, measuring **Vel1**.
4. Roll the trackball and press **Set** to anchor the second peak point, measuring **Vel2**, calculating **RI**.
5. Roll the trackball and press **Set** to begin a new RI measurement. You can measure a maximum of four groups of data. The outcome will be displayed in the measurement result window.
6. Press **Measure** to finish and exit.

D Trace

The trace in PW mode is shown below:

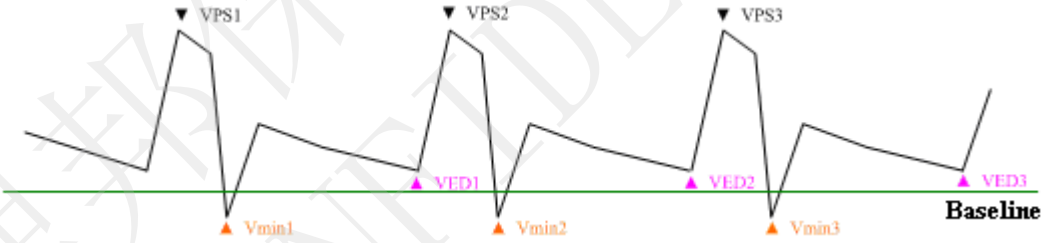


Figure 6-19 Trace Diagram

Where,

- VPS is the maximum velocity in the cycle;
- VED is the minimum velocity in the cycle;
- V_{min} is the minimum absolute value.

NOTE:

1. The trace function is effective above the baseline only.
2. Freeze the system before performing the tracing function.

- **To perform D Trace function (manual tracing)**

1. Press **Measure** to activate a measurement cursor "+".

2. Roll the trackball to highlight **D Trace** and press **Set**.
3. Select **Manual** and a "+" is displayed.
4. Roll the trackball and press **Set** to anchor the start point.
5. Roll the trackball to trace along the Doppler wave forward, or press **Back** to erase the trace backward.
6. Press **Set** to anchor the end point, the system displays the results of PS, ED, RI, S/D, PI, TAMAX, etc. in measurement result window.
7. Roll the trackball and press **Set** to begin a new tracing measurement. You can measure a maximum of four groups of data. The outcome will be displayed in the measurement result window.
8. Press **Measure** to finish and exit.

- **To perform D Trace function (automatic tracing)**

1. Press **Measure** to activate a measurement cursor "+".
2. Roll the trackball to highlight **D Trace** and press **Set**.
3. Select **Auto** and a big "+" is displayed.
4. Roll the trackball and press **Set** to anchor the start point.
5. Roll the trackball press **Set** to anchor the end point, the system displays the results of PS, ED, RI, S/D, PI, TAMAX, etc. in measurement result window.
6. Roll the trackball and press **Set** to begin a new tracing measurement. You can measure a maximum of four groups of data. The outcome will be displayed in the measurement result window.
7. Press **Measure** to finish and exit.

NOTE: While automatic tracing, you can add the envelope on the spectrum upwards or downwards. The higher the sensitivity, the more poor signal will be enveloped, but also more noises will be enveloped. The lower the sensitivity, the less the noise signal will be enveloped, but also some spectrum signal will be lost.

6.6.4. General Report

To preview the general ultrasound report:

Highlight **Print Report** in the B MEAS menu (B Mode Generic Measurement and Calculation Menu), and press **Set** to display the **general worksheet** dialog box, as shown below:

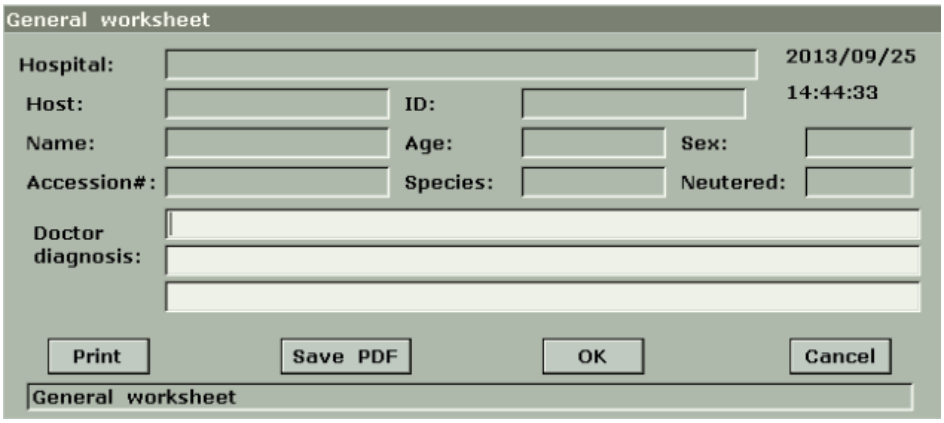


Figure 6-20 General Worksheet

To edit the general ultrasound report:

Move the trackball to the text box and edit the report, and select **OK** to save the report and close the dialog box.

To print the general ultrasound report:

Press **Print** in the General worksheet dialog box.

Printing reference Section *5.8, Printing*.

Save PDF

Press **Save PDF** to save the report to the removable U disk in PDF format. Images of white/black or color can be inserted in the report.

6.7. CINE Review

The system provides a storage capacity of 256 frames for CINE Review playback.

Activate the device and enter the real-time B, B/B, 4B, B/M, or PW scanning mode. Enable the system to collect images before CINE Review playback. The cine function includes frame-by-frame playback (manual playback) and motion playback (automatic playback). The cine review symbol is displayed on the bottom of the screen, as shown below:

Figure 6-21 CINE Review Symbol

To perform the CINE Review playback:

1. Press **Freeze** to freeze the image, and the system displays the cine menu, as shown below:

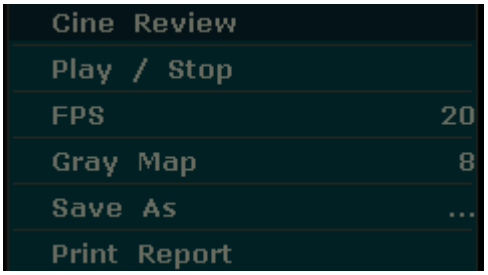


Figure 6-22 Cine Review Menu

2. Roll the trackball to start playing back frame by frame. Roll the trackball to the right to advance the cine data one frame at a time, or to the left to move the data in reverse. The arrow on the CINE Review Symbol indicates the direction toward which the data is moving. The loop of data wraps around when either end is reached. As the trackball is moved, the current cine number is displayed on the right of the CINE Review Symbol.
3. Press **Cine** to exit frame-by-frame playback mode and enter the motion playback mode.
4. In motion playback mode, press **Play/Stop** to play or to stop.
5. Press **Cine** to go back to the frame-by-frame mode.
6. Press **Freeze** to exit the CINE Review playback.

The default setting is to load images by serial numbers forward. When the number reaches the last, it will return to 1.

During playing back, press **Save As** to save the file in BMP, JPG, FRM, DCM, CIN or AVI format. You can save files to the local disk or U disk. For details about operation method, please refer to 6.8.1 “Saving Files”

NOTE:

1. Cine review is unavailable in M-mode.
2. Cine review can’t be performed at the beginning of scanning or probe switching. You should wait a moment.
3. The FPS (frames per second) is adjustable, from 5 f/s to 50 f/s, in increments of 5 f/s.
4. After opening a cine file, you can perform measurements, add comments and the body mark on the image and print them in the report. See section *5.4.5 Comment function* and section *5.4.6. Body mark function* for detailed operation information.

6.8. File Management

Press **File** to display the file menu, shown as below.

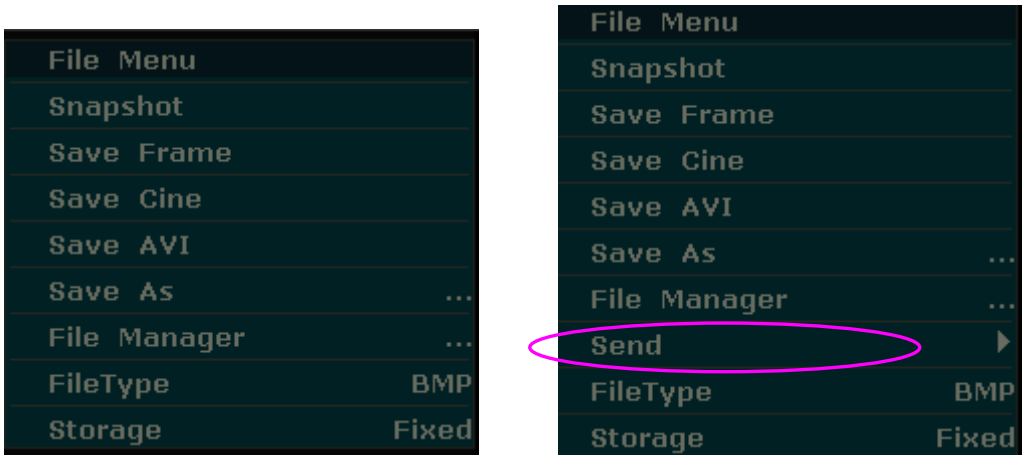


Figure 6-23 File Menu (the left—with no DICOM installed, the right—with DICOM installed)

6.8.1. Saving Files

File types:

The file types include BMP, JPG, DCM (if DICOM is installed), CIN, FRM, and AVI.

To choose a storage disk:

Highlight **Storage** in the file menu and press **Set** repeatedly to cycle between **Fixed,** USB-Disk and portable hard disk **(A:\, B:\, C:\)**. If no USB-disk or portable hard disk is connected, only the **Fixed** storage disk will be available. You can set the default storage disk by using **Preset**>**System Preset**>**General Preset**.

NOTE:

1. After connecting a removable disk, the interface displays a USB symbol on the bottom left corner.
2. Please do not use the two USB ports at a time, otherwise, the system may fail to read / write data.

To set a file type:

The **File Type** in the file menu means the file type for the quick saved images.

To choose a file type for the quick saved images: highlight **File Type** in the file menu and press **Set** repeatedly to cycle between **JPG**, **BMP**, **FRM and DCM** (if DICOM is installed).

To save a file:

The system provides two ways to save images:

- Press **Quick Save** on the keyboard;

  Press **Quick Save** on the keyboard to save the current displaying image in BMP, JPG, FRM or DCM (if DICOM is installed) format (set by **File Type** in the file menu, as shown above).

- Use **Snapshot**, **Save Cine**, **Save As**, **Save Frame** or **Save AVI** of the file menu to save files.

➢ **Snapshot**

Highlight **Snapshot** in the file menu and press **Set** to save the current displaying image in BMP, JPG, FRM or DCM (if DICOM is installed) format (set by **File Type** in the file menu, as shown above).

➢ **Save Frame**

1. Press **Freeze** to freeze the system;
2. Play back and find the desired image;
3. Press **File** to open the file menu;
4. Highlight **Save Frame** in the file menu, and press **Set** to save the current displaying image.

➢ **Save Cine**

1. Press **Freeze** to freeze the system;
2. Press **File** to open the file menu;
3. Highlight **Save Cine** in the file menu, and press **Set**.

➢ **Save AVI**

1. Press **Freeze** to freeze the system;
2. Press **File** to open the file menu;
3. Highlight **Save AVI** in the file menu, and press **Set**.

NOTE:

The AVI files can not be viewed on this system, please use a U disk to copy the AVI files to a PC, and view them by using the WINDOWS RealPlayer.

➢ **Save As**

When obtaining a satisfying image:

1. Press **File** and select **Save As…**in the file menu to display the **File Save As** dialog box.
2. Select a destination driver from the **Driver** pull-down menu, and a folder from the directory on the left, or press **New Folder** to create a folder for storing files.
3. Press **Set** on the field next to **File Name**, enter a file name with the keyboard.
4. Press **OK** to save, or press **Cancel** to give up.

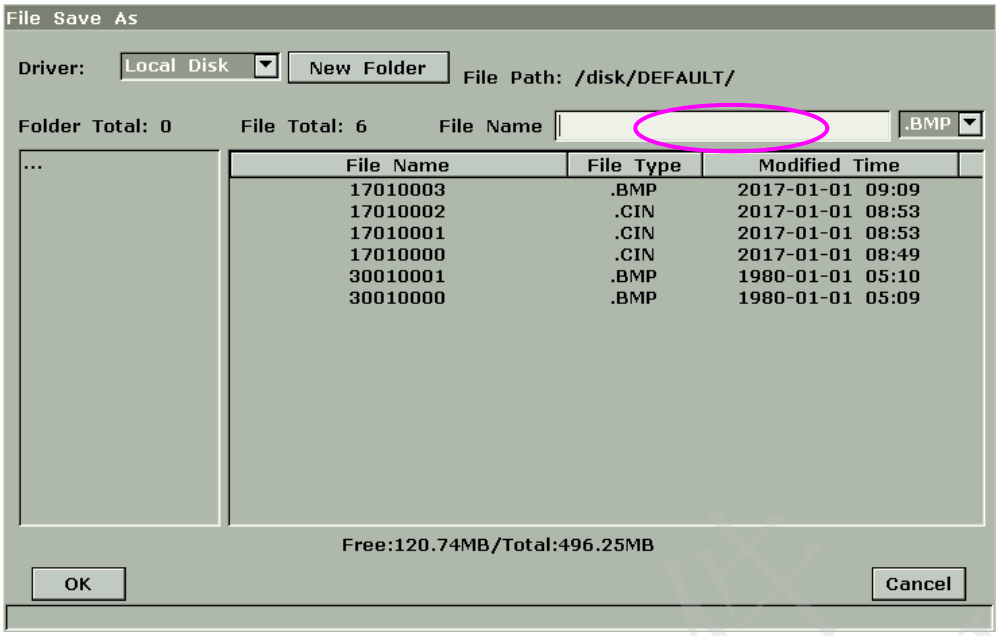


Figure 6-24 File Saving Dialog Box

NOTE:

If you do not enter the name for the file, the system will automatically number the file in sequence. For instance, if the latest number comes to YYMM0020 (“Y” stands for “year”, and “M” stands for “month”), and if you save a file the next time, the file is numbered as YYMM0021.

When saving a file, the saving information is automatically displayed in the middle of image area.

6.8.2. File Manager

You can use the file manager to perform the file management or browse the images.

In real-time or frozen status, press **File** to display file menu**,** and select **File Manager,** the **File Manager** dialog box pops up, as shown below.

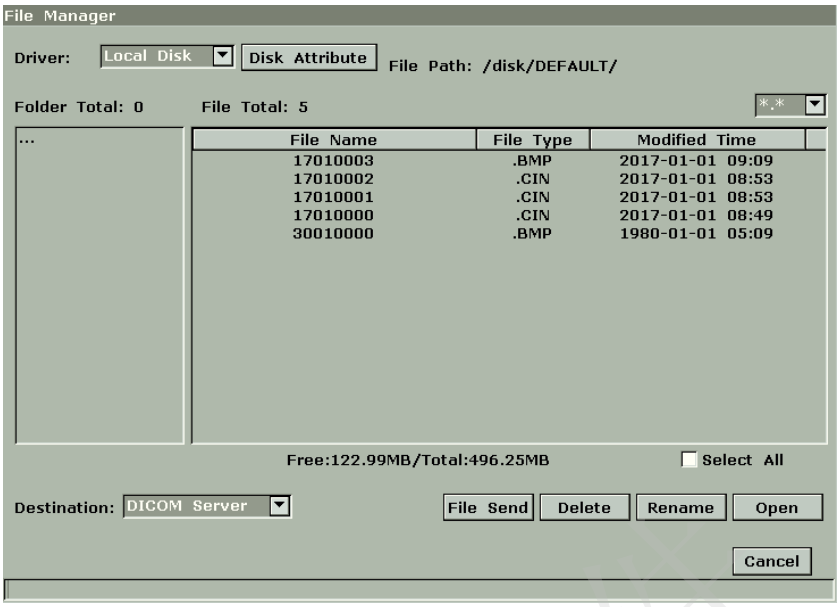


Figure 6-25 File Manager Dialog Box

Basic operations:

- Press **Disk Attribute** to check capacity information of current driver.
- Select a file format from the pull-down menu  , such as BMP/ JPG/ DCM/ FRM/ CIN/ AVI/ DAT/ PDF to display files in one type, or select *.* to display all files.
- Point to a file, press **Set** to select it, and press **Set** again to deselect it; the system supports multi-choice by default; check the **Select All** checkbox to select all files, and then you can perform following operations: **File Send**, **Delete** and **Open**.
- Click on the headings of the file list: **File Name**, **File Type** or **Modified Time** to rearrange the file sequence according to the file name, file type or modified time (in ascending/descending order).

NOTE:

1. When you are sending, deleting or renaming a file, do not connect or disconnect the USB disk or portable hard disk.
2. USB disk or portable hard disk must be in FAT32 format.
3. Do not use the USB disk or portable hard disk for other uses, but only for this device. Otherwise the storage and the transmission function may not be stable.
4. We suggest that you use the USB disk or portable hard disk supplied or recommended by the manufacturer.

To send files

1. Connect a USB disk or portable hard disk to the system, press **File,** and select **File Manager** in the file menu.
2. Select a desired driver from the **Driver** pull-down menu and press **Set**, point to the file or folder that need to be sent and press **Set**.
3. Select a destination driver from the **Destination** pull-down menu. The destination driver includes local disk, USB-disk, portable hard disk or DICOM server (If DICOM function is installed).
4. If the destination driver is DICOM server, press **File Send** to send the DICOM and CIN files to DICOM server directly;

   If the destination driver is local disk, USB-disk or portable hard disk, press **File Send** to open the **File Send** dialog box, select a target folder on the left, or press **New Folder** to create a folder for storing files.
5. Press **OK** to send files to the target directory.

To delete a file folder/file

1. Select a desired driver from the **Driver** pull-down menu and press **Set**.
2. Point to the file folder/file that needs to be deleted, and press **Set**.
3. Press **Delete**, and you will be prompted whether to delete the files.
4. Press **Yes** to delete the files, or **No** to give up.

To rename a file

1. Select a desired driver from the **Driver** pull-down menu and the file format, and then press **Set**.
2. Point to the file that needs to be renamed, and press **Set**.
3. Press **Rename** to open the **Input new name for the file** dialog box, enter a new file name with the keyboard.
4. Press **OK** to rename the file, or **Cancel** to give up.

To open files

1. Select a desired driver from the **Driver** pull-down menu and file format, and then press **Set**.
2. Point to the file that needs to be opend and press **Set**, press **Open** or double click on the file, a prompt ***Loading file…*** is displayed in the middle of the screen.
3. If the file format is FRM/CINE, cine images will be loaded. You can perform Cine review, measurements, or add comments/body marks and print them out in reports; if the file format is BMP/JPG/DCM, the system will enter image browsing status: check the multi-choice checkbox to browse the selected files in file list, uncheck the checkbox to browse all files.

press << on the bottom of the screen to open the previous image, and >> to open the next image; press Play to perform automatic browsing, and press Stop to stop automatic browsing; press Exit or **Esc** to exit.

4. Press **Open** without selecting any file will open the first file.

NOTE:

1. Images that have not yet been saved in the saving zone can not be loaded.
2. When saving or loading an image is still in process (prompt instruction *Saving file…* or *Loading file…*), please do not perform any other operation. This is to avoid damaging the device.
3. You should freeze the system before opening Cine images.

6.8.3. Sending Files

If you have installed the DICOM software, and the DICOM presetting has been performed correctly, you can send images / files.

Figure 6-26 File Menu (with DICOM Function)

To send a DCM Image

1. Highlight the secondary menu **DCM Image**, and then press **Set**.

2. If the server is running normally, the current image will be sent to the server.

3. The system displays a prompt indicating the successful transmission.

To send a DCM file

1. Highlight the secondary menu **DCM File**, and then press **Set**.

2. The system displays the File Opening Dialog Box for selecting a DCM file to be transmitted.

3. If the server is running normally, the selected file will be sent to the server.

4. The system displays a prompt indicating the successful transmission.

To send a DCM package

1. Highlight the secondary menu **DCM package**, and then press **Set**.

2. The system displays the File Opening Dialog Box for selecting the driver.

3. If the server is running normally, all the DCM files of the selected driver will be sent to the server.

4. The progress bar disappears after successful transmission.

To send Cine Images

1. Freeze the system.

2. Press **File** to enter the file menu.

3. Highlight the secondary menu **Cine Images**, and then press **Set**.

4. If the server is running normally, the current Cine images will be sent to the server.

5. The progress bar disappears after successful transmission.

To send a Cine File

1. Highlight the secondary menu **Cine File**, and then press **Set**.

2. The system displays the File Opening Dialog Box for selecting a cine file to be transmitted.

3. If the server is running normally, the selected file will be sent to the server.

4. The progress bar disappears after successful transmission.

NOTE: When a DCM image or a DCM file is sent, the images and measurement parameters will be sent together.

6.9. Needle Guide Function

NOTE:

Use proper disinfection techniques at all times to perform a biopsy.

Always follow these basic precautions:

WARNING

1. Disinfect the needle guide and the probe before the first use and after each subsequent use to avoid cross infection.
2. Always handle probes and needle guide adaptors with care. Do not use a probe or an

adaptor if it has been dropped or struck against a hard surface until it is inspected by a customer engineer of the manufacturer.

3. The displayed needle guide line on the monitor is intended for reference during biopsy procedures. A variety of factors outside the manufacturer's control, such with the change of tissue density, bending of the needle, off-axis pressure by the person holding the probe, may cause deflection of a needle outside of the displayed line even when the probe, needle guide, and the system software are all performing as intended and within manufacturing specification. The specialist performing a biopsy procedure must be aware of potential external factors when executing an invasive procedure.
4. The caliper must be placed along the needle path. If not, the displayed measurements may be incorrect.

6.9.1. Enabling Needle Guide Function

In real-time B mode status menu, highlight **Needle Guide** and then press **Set**. Prompt information **Needle guide line must be calibrated prior to each puncture** will be displayed on the screen. Press **Close** and enter the puncture function and a needle guide menu is displayed, as shown below:

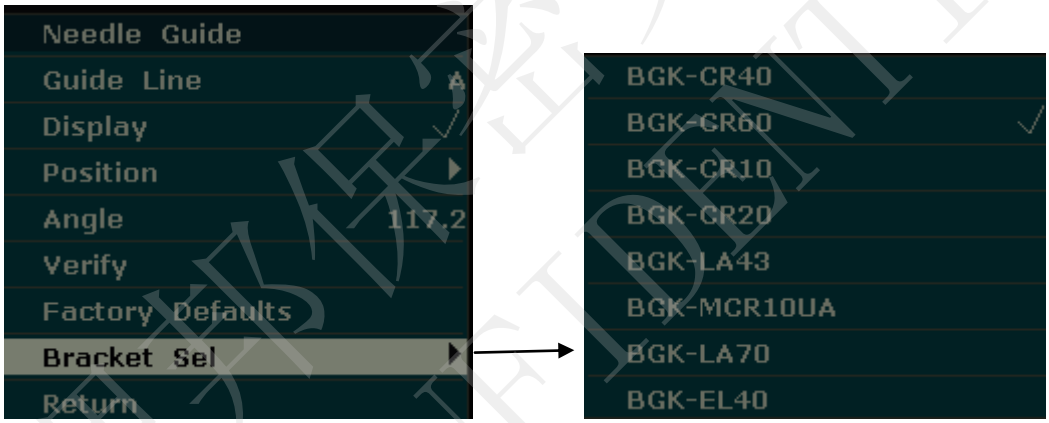


Figure 6-27 Needle Guide Menu

WARNING

1. Prior to each puncture, calibrate the needle guide line.
2. If the needle position is not the same as the needle guide line position, do not perform the puncture.

♦ **To Display or To Hide the Needle Guide Line**

Highlight **Display** in the needle guide menu, and press **Set** repeatedly to display or to hide the needle guide line.

♦ **To Adjust the Needle Guide Line Position**

Highlight **Position** in the needle guide menu, and press **Set** or **Back** to adjust the guide line

position horizontally.

♦ **To Select the Angle of Needle Guide Line**

Needle guide line has been verified when the device is produced. The value is saved in Factory data. But after a period of use, the needle guide line needs to be adjusted since the real value may be changed. For instance, highlight **Angle** in the needle guide menu and press **Set** to adjust, and the system displays the angle.

6.9.2. Calibrating Guide Line (Performing Phantom Cal)

1. Put the assembled puncture kit, put the probe in to water phantom, and perform the water scan;
2. Adjust the position and angle of needle to comply with the guide line as shown below;
3. Select **Verify** to save the verified value.

◆ To verify the needle guide line:

Move the needle guide line horizontally

Highlight **Position**, press **Set** to increase the value and press **Back** to decrease the value, and the value is displayed in the menu option.

◆ To adjust the angel of needle guide line:

Enter **Angle** option to adjust the angle, press **Set** to increase the value and press **Back** to decrease the value, and the value is displayed in the menu option.

◆ To save the verified value:

After verifying the position and the angle, highlight **Verify** and press **Set**, and the system will save the verified value. After restarting the system, the verified value is activated.

◆ To save the factory data:

Highlight **Load Factory** and press **Set** load the factory data.

◆ To select the bracket:

If the probe has different brackets, you can use the **Bracket sel** option to select the bracket.

6.9.3. Performing Needle Guide Function

To perform biopsy:

1. The needle guide line is displayed on the image of the ultrasound system, and the numbers of the menu on the right screen stand the situation of puncture;

2. Align the needle guide line with the target;
3. Get the sample of the target;
4. Move the probe away from the animal carefully.

WARNING

Do not freeze the system when performing puncture.

NOTES:

- There is one guide lines for each puncture frame.
- If image depth ≤ 8 cm, the distance between the two nods of the needle guide line indicates 0.5 cm.
- If image depth > 8 cm, the distance between the two nods of the needle guide line indicates 1 cm.

6.9.4. Exiting Needle Guide Function

Press **Return** of the needle guide menu to exit puncture function, the needle guide menu will be closed and the needle guide line in image will disappear.

Chapter 7 Abdominal Measurements & Calculations

7.1. Measurements and Calculations

The abdominal examination is usually in the B mode.

1. Press **Exam,** select the exam mode **Abd-Small/Abd-Large**, and then press **Set**.
2. Press  to enter the B mode.
3. Press **Measure** to activate the application measurement function. The measurement menu is displayed.

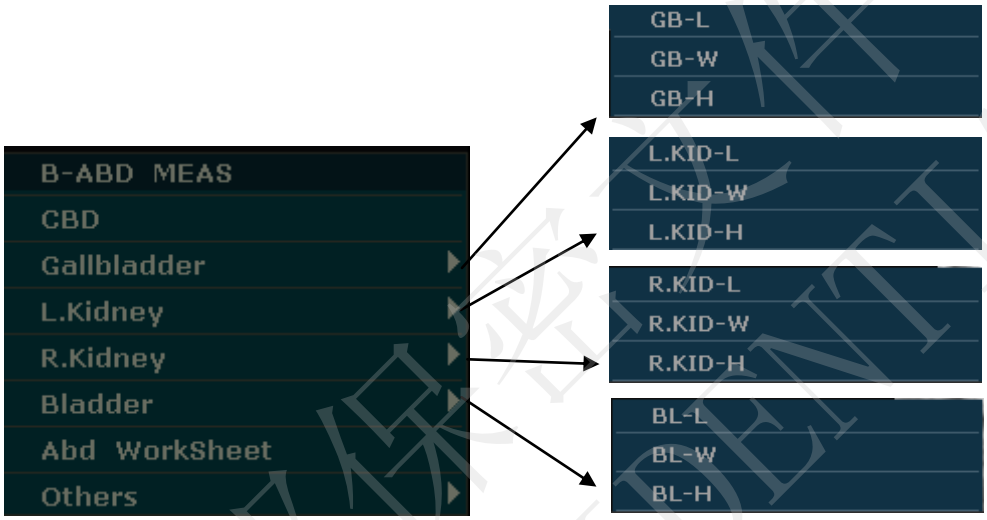


Figure 7-1 Abdominal Measurement and Calculation Menu

Items of Measurement and Calculation

CBD, Gallbladder, Left Kidney, Right Kidney, and Bladder.

7.1.1. CBD

1 In the abdominal measurement menu, roll the trackball to highlight **CBD**, and then press **Set**.

2 Measure CBD by the method of distance measurement.

Reference Section *6.6.1 Generic Measurement in B mode*

3 After the measurement, the result of CBD will be displayed in the measurement result window.

7.1.2. Gallbladder

1. In the abdominal measurement menu, roll the trackball to highlight **Gallbladder**, select **GB-L**, **GB-W** or **GB-H** from the secondary menu， and then press **Set**.
2. Measure GB-L, GB-W or GB-H by the method of distance measurement.

   Reference Section *6.6.1 Generic Measurement in B mode.*
3. After the measurement, the result of gallbladder will be displayed in the measurement result window.

7.1.3. Kidney

1. In the abdominal measurement menu, roll the trackball to highlight **L Kidney**/**R Kidney**, select **L.KID-L/L.KID-W/L.KID-H,** or **R.KID-L/R.KID-W/R.KID-H** from the secondary menu, and then press **Set**.
2. Measure KID-L, KID-W, or KID H, by the method of distance measurement.

   Reference Section *6.6.1 Generic Measurement in B mode.*
3. After the measurement, the result of kidney will be displayed in the measurement result window.

7.1.4. Bladder

1. In the abdominal measurement menu, roll the trackball to highlight **Bladder**, select **BL-L**, **BL-W**, or **BL-H** from the secondary menu, and then press **Set**.
2. Measure BL-L, BL-W, or BL-H, by the method of distance measurement.

   Reference Section *6.6.1 Generic Measurement in B mode.*
3. After the measurement, the result of bladder will be displayed in the measurement result window.

7.2. Abdominal Report

After the abdominal examination, the system generates an abdominal worksheet.

1. Select the exam mode **Abd-Small**/**Abd-Large**.
2. In B mode, after application measurements press Abd worksheet to open **Abdominal**

Worksheet, as shown below:

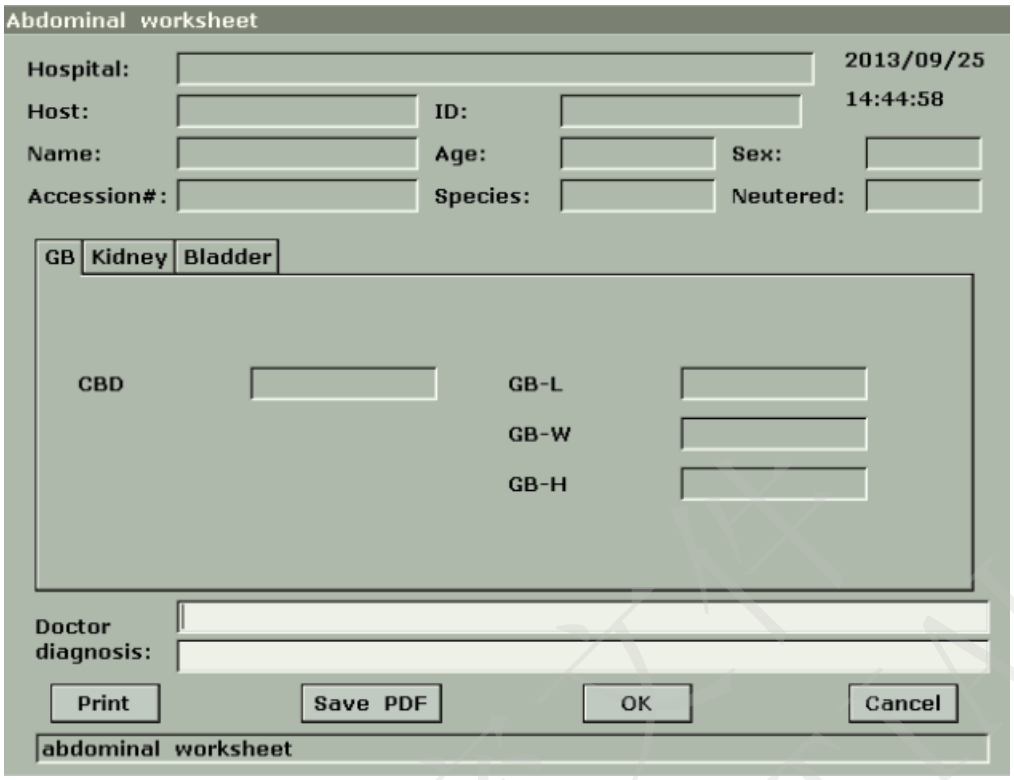


Figure 7-2 Abdominal Worksheet

The diagnosis editing column displays the cursor "I", and you can enter diagnosis information.

To print the report:

Press **Print** in the Abdominal Worksheet.

Printing reference Section *5.8 Printing.*

7.3. Others

Select **Others** to enter another application measurement.

Chapter 8 Obstetric Measurement and Calculation

The obstetric examination is usually in the B mode.

To enter B mode obstetric examination:

1 Press Exam, select a desired exam mode: **OB Canine**, **OB Feline**, **OB Equine**, **OB Bovine**, **OB Ovine**, or **OB Others**, and then press **OK**, or double click on the exam type.

2 Press  to enter B mode.

3 Press **Measure** to activate the application measurement function. The system displays the measurement menu as shown in *Figure 8-1*.

8.1. Obstetric Measurement and Calculation in B Mode

Items of Measurement and Calculation
CRL, GSD, GSD-H, GSD-V, HD, TD, BD, BPD and MA.

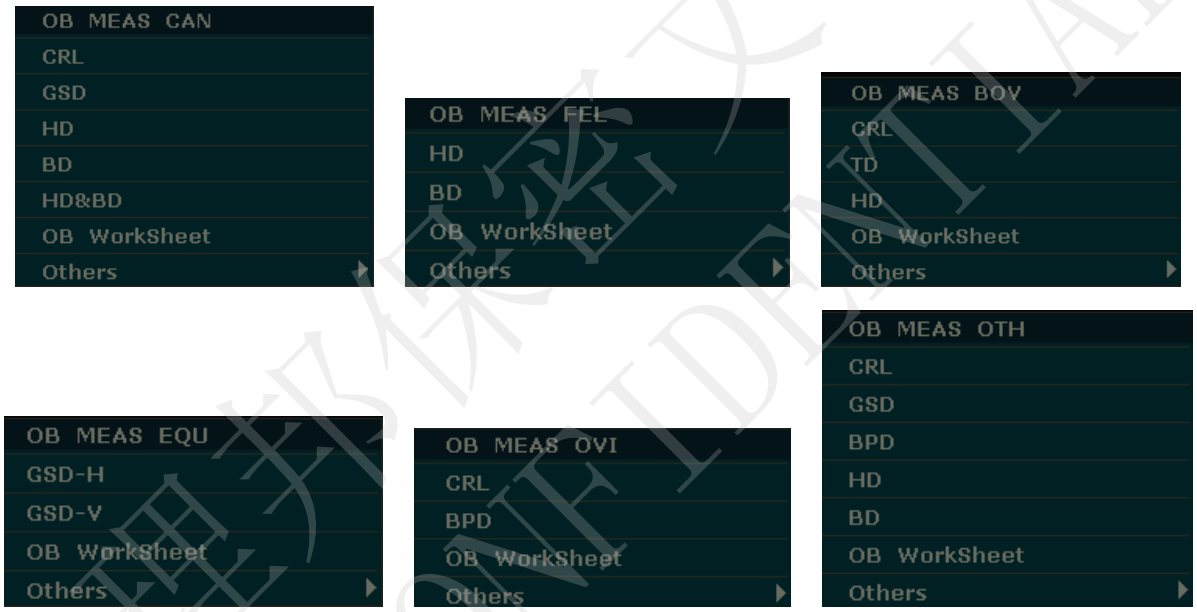


Figure 8-1 Obstetrics Measurement and Calculation Menu

Label	Description	Channel	Method	Results display
CRL	Crown Rump Length	1	Distance (mm)	The measurement results will be displayed in the result window
GSD	Gestational Sac Diameter	1		
GSD-H	Gestational Sac Diameter-Horizontal	1		
GSD-V	Gestational Sac Diameter-Vertical	1		
HD	Head Diameter	1		
TD	Trunk Diameter	1		
BD	Body Diameter	1		

BPD	Biparietal Diameter			
MA	Menstrual Age	1	According to species, described in Appendix III	

Table 8-1 Obstetrics Measurement & Calculation

8.2. Canine Obstetrics Measurement

When the exam mode **OB Canine** is selected, the **OB MEAS CAN** menu will display after entering the obstetrics measurement.

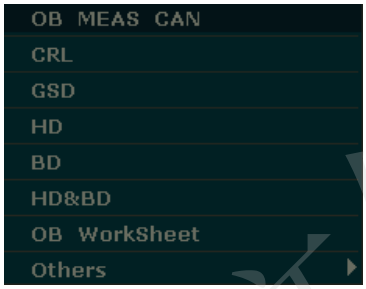


Figure 8-2 Canine Obstetrics Measurement and Calculation Menu

After measuring one or more measurement items of GSD, CRL, HD, BD, HD&BD, the system will calculate the MA automatically and display the result.

8.2.1. CRL

To measure CRL:

1. In the **OB MEAS CAN** menu, roll the trackball to highlight the menu **CRL**, press the **Set** key, and move the cursor to image and display "+".
2. Measure CRL, in the method of distance measurement.

   For more information on B-mode generic distance measurements, please refer to section *6.6.1 Generic Measurement in B mode.*
3. The result is displayed in the measured result window.
4. To begin a new CRL measurement, repeat steps 1 through 3. You can measure a maximum of one group of data.

8.2.2. GSD

To measure GSD:

1. In the **OB MEAS CAN** menu, roll the trackball to highlight the menu **GSD**, press the **Set** key, and move the cursor to image and display "+".
2. Measure GSD, in the method of distance measurement.

For more information on B-mode generic distance measurements, please refer to section *6.6.1 Generic Measurement in B mode.*

3. The result is displayed in the measured result window.
4. To begin a new GSD measurement, repeat steps 1 through 3. You can measure a maximum of one group of data.

8.2.3. HD

To measure HD:

1. In the **OB MEAS CAN** menu, roll the trackball to highlight the menu **HD**, press the **Set** key, and move the cursor to image and display "+".
2. Measure HD, in the method of distance measurement.

   For more information on B-mode generic distance measurements, please refer to section *6.6.1 Generic Measurement in B mode.*
3. The result is displayed in the measured result window.
4. To begin a new HD measurement, repeat steps 1 through 3. You can measure a maximum of one group of data.

8.2.4. BD

To measure BD:

1. In the **OB MEAS CAN** menu, roll the trackball to highlight the menu **BD**, press the **Set** key, and move the cursor to image and display "+".
2. Measure BD, in the method of distance measurement.

   For more information on B-mode generic distance measurements, please refer to section *6.6.1 Generic Measurement in B mode.*
3. The result is displayed in the measured result window.
4. To begin a new BD measurement, repeat steps 1 through 3. You can measure a maximum of one group of data.

8.2.5. HD&BD

To measure HD&BD:

1. In the **OB MEAS CAN** menu, roll the trackball to highlight the menu **HD&BD**, press the **Set** key, and move the cursor to image and display "+".
2. Measure HD&BD, in the method of distance measurement.

   For more information on B-mode generic distance measurements, please refer to section *6.6.1*

Generic Measurement in B mode.

3. The result is displayed in the measured result window.
4. To begin a new HD&BD measurement, repeat steps 1 through 3. You can measure a maximum of one group of data.

8.3. Feline Obstetrics Measurement

When the exam mode **OB Feline** is selected, the **OB MEAS FEL** menu will display after entering the obstetrics measurement.

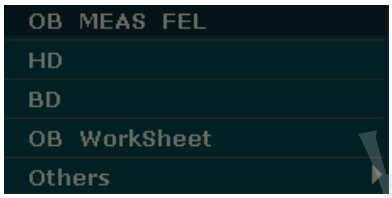


Figure 8-3 Feline Obstetrics Measurement and Calculation Menu

After measuring one or both of the two measurement items, HD, BD, the system will calculate the MA automatically and display the result.

The measurements of HD and BD are the same to that of the Canine, please refer to section *8.2.3 HD* and *8.2.4 BD* respectively for reference.

8.4. Equine Obstetrics Measurement

When the exam mode **OB Equine** is selected, the **OB MEAS EQU** menu will display after entering the obstetrics measurement.

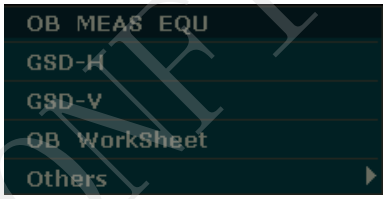


Figure 8-4 Equine Obstetrics Measurement and Calculation Menu

After measuring one or both of the two measurement items, GSD-H, GSD-V, the system will calculate the MA automatically and display the result.

8.4.1. GSD-H

To measure GSD-H:

1. In the **OB MEAS EQU** menu, roll the trackball to highlight the menu **GSD-H**, press the **Set** key, and move the cursor to image and display "+".
2. Measure GSD-H, in the method of distance measurement.

For more information on B-mode generic distance measurements, please refer to section *6.6.1 Generic Measurement in B mode.*

3. The result is displayed in the measured result window.
4. To begin a new GSD-H measurement, repeat steps 1 through 3. You can measure a maximum of one group of data.

8.4.2. GSD-V

To measure GSD-V:

1. In the **OB MEAS EQU** menu, roll the trackball to highlight the menu **GSD-V**, press the **Set** key, and move the cursor to image and display "+".
2. Measure GSD-V, in the method of distance measurement.

   For more information on B-mode generic distance measurements, please refer to section *6.6.1 Generic Measurement in B mode.*
3. The result is displayed in the measured result window.
4. To begin a new GSD-V measurement, repeat steps 1 through 3. You can measure a maximum of one group of data.

8.5. Bovine Obstetrics Measurement

When the exam mode **OB Bovine** is selected, the **OB MEAS BOV** menu will display after entering the obstetrics measurement.

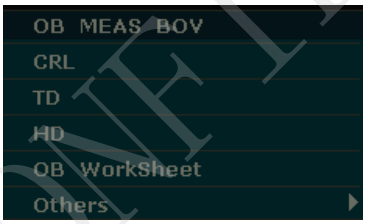


Figure 8-5 Bovine Obstetrics Measurement and Calculation Menu

After measuring one or more measurement items of CRL, TD, HD, the system will calculate the MA automatically and display the result.

The measurements of CRL and HD are the same to that of the Canine, please refer to section *8.2.1 CRL* and *8.2.3 HD* respectively for reference.

To measure TD:

1. In the **OB MEAS BOV** menu, roll the trackball to highlight the menu **TD**, press the **Set** key, and move the cursor to image and display "+".
2. Measure TD, in the method of distance measurement.

For more information on B-mode generic distance measurements, please refer to section *6.6.1 Generic Measurement in B mode.*

3. The result is displayed in the measured result window.
4. To begin a new TD measurement, repeat steps 1 through 3. You can measure a maximum of one group of data.

8.6. Ovine Obstetrics Measurement

When the exam mode **OB Ovine** is selected, the **OB MEAS OVI** menu will display after entering the obstetrics measurement.

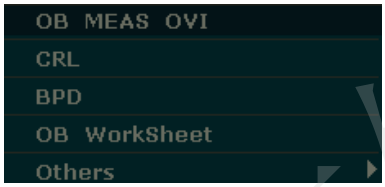


Figure 8-6 Ovine Obstetrics Measurement and Calculation Menu

After measuring one or both of the two measurement items, CRL, BPD, the system will calculate the MA automatically and display the result.

The measurement of CRL is the same to that of the Canine, please refer to section *8.2.1 CRL* for reference.

To measure BPD:

1. In the **OB MEAS OVI** menu, roll the trackball to highlight the menu **BPD**, press the **Set** key, and move the cursor to image and display "+".
2. Measure BPD, in the method of distance measurement.

   For more information on B-mode generic distance measurements, please refer to section *6.6.1 Generic Measurement in B mode.*
3. The result is displayed in the measured result window.
4. To begin a new BPD measurement, repeat steps 1 through 3. You can measure a maximum of one group of data.

8.7. Other Obstetrics Measurements

When the exam mode **OB Others** is selected, the **OB MEAS OTH** menu will display after entering the obstetrics measurement.

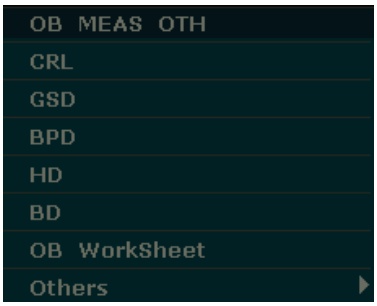


Figure 8-7 Other Obstetrics Measurements and Calculation Menu

The measurements items of **OB MEAS OTH** are the same as those of **OB MEAS CAN.** Please refer to section *8.2 Canine Obstetrics Measurement* for the measurements and calculations.

8.8. Obstetric Report

After obstetric examination, the system generates an obstetrical diagnosis worksheet automatically, and the worksheet includes the information of the animal, the measurements and calculations, and the diagnosis.

1. Select a desired exam mode **OB Canine**, **OB Feline**, **OB Equine**, **OB Bovine**, **OB Ovine**, or **OB Others**.
2. In B mode, after application measurements press **OB Worksheet** to open **Obstetric Worksheet**, as shown below:

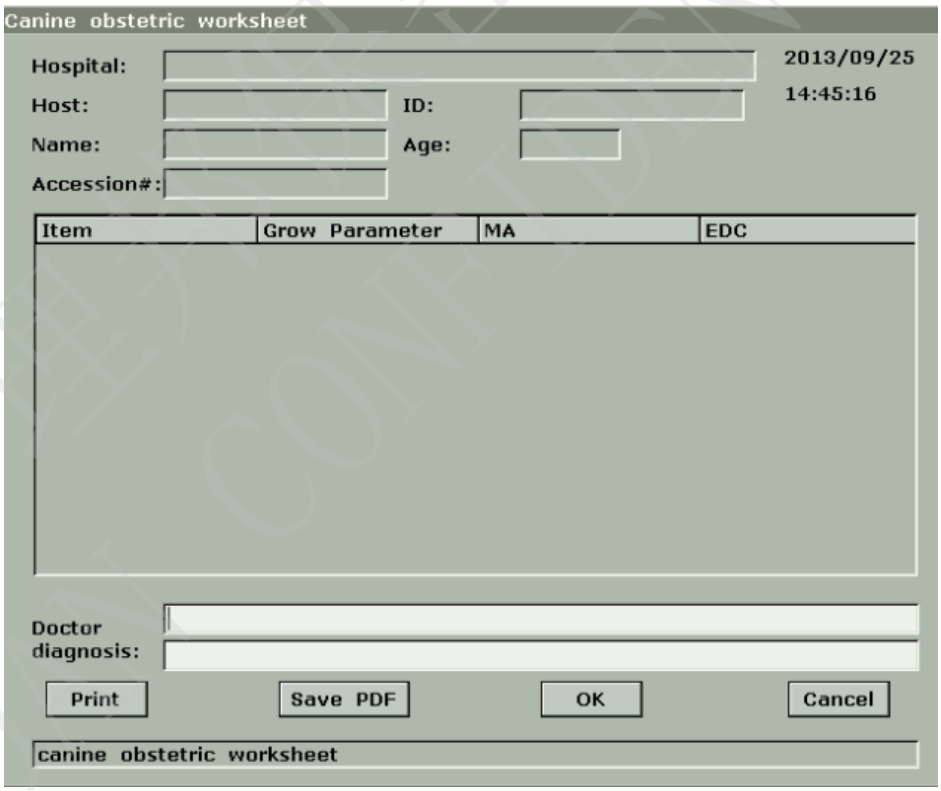


Figure 8-8 Canine Obstetrics Worksheet

The diagnosis editing column displays the cursor "I", and you can enter diagnosis information.

NOTE:

1. The system will display the completed measurements and calculations, the uncompleted measurements and calculations will not be displayed.
2. You can check the measured items by opening the **OB worksheet** dialog box whenever you want, during measurement or after that. Then press **OK** or **Cancel** to close the dialog box, and continue to measure.

To print the report:

Press **Print** in the Obstetric Worksheet.

 Printing reference Section *5.8 Printing.*

8.9. Others

Select **Others** to enter another application measurement.

Chapter 9 Cardiology Measurement and Calculation

The cardiology examination is usually in the B mode, the B/M mode or the M mode.

9.1. Cardiac Measurement and Calculation in M Mode

To enter M mode obstetric examination:

1. Press **Exam**, select the exam mode **Cardiac**, and **Set**.
2. Press  to enter M mode; Or press  to enter B/M mode and press **Set** to set the sample line.
3. Press **Measure** to activate the application measurement function. The system displays the measurement menu shown as below.

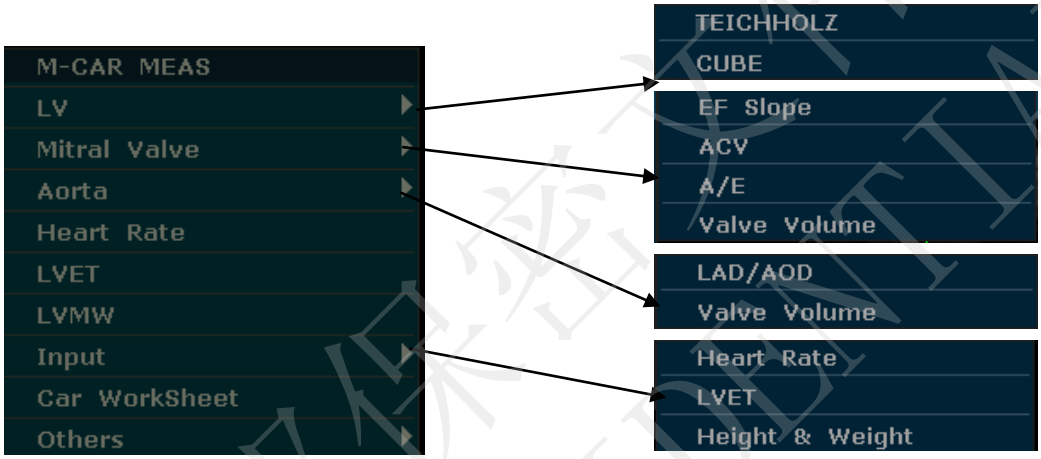


Figure 9-1 M Mode Cardiac Measurement and Calculation Menu

1. Items of Measurement and Calculation

   M-CARDIAC MEAS: LV, Mitral, Heart Rate, LVET, and LVMW.

2. Items of input

   Heart Rate, LVET, and Height &Weight.

   The formulas of B/M mode and M mode cardiac LV measurement include TEICHHOLZ and CUBE, as shown below, and the default formula is TEICHHOLZ.

1. CUBE formula:

NOTE: d: end diastolic; s: end systolic

Label	Description	Method
LVIDd	Left Ventricle Internal Diameter	Distance (mm)
LVIDs	Left Ventricle Internal Diameter	
ET	Ejection Time	Time (ms or s)
HR	Heart Rate	M mode heart rate measurement or key in (bpm)
EDV	End Diastolic Volume	EDV (mL) = $LVIDd^3$ (mm^3)/1000
ESV	End Systolic Volume	ESV (mL) = $LVIDs^3$ (mm^3)/1000
SV	Stroke volume	SV (mL) = EDV (mL)-ESV (mL)
CO	Cardiac Output	CO (L/min) = SV (mL) x HR (bpm)/1000
EF	Ejection fraction (M mode)	EF (No unit) = SV (mL)/ EDV (mL) x 100%
FS	Fractional Shortening	FS (No unit) = [{ LVIDd (mm)- LVIDs (mm)}/ LVIDd (mm)]x 100%
SI	Stroke Index	SI (No unit) = SV (mL)/ BSA (m^2)
CI	Cardiac Index	CI (No unit) = CO (L/min)/ BSA (m^2)
MVCF	Mean Velocity Circumferential Fiber Shortening	MVCF (No unit) = { LVIDd (mm)- LVIDs (mm)}/ {LVIDd (mm) x ET (ms)/1000}
BSA	Body Surface Area	Calculate by the selected formula (m^2)

Table 9-1 Measurement and Calculation Items with CUBE formula

The formulas of BSA calculation:

Canine: $BSA=0.112*WT^{0.67}$;
Feline: $BSA=0.098*WT^{0.67}$;
Equine: BSA=1.09+0.008*WT;
Bovine: $BSA=0.14*WT^{0.57}$;
Ovine: $BSA=0.085*WT^{0.67}$;
Others: $BSA=0.112*WT^{0.67}$;

HT: height, cm;
WT: weight, kg;
BSA: Body Surface Area m^2.

2. TEICHHOLZ formula:

NOTE: d: end diastolic; s: end systolic

Label	Description	Method
LVIDd	Left Ventricle Internal Diameter	Distance (mm)
LVIDs	Left Ventricle Internal Diameter	
ET	Ejection Time	Time (ms or s)
HR	Heart Rate	M mode heart rate measurement or key in (bpm)
EDV	End Diastolic Volume	EDV (mL) = {7 × LVIDd ^{3} (cm)^3}/{2.4+ LVIDd (cm)}
ESV	End Systolic Volume	ESV (mL) = {7 × LVIDs ^{3} (cm)^3}/{2.4+ LVIDs (cm)}
SV	Stroke volume	SV (mL) = EDV (mL)-ESV (mL)
CO	Cardiac Output	CO (L/min) = SV (mL) × HR (bpm)/1000
EF	Ejection fraction (M mode)	EF (No unit) = SV (mL)/ EDV (mL) ×100%
FS	Fractional Shortening	FS (No unit) = [{ LVIDd (mm)- LVIDs (mm)}/ LVIDd (mm)] ×100%
SI	Stroke Index	SI (No unit) = SV (mL)/ BSA (m^2)
CI	Cardiac Index	CI (No unit) = CO (L/min)/ BSA (m^2)
MVCF	Mean Velocity Circumferential Fiber Shortening	MVCF (No unit) = {LVIDd (mm)- LVIDs (mm)}/ {LVIDd (mm) x ET (ms)/1000}
BSA	Body Surface Area	Calculate by the selected formula (m^2)

Table 9-2 Measurement and Calculation Items with TEICHHOLZ formula

3. Other measurement items:

Label	Description	Method
AOD	Aortic root Diameter	Distance (mm)
LAD	Left Atrium Diameter	
CA	Cardiac cycle apex A	
CE	Cardiac cycle apex E	
EF SLP	Ejection Fraction Slope	Slope (mm/s)
ACV	AC Decreasing Velocity	
DEV	Deceleration Velocity	
DCT	Deceleration Time	Time (ms or s)

MAVO1	Aortic Valve Volume Opened, beginning	Distance (mm)
MAVO2	Aortic Valve Volume Opened, ending	
AA	Aortic Amplitude	
LVMW	Left Ventricular Muscle Weight	LVMW (g) =1.04* ({IVSTd (cm)+LVIDd (cm)+LVPWd (cm)}^{3}-LVIDd^3 (cm)^3)-13.6
LVMWI	Left Ventricular Muscle Weight Index	LVMWI (No unit) = LVMW/BSA
A/E	The ratio of CA to CE	A/E (No unit) = CA (mm)/CE (mm)
LAD/AOD	Left Atrium Diameter / Aortic root Diameter	LAD/AOD (No unit) = LAD (mm) / AOD (mm)
AVSV	Aortic Valve Stoma Valve flow	AVSV (mL) = MAVO1 (cm)+MAVO2 (cm)* ET (s)*50+AA (cm)
QMV	Mitral Valve Flow	QMV (mL) = 4*DEV (cm/s)*DCT (s)

Table 9-3 Other Measurement Items

4. Calculation items:

Label	Description	Method
EDV	End Diastolic Volume	EDV (mL) = LVIDd^3 (mm^3)/1000 CUBE formula
ESV	End Systolic Volume	ESV (mL) = LVIDs ^{3} (mm^3)/1000 CUBE formula
SV	Stroke volume	SV (mL) = EDV (mL)-ESV (mL)
CO	Cardiac Output	CO (L/min) = SV (mL) × HR (bpm)/1000
EF	Ejection fraction (M mode)	EF (No unit) = SV (mL)/ EDV (mL) × 100%
FS	Fractional Shortening	FS (No unit) =[{LVIDd (mm)- LVIDs (mm)}/ LVIDd (mm)]x 100%
SI	Stroke Index	SI (No unit)= SV (mL)/ BSA (m^2)
CI	Cardiac Index	CI (No unit)= CO (L/min)/ BSA (m^2)
MVCF	Mean Velocity Circumferential Fiber Shortening	MVCF (No unit)= { LVIDd (mm)- LVIDs (mm)}/ {LVIDd (mm) × ET (ms)/1000}

BSA	Body Surface Area (m^2)	Calculate by to the selected formula
LVMW	Left Ventricular Muscle Weight	LVMW (g)=1.04*[{IVSTDd (cm)+LVIDd (cm) + LVPWd^3 (cm)}^{3}-LVIDd^3 (cm)^3]-13.6
LVMWI	Left Ventricular Muscle Weight Index	LVMWI (No unit)=LVMW/BSA
A/E	The ratio of CA to CE	A/E (No unit)= CA (mm)/CE (mm)
LAD/AOD	Left Atrium Diameter / Aortic root Diameter	LAD/AOD (No unit)= LAD (mm)/AOD (mm)
AVSV	Aortic Valve Stoma Valve flow	AVSV (mL)=MAVO1 (cm)+MAVO2 (cm)* ET (s)*50+AA (cm)
QMV	Mitral Valve Flow	QMV (mL)=4*DEV (cm/s)*DCT (s)

Table 9-4 Calculation Items

9.1.1. LV

The B/M mode and M mode measurements of LV are based on ESV and EDV, which are calculated by LVIDs and LVIDd measurement respectively.

After measuring LVIDs and LVIDd and entering Heart Rate, LVET, and Height & Weight, the system can calculate some physiological parameters, such as ESV, EDV, SV, EF, FS, CO, MVCF, SI, and CI.

There are two calculation formulas for heart antrum volume in the B/M mode and the M mode, as shown below.

Item	**Formula**
TEICHHOLZ	EDV (mL)= 7 x LVIDd^3 (cm^3)/{2.4 + LVIDd (cm)} ESV (mL)= 7 x LVIDs^3 (cm^3)/{2.4 + LVIDs (cm)}
CUBE	EDV (mL) = LVIDd^3 (mm)^3 / 1000 ESV (mL) = LVIDs^3 (mm)^3 / 1000

Table 9-5 TEICHHOLZ and CUBE Formula

NOTE:

Ensure that the value of LVIDd is bigger than that of LVIDs, or the system can not display the calculation items.

SV and EF calculation is as below.

Measurement items:

LVIDs and LVIDd

To measure LV:

In the M-cardiac measurement menu, roll the trackball to highlight **LV**, and the secondary menu

will be displayed. Select TEICHHOLZ or CUBE and press **Set**. Then move the cursor to the image area and a "+" is displayed.

Move the cursor to the end systolic of left ventricle, and measure LVIDs. The method is similar to generic M mode distance measurement. LVIDs and ESV will be displayed in the measured result window.

Move the cursor to the end diastolic of the left ventricle, and then measure LVIDd. The method is the same as the generic M mode distance measurement method. LVIDd, EDV, SV, EF, and FS will be displayed in the measured result window.

To enter HR

In the M-cardiac measurement menu, roll the trackball to highlight **Input**. Then select the secondary menu **Heart Rate** and press **Set** to display a **HR input** dialog box, as shown below.

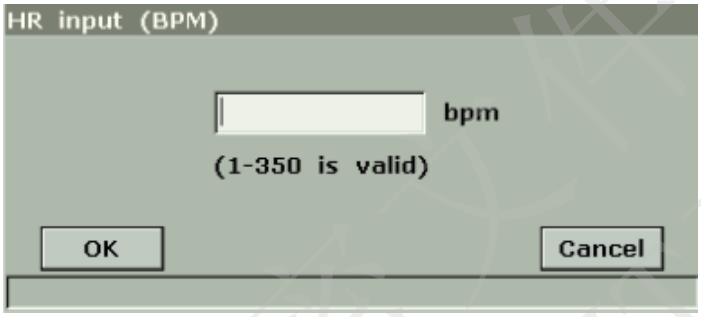


Figure 9-2 HR Input Dialog Box

Input a suitable value in the HR (bpm) box.

Roll the trackball to highlight **OK** and press **Set**, and after measuring LV, the result of CO will be displayed in the measured result window.

To enter LVET

In the M-cardiac measurement menu, roll the trackball to highlight **Input**. Then select the secondary menu **LVET** and press **Set** to display an **ET input** dialog box, as shown below.

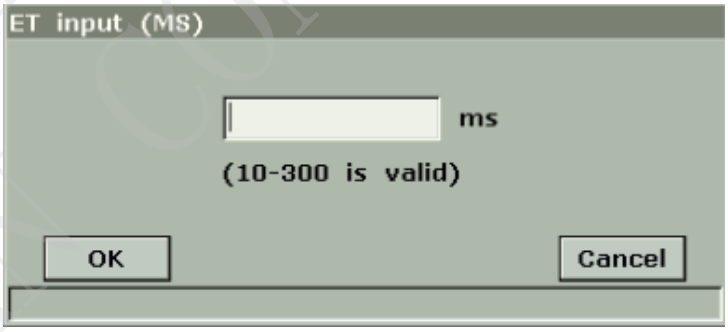


Figure 9-3 ET Input Dialog Box

1. Input a suitable value in the LVET (ms) box.
2. Roll the trackball to highlight **OK** and press **Set**.

◆ To enter Height and Weight

1. In the M-cardiac measurement menu, roll the trackball to highlight **Input**. Then select the secondary menu **Height & Weight** and press **Set** to display a **Height and Weight** entering dialog box, as shown below.

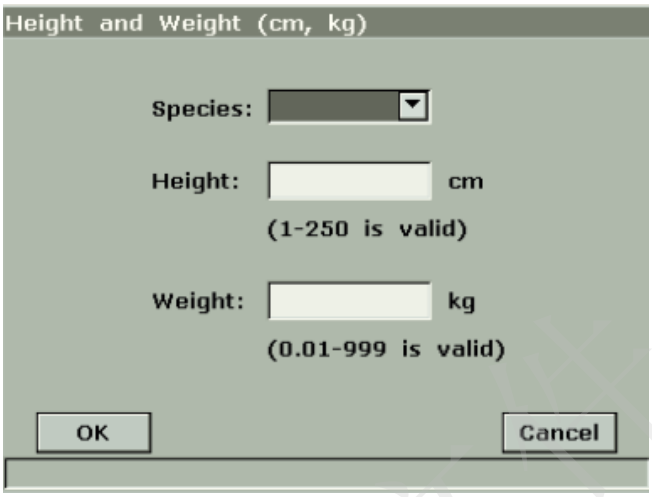


Figure 9-4 Height and Weight Input Dialog Box

2. Select species from the pull-down menu and input suitable values in the Height and Weight boxes.
3. Roll the trackball to highlight **OK** and press **Set**.

The measurements and calculations of all the LV parameters are as below.

Measurement or input items:

Input or measurement: HR, LVET and animal's Height & Weight;

Measurement: LVIDs and LVIDd

To calculate all the LV parameters:

Input or measure HR, LVET, and Height & Weight.

Measure LVIDs and LVIDd following the prompt instruction.

All the LV parameters, ESV, EDV, SV, FS, EF, CO, MVCF, SI and CI will be displayed in the measured result window.

9.1.2. Mitral Valve

Mitral Valve calculation is as below.

- Measurement items:

EF slope, ACV, A/E, DEV, and DCT

Mitral Valve measurement:

In the M-cardiac measurement menu, roll the trackball to highlight **Mitral** to display the secondary menu.

To measure EF slope, ACV, and A/E

Roll the trackball to highlight **EF Slope**, **ACV**, or **A/E**, and press **Set**.

The method of measuring **EF Slope** and **ACV** is similar to the generic M mode slope measurement method.

To measure **A/E**, measure the breadth from apex A to point C and the breadth from apex E to point C respectively. The method is similar to the generic M mode distance measurement method.

After the measurement the results of EF SLP, ACV and A/E will be displayed in the measured result window.

To measure Valve Volume (QMV)

Calculation formula:

QMV (mL) = 4*DEV (cm/s)*DCT (s)

Measurement operation procedure:

Roll the trackball to highlight **Valve Volume**, and press **Set**.

Measure DEV. The method is similar to the generic M mode slope measurement method.

Measure DCT. The method is similar to the generic M mode time measurement method.

After the measurement, the result of QMV will be displayed in the measured result window.

9.1.3. Aortia

Aortia calculation is as below.

- Measurement items:

LAD/ AOD and Valve Volume

- Aortia calculation

In the M-cardiac measurement menu, roll the trackball to highlight **Aortia** to display the secondary menu.

✧ **LAD/AOD measurement**

1. Roll the trackball to highlight **LAD/AOD** and press **Set**.
2. Measure LAD and AOD respectively. The method is similar to the generic M mode distance measurement method.
3. The result will be displayed in the measured result window.

✧ **AVSV measurement**

The calculation formula:

AVSV (mL) = MAVO1 (cm)+MAVO2 (cm)*ET (s)*50+AA (cm)

The measurement operation procedure:

1. Roll the trackball to highlight **Valve Volume** and press **Set**.
2. Measure MAVO1. The method is similar to the generic M mode distance measurement method.
3. Measure MAVO2. The method is similar to the generic M mode distance measurement method.
4. Measure AA. The method is similar to the generic M mode distance measurement method.
5. Measure LVET. The method is similar to the generic M mode time measurement method.
6. After the measurement, the result of AVSV will be displayed in the measured result window.

9.1.4. LVMW, LVMWI

LVMW and LVMWI calculations are as below.

- Measurement items:

LVPWd, IVSTd and LVIDd

- The calculation formula

LVMW (g) = 1.04*[{IVSTd (cm) +LVIDd (cm) +LVPWd (cm)}^{3}-LVIDd^3 (cm)^3]-13.6

LVMWI = LVMW (g)/BSA (m)^2

- To calculate LVMW, LVMWI

1. In the M-cardiac measurement menu, roll the trackball to highlight **LVMW**, and press **Set**.
2. Measure LVPWd, IVSTd and LVIDd respectively following the prompt instruction.
3. After the measurements, the result of LVMW will be displayed in the measured result window. The system will display LVWMI if you have keyed in Height and Weight before the measurement. If you measured LV before, it will renovate the LV results.

9.2. Cardiac Measurement and Calculation in B Mode

1. Press **Exam**, select the exam mode **Cardiac**, and then press **Se**.
2. In B mode, press **Measure**, the system will enter B mode cardiac measurement. The B mode cardiac measurement menus are shown as follows:

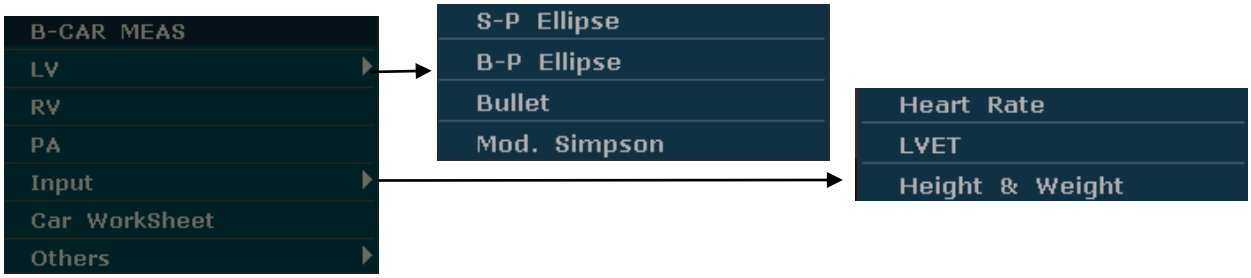


Figure 9-5 B Mode Cardiac Measurement and Calculation Menu

1. Items of Measurement and Calculation

   B-CARDIAC MEAS: RV, LV, and PA.

2. Items of input

   Heart Rate, LVET, and Height & Weight.

   The default measurements are LVLs, LVALs, LVLd, and LVALd measurements with single-plane ellipse.

   The formulas of B mode cardiac LV measurement include Single plane ellipse, Dual plane ellipse, Bullet, and Modified Simpson, shown as follows:

1. Single plane ellipse formula:

NOTE: d: end diastolic; s: end systolic

Label	**Description**	**Method**
LVLd	Left Ventricle Long-axle Diameter	Distance (mm)
LVALd	Left Ventricle Area of Long-axle	Ellipse Area (mm^2, cm^2, or dm^2)
LVLs	Left Ventricle Long-axle Diameter	Distance (mm)
LVALs	Left Ventricle Area of Long-axle	Ellipse Area (mm^2, cm^2, or dm^2)
HR	Heart Rate	Key in (bpm)
EDV	End Diastolic Volume	EDV (mL)= $(8/3\pi)\times\{LVALd\ (mm^2)\}^2/LVLd$ (mm) /1000
ESV	End Systolic Volume	ESV (mL)= $(8/3\pi)\times\{LVALs\ (mm^2)\}^2/LVLs$ (mm) /1000
SV	Stroke volume	SV (mL)=EDV (mL)-ESV (mL)
CO	Cardiac Output	CO (L/min)= SV (mL) × HR (bpm)/1000
EF	Ejection fraction (B mode)	EF (No unit)= SV (mL)/ EDV (mL) x 100%
SI	Stroke Index	SI (No unit)= SV (mL)/ BSA (m^2)
CI	Cardiac Index	CI (No unit)= CO (L/min)/ BSA (m^2)
BSA	Body Surface Area	Calculate by the selected formula (m^2)

Table 9-6 Measurement and Calculation Items with Single Plane Ellipse Formula

2. Dual plane ellipse formula:

NOTE: d: end diastolic; s: end systolic

Label	Description	Method
LVALd	Left Ventricle Area of Long-axle	Ellipse Area (mm^2, cm^2, or dm^2)
LVAMd	Left Ventricular Fractional Area of Mitral Valve	
LVIDd	Left Ventricle Internal Diameter	Distance (mm)
LVALs	Left Ventricle Area of Long-axle	Ellipse Area (mm^2, cm^2, or dm^2)
LVAMs	Left Ventricular Fractional Area of Mitral Valve	
LVIDs	Left Ventricle Internal Diameter	Distance (mm)
HR	Heart Rate	Key in (bpm)
EDV	End Diastolic Volume	EDV(mL)=(8/3π)×LVALd(mm^2)×LVAMd(mm^2)/LVIDd(mm) /1000
ESV	End Systolic Volume	ESV(mL)=(8/3π)×LVALs(mm^2)×LVAMs(mm^2)/LVIDs(mm) /1000
SV	Stroke volume	SV (mL)=EDV (mL)-ESV (mL)
CO	Cardiac Output	CO (L/min)= SV (mL) × HR (bpm)/1000
EF	Ejection fraction (B mode)	EF (No unit)= SV (mL)/ EDV (mL) x 100%
SI	Stroke Index	SI (No unit)= SV (mL)/ BSA (m^2)
CI	Cardiac Index	CI (No unit)= CO (L/min)/ BSA (m^2)
BSA	Body Surface Area	Calculate by the selected formula (m^2)

Table 9-7 Measurement and Calculation Items with Dual Plane Ellipse Formula

3. Bullet volume formula:

NOTE: d: end diastolic; s: end systolic

Label	Description	Method
LVAMd	Left Ventricular Fractional Area of Mitral Valve	Ellipse Area (mm^2, cm^2, or dm^2)
LVLd	Left Ventricular Length	Distance (mm)
LVAMs	Left Ventricular Fractional Area of	Ellipse Area (mm^2, cm^2, or dm^2)

	Mitral Valve	
LVLs	Left Ventricular Length	Distance (mm)
HR	Heart Rate	Key in (bpm)
EDV	End Diastolic Volume	EDV (mL)= (5/6)×LVLd (mm)×LVAMd (mm^2) /1000
ESV	End Systolic Volume	ESV (mL)= (5/6)×LVLs (mm)× LVAMs (mm^2) /1000
SV	Stroke volume	SV (mL)=EDV (mL)-ESV (mL)
CO	Cardiac Output	CO (L/min)= SV (mL) × HR (bpm)/1000
EF	Ejection fraction (B mode)	EF (No unit)= SV (mL)/ EDV (mL) x 100%
SI	Stroke Index	SI (No unit)= SV (mL)/ BSA (m^2)
CI	Cardiac Index	CI (No unit)= CO (L/min)/ BSA (m^2)
BSA	Body Surface Area	Calculate by the selected formula (m^2)

Table 9-8 Measurement and Calculation Items with Bullet Formula

4. Modified SIMPSON formula:

NOTE: d: end diastolic; s: end systolic

Label	**Description**	**Method**
LVAMd	Left Ventricular Fractional Area of Mitral Valve	Ellipse Area (mm^2, cm^2, or dm^2)
LVLd	Left Ventricular Length	Distance (mm)
LVAPd	Left Ventricular Fractional Area of Papillary Muscles	Ellipse Area (mm^2, cm^2, or dm^2)
LVAMs	Left Ventricular Anterior Wall	
LVLs	Left Ventricular Length	Distance (mm)
LVAPs	Left Ventricular Fractional Area of Papillary Muscles	Ellipse Area (mm^2, cm^2, or dm^2)
HR	Heart Rate	Key in (bpm)
EDV	End Diastolic Volume	*1
ESV	End Systolic Volume	
SV	Stroke volume	SV (mL)=EDV (mL)-ESV (mL)
CO	Cardiac Output	CO (L/min)= SV (mL) x HR (bpm)/1000

EF	Ejection fraction (B mode)	EF (No unit)= SV (mL)/ EDV (mL) x 100%
SI	Stroke Index	SI (No unit)= SV (mL)/ BSA (m^2)
CI	Cardiac Index	CI (No unit)= CO (L/min)/ BSA (m^2)
BSA	Body Surface Area	Calculate by to the selected formula (m^2)

Table 9-9 Measurement and Calculation Items with Modified SIMPSON Formula

*1

$$EDV\ (mL) = LVLd\ (mm) / 9 \times \left\{4 \times LVAMd\ (mm^2) + 2 \times LVAPd\ (mm^2) + \sqrt{LVAMd\ (mm^2) \times LVAPd\ (mm^2)}\right\} / 1000$$

$$ESV\ (mL) = LVLs\ (mm) / 9 \times \left\{4 \times LVAMs\ (mm^2) + 2 \times LVAPs\ (mm^2) + \sqrt{LVAMs\ (mm^2) \times LVAPs\ (mm^2)}\right\} / 1000$$

5. Other measurement and calculation items:

Label	Description	Method
LVET	Left Ventricular Ejection Time	Time (ms)
FS	Fractional Shortening	FS (No unit)={ LVIDd (mm)- LVIDs (mm)}/ LVIDd (mm) x 100%
MVCF	Mean Velocity Circumferential Fiber Shortening	MVCF (No unit)= { LVIDd (mm)- LVIDs (mm)}/ {LVIDd (mm) x ET (ms)/1000}

Table 9-10 Other Measurement and Calculation Items

9.2.1.LV

LV measurement is as below.

Single plane ellipse

- Measurement items:

  LVLs, LVALs, LVLd, and LVALd.

- To measure LV:

1. In the B-cardiac measurement menu, roll the trackball to highlight **LV**. Then select **S-P Ellipse** and press **Set**.
2. During end systolic, measure LVLs and LVALs respectively. The system calculates and displays ESV value.
3. During end diastolic, measure LVLd and LVALd respectively, the method of former one is similar to the generic B mode distance measurement method and the second one, the generic B mode ellipse area measurement method. The system calculates and displays EDV, SV, and EF.

Dual plane ellipse, Bullet, and Modified SIMPSON

The operations in these methods are similar to those in the single plane ellipse method. Please refer to the corresponding B mode generic measure method for details, and you can use the prompt instruction to help you.

CO calculation is as below.

- Measurement and input items:

  Measure LV;

  Key in: HR

- To calculate CO:

  1. In the B-cardiac measurement menu, roll the trackball to highlight **Input**. Then select the secondary menu **Heart Rate** and press **Set** to display an **HR input** dialog box, as shown below.

Figure 9-6 HR Input Dialog Box

  2. Input a suitable value in the HR (bpm) box.
  3. Roll the trackball to highlight **OK** and press **Set**. After measuring LV, CO will be displayed in the measured result window.

MVCF calculation is as below.

- Measurement and input items:

  Measure: LV;

  Key in: LVET

- To calculate MVCF:

  1. Move the cursor to **Input**. Then select the secondary menu **LVET** and press **Set** to display an **ET input** dialog box, as shown below.

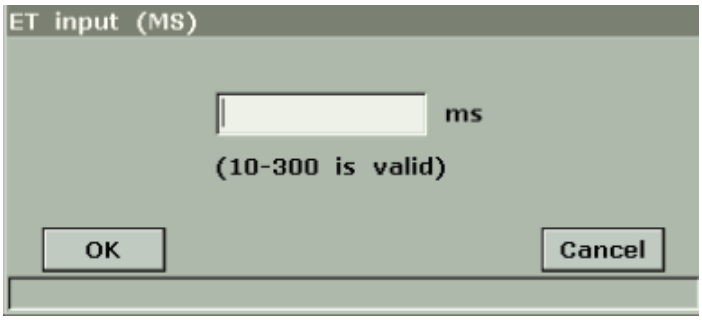


Figure 9-7 ET Input Dialog Box

2. Input a suitable value in the LVET (ms) box.
3. Roll the trackball to highlight **OK** and press **Set**. After measuring LV, MVCF will be displayed in the measured result window.

CI and SI calculations are as below.

- Measurement and input items:

  Measure: LV and HR;

  Key in: Height and Weight

- To calculate CI and SI:

1. In the B-cardiac measurement menu, roll the trackball to highlight **Input**. Then select the secondary menu **Height & Weight** and press **Set** to display a **Height and Weight** entering dialog box, as shown below.

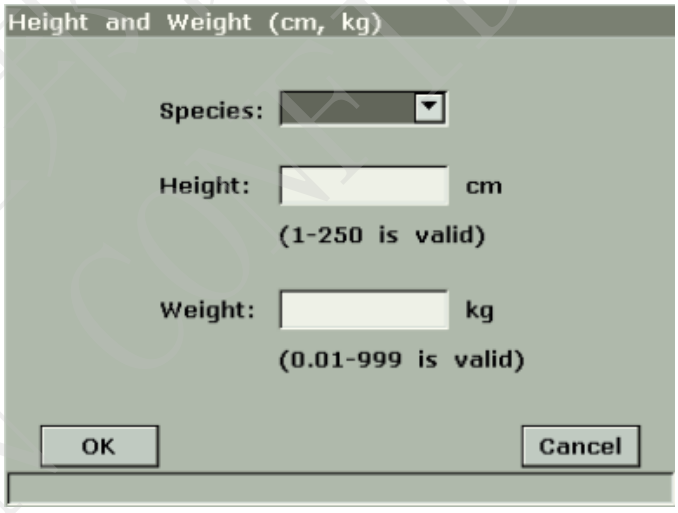


Figure 9-8 Height and Weight Input Dialog Box

2. Select species from the pull-down menu and input suitable values in the Height (cm) and Weight (Kg) boxes.
3. Roll the trackball to highlight **OK** and press **Set**. BSA will be displayed in the measured result window. After measuring LV and HR, SI and CI will also be displayed in the

measured result window.

9.2.2. RV (Right Ventricle Internal Diameter)

1. In the B-cardiac measurement menu, roll the trackball to highlight **RV**.
2. Measure RV with distance method.
3. The result will be displayed in the measured result window.

9.2.3. PA (Pulmonary Artery)

1. In the B-cardiac measurement menu, roll the trackball to highlight **PA**, and press **Set** to display a "+" in the image area.
2. Measure **PA** with distance measurement method.
3. The result will be displayed in the measured result window.

Other parameters:

If you want to perform other cardiac parameter measurements, please enter B/M mode or M mode cardiac measurement.

The result of ventricle volume measurement is more exact in two-dimension. You can get the two-dimension heart image of end diastolic and end systolic exactly and conveniently in the B/M mode. So we suggest that you do the cardiac measurement and calculation in the B/M mode.

9.3. Cardiac Measurement and Calculation in PW Mode

1. Press **Exam,** select the exam mode **Cardiac**, and then press **Set**.
2. In PW mode, Press **Set** to set the sample line, and press **Measure**, the system will enter PW mode cardiac measurement. The PW mode cardiac measurement menu is shown as below:

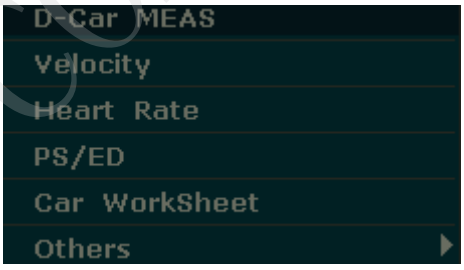


Figure 9-9 PW Mode Cardiac Measurement and Calculation Menu

The operations of **Velocity** and **Heart Rate** are the same as those described in section *6.6.3 Generic Measurement in PW mode* and *section 6.6.2 Generic Measurement in M mode.*

To measure **PS/ED**:

1. In the **D-Car MEAS** menu, roll the trackball to highlight **PS/ED** and press **Set** and a "+" is displayed.
2. Roll the trackball and press **Set** to anchor the first point, measuring **Vel1**.
3. Roll the trackball and press **Set** to anchor the second point, measuring **Vel2**, and calculating **PS/ED**.
4. Roll the trackball and press **Set** to begin a new **PS/ED** measurement. You can measure a maximum of one group of data. The outcome will be displayed in the measurement result window, as shown below.

9.4. Cardiac Report

After the cardiac examination, the system generates a cardiology examination and diagnosis worksheet.

1. Select the exam mode **Cardiac**.
2. In M/B mode, after application measurements press Car Worksheet to open **Cardiac Worksheet**, as shown in *Figure 9-10*.

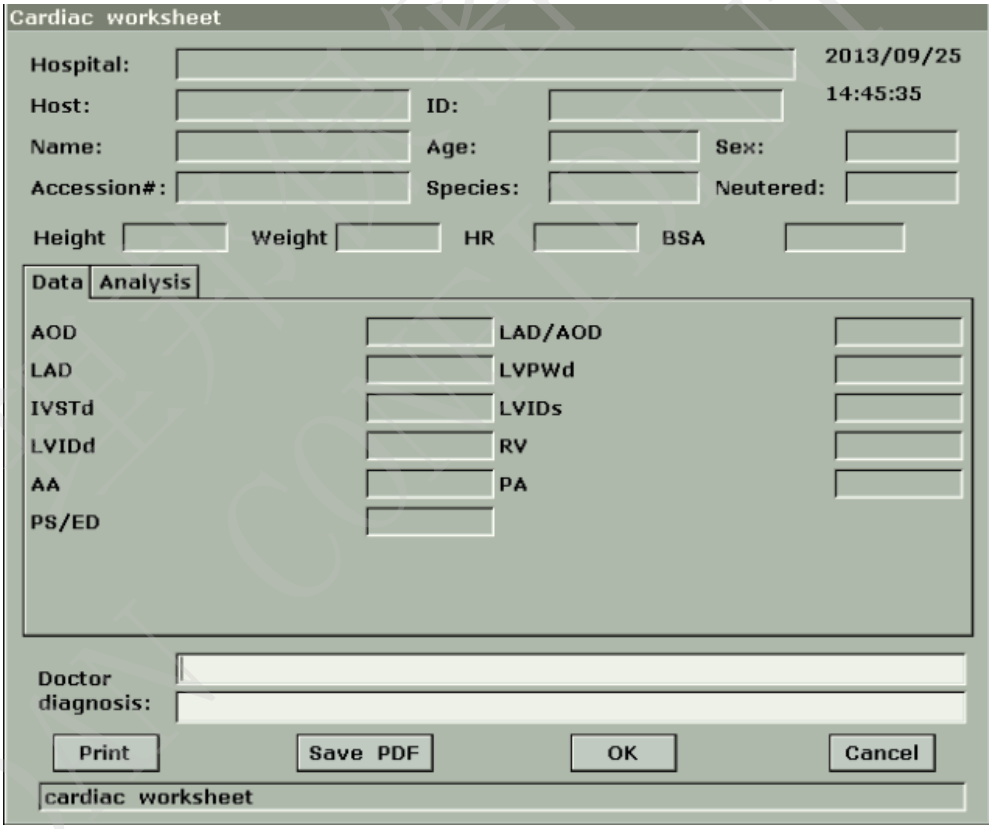


Figure 9-10 Cardiac Worksheet

The diagnosis editing column displays the cursor "I", and you can enter diagnosis information.

To print the report:

Press **Print** in the Cardiac Worksheet.

 Printing reference Section *5.8 Printing..*

9.5. Others

Select **Others** to enter another application measurement.

Chapter 10 Vascular Measurements & Calculations

Usually the vascular examination is in the PW mode.

10.1. Measurements and Calculations in PW Mode

1 Press **Exam**, select the exam mode **Vascular**, and then press **Set**.

2 Press 

to display the sample line, and press this key again to enter the PW mode.

3 Press **Measure** to activate the application measurement function. The system displays the measurement menu as shown below.

Items of Measurement and Calculation

Velocity, Forelimb, Hindimb, CCA, ICA, ECA, and Vert A,

Figure 10-1 Vascular Measurement and Calculation Menu in PW Mode

Label	Description	Channel	Method
CCA	Common Cartid Artery	1	D trace
ICA	Internal Cartid Artery	1	
ECA	External Cartid Artery	1	
Vert A	Vertebral Artery	1	

Table 10-1 Vascular Measurement and Calculation Items in PW Mode

10.1.1. Forelimb

To measure Forelimb:

1. In the PW-vascular measurement menu, select **Forelimb**.
2. Measure **Forelimb**, by the method of D trace measurement.

Reference Section *6.6.3 Generic Measurement in PW mode.*

3. The results are displayed in measurement result window.
4. To begin a new **Forelimb** measurement, repeat steps 1 through 3. You can measure a maximum of one group of data.

10.1.2. Hindlimb

To measure Hindlimb:

1. In the PW-vascular measurement menu, select **Hindlimb**.
2. Measure **Hindlimb** by the method of D trace measurement.

Reference Section *6.6.3 Generic Measurement in PW mode.*

3. The results are displayed in measurement result window.
4. To begin a new **Hindlimb** measurement, repeat steps 1 through 3. You can measure a maximum of one group of data.

10.1.3. CCA

To measure CCA:

1. In the PW-vascular measurement menu, select **CCA**.
2. Measure **CCA**, by the method of D trace measurement.

Reference Section *6.6.3 Generic Measurement in PW mode.*

3. The results are displayed in measurement result window.
4. To begin a new **CCA** measurement, repeat steps 1 through 3. You can measure a maximum of one group of data.

10.1.4. ICA

To measure ICA:

1. In the PW-vascular measurement menu, select **ICA**.
2. Measure **ICA**, by the method of D trace measurement.

Reference Section *6.6.3 Generic Measurement in PW mode.*

3. The results are displayed in measurement result window.
4. To begin a new **ICA** measurement, repeat steps 1 through 3. You can measure a maximum of one group of data.

10.1.5. ECA

To measure ECA:

1. In the PW-vascular measurement menu, select **ECA**.
2. Measure **ECA**, by the method of D trace measurement.

Reference Section *6.6.3 Generic Measurement in PW mode.*

3. The results are displayed in measurement result window.
4. To begin a new **ECA** measurement, repeat steps 1 through 3. You can measure a maximum of one group of data.

10.1.6. Vert A

To measure Vert A:

1. In the PW-vascular measurement menu, select **Vert A**.
2. Measure **Vert A**, by the method of D trace measurement.

Reference Section *6.6.3 Generic Measurement in PW mode.*

3. The results are displayed in measurement result window.
4. To begin a new **Vert A** measurement, repeat steps 1 through 3. You can measure a maximum of one group of data.

10.2. Vascular Report

After finishing the vascular examination, the system generates a vascular worksheet.

1. Select the exam mode **Vascular**.
2. In PW mode, after application measurements press **Vas Worksheet** to open **Vascular Worksheet**, as shown below:

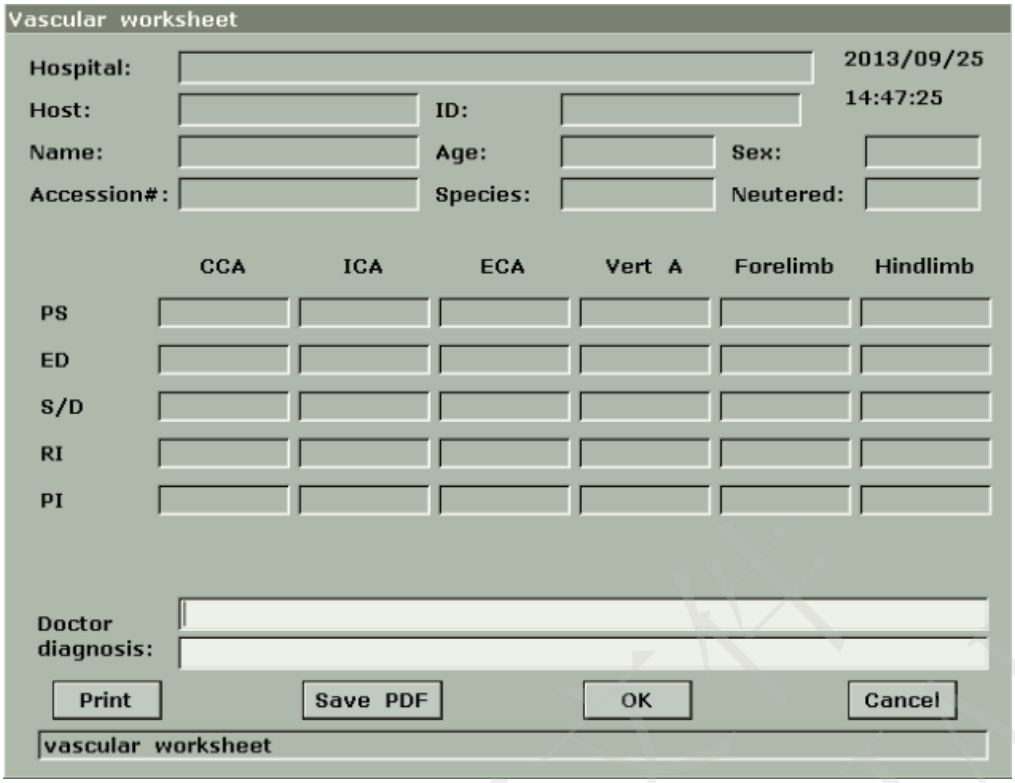


Figure 10-2 Vascular Worksheet

The diagnosis editing column displays the cursor "I", and you can enter diagnosis information.

To print the report:

Press **Print** in the vascular worksheet.

Printing reference Section *5.8 Printing.*

10.3.Others

Select **Others** to enter another application measurement

Chapter 11 Inspection and Maintenance

CAUTION

The device and accessories are to be disposed of according to local regulations after their useful lives. Alternatively, they can be returned to the dealer or the manufacturer for recycling or proper disposal. Batteries are hazardous waste. Do not dispose them together with house-hold garbage. At the end of their life hand the batteries over to the applicable collection points for the recycling of waste batteries. For more detailed information about recycling of this product or battery, please contact your local Civic Office, or the shop where you purchased the product.

11.1. Daily Checklist

Check before the system is switched on:

- Visually inspect all the probes. Do not use any damaged probe.
- Visually inspect all the probe assembly cables and associated connectors.
- Visually inspect all the power cords. Do not turn on the power if a cord is frayed or split, or shows signs of wear.
- Make sure the device is firmly connected to the common earth terminal via a ground wire.
- Verify that the trackball and TGC slide controls are clean and free from gel or contaminants.

Check after the system is switched on:

- Visually check the on-screen display and lighting. Verify that the monitor displays the current date and time and there isn't any error message.
- Verify that the probe identification and indicated frequency on the screen are correct for the activated probe.
- Ensure that there isn't obvious abnormal noise, discontinuous image or dark area.
- Ensure that it isn't smelly or too hot.
- Ensure that the ultrasound window isn't too hot, checking with your hand.
- Verify that the buttons and knobs on the keyboard are good to operate.

11.2. Cleaning and Disinfection

All exterior parts of the device, including the control panel and probes, should be cleaned and/or disinfected as necessary or between uses with a recommended cleanser or disinfectant. Clean each part to remove any surface particles. Disinfect the parts to kill vegetative organisms and viruses.

You must take all necessary precautions to eliminate the possibility of exposing patients, operators or third parties to hazardous or infectious materials. Use universal precautions during cleaning and disinfection. You should treat all parts of the device that come in contact with human blood or other body fluids as they were known to be infectious.

After use, clean the outer shell of the device with soft and dry cloth gently.

The cleaning of internal components of the device should be performed by authorized and qualified personnel.

WARNING

1. To avoid electrical shock and damage to the system, always shut down and disconnect the device from the AC power source before cleaning and disinfection.
2. To avoid infection, always use protective gloves when performing cleaning and disinfecting procedures.
3. To avoid infection, ensure that the solution expiration date has not passed.

CAUTION

1. Be careful when cleaning the display screen. Since the display screen is easily scratched or damaged, we should wipe it with a soft and dry cloth.
2. To avoid the possibility of electrostatic shock and damage to the system, avoid the use of aerosol spray cleansers on the monitor.
3. Do not clean the internal base of the device.
4. Do not use spray detergents on the system or it may force cleaning fluid into the system and damage electronic parts. Solvent fumes build up and form flammable gases or damage internal parts.
5. Do not pour any fluid onto the system surface, as fluid seepage into the electrical circuitry may cause excessive leakage current or system failure.
6. Do not leave residual detergent on the surface of the device.

11.2.1. System Surface Cleaning

To clean the system surface:

1. Power off the system and disconnect it from power supply.
2. Use a clean gauze pad or lint-free cloth, moistened lightly with a mild detergent (Javel water), to wipe the surface and the control panel.
3. After cleaning, reconnect the system to power source.

CAUTION

Make sure the cleaning solution does not seep into the control panel or any other openings.

NOTE:

1. Take particular care when cleaning the areas near trackball and the slide controls.
2. Make sure they are free of gel and any other visible residue.
3. Use a soft dry cloth without chemicals for cleaning, because the surface of polarizer is very soft and easily scratched.

11.2.2. Probe and Probe Holder Cleaning and Disinfection

To clean probe holder:

1. Disassemble the probe holder by uninstalling the two screws.
2. Wash the holder with flowing water, using a mild detergent (Javel water).
3. After cleaning and drying, assemble the probe holder to the main unit.

Every time before use, layer of medical ultrasound coupling gel should be applied evenly on the area of the acoustical window of the probe. Be careful not to generate any air bubble.

To clean the probes:

1. Disconnect the probe from the system.
2. Wipe off all the gel gently with a soft cloth.
3. Rinse the probe with enough distilled water to remove all visible soap residues.
4. Air dry or dry with a soft cloth.

NOTE: The single-use sheath should be used on V563-2 probe. Before cleaning the probe, remove the sheath gently and discard it. Put on a new single-use sheath before using the probe.

CAUTION

We recommend that the single-use sheath should be complies with the local regulations

To disinfect the probe:

Disinfection should be performed each time after use.

1. Prepare the disinfectant(2.4% glutaraldehyde or 0.55% ortho-Phthalaldehyde).
2. Place the cleaned and dried probe in contact with the disinfectant (refers to figure 11-1 for the contacting area) for the time specified by the disinfectant manufacturer.

The following figure defines how much of the probe can be submerged.

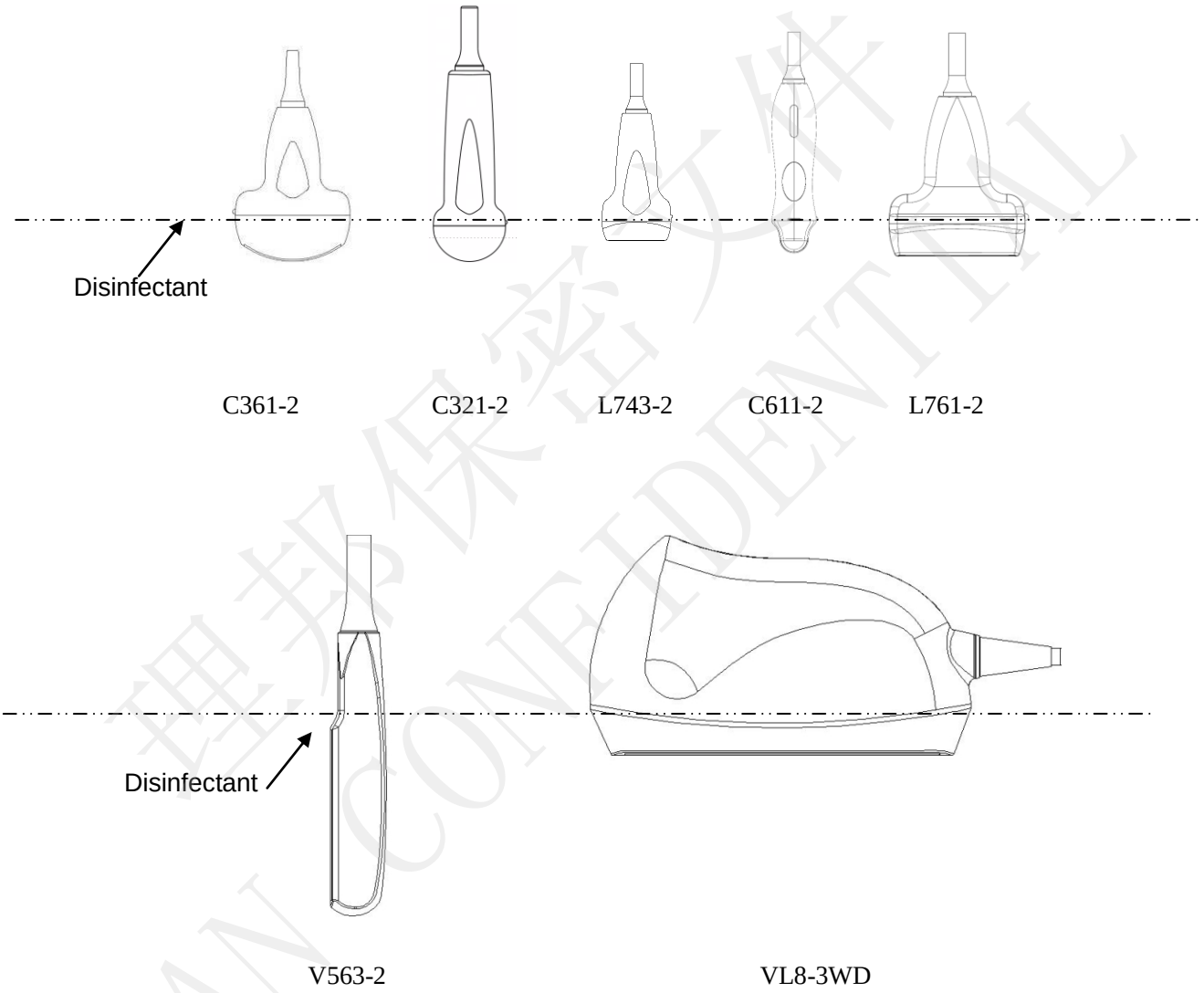


Figure 11-1 Depth of the Probe Immerged into Disinfectant

3. After removing from the disinfectant, rinse the probe according to the disinfectant instructions. Flush all residues from the probe and perform air dry.

WARNING

1. Do not immerse the probe connector. If the cable connector is immersed, do not plug the connector into the system. Rinse the connector under running water and dry it thoroughly. If necessary, contact the manufacturer for service.
2. Prohibit infiltration of any type of liquid into the device or the probe.
3. Do not sterilize the probe using techniques such as autoclave, ultraviolet, gamma radiation, gas, steam, or heat. Otherwise, severe damage will result.
4. The coupling gel adapted to the probe is a medical ultrasound coupling gel. Use the ultrasound coupling gel which complies with the local regulations.
5. Do not immerse the power cord and connector of the probe into solutions. Probes can be submerged to, but not including, the strain relief of the probe array. Do not immerse or soak any part of a probe in any cleaning material not listed in the recommended list of disinfectants.

Proper Use of Probes

In order to extend the service life and to obtain optimum performance of the probe, please operate as follows:

Inspect power cord, socket and acoustical window of the probe periodically.

Shut down the machine before connecting or disconnecting the probe.

Do not drop the probe onto the floor or collide with hard objects. Otherwise it will be damaged easily.

When the probe is not used, put it in the probe holder.

Heating the probe is strictly forbidden.

Pulling or bending the power cord of the probe is strictly forbidden; otherwise internal connecting lines of the power cord may rupture.

Coupling gel can only be used on the head of the probe, and it should be wiped off after use.

Each time after use, clean and disinfect the probe.

The acoustical window and the shell of the probe should be examined frequently.

WARNING

The DUS 60 VET cannot be used together with high-frequency surgical equipment.

CAUTION

1. Do not disinfect or clean probes under high temperature, and the temperature should be below 45°C.

2. In order to avoid damaging the device, the disinfection method is limited to regular maintenance of devices in hospitals. Disinfecting instruments should be cleaned first.

11.2.3. Needle Guide Cleaning and Disinfecting

NOTES:

1. Use proper disinfection techniques at all times to perform a biopsy.
2. Disinfect the needle guide before the first use and after each subsequent use.

Cleaning

You should clean a Needle Guide before disinfecting.

To clean a Needle Guide, use a brush or cloth that has been damped with a mild detergent (Javel water).

Disinfecting

Always disinfect the Needle Guide after use.

11.2.4. Trackball Cleaning

To clean the trackball:

1. Remove the front panel bezel.
2. Remove the trackball as shown in figure 11-2.
3. Clean trackball with a tissue and 70% isopropyl alcohol.
4. Clean the inside of the trackball assembly with a cotton swab and 70% isopropyl alcohol.
5. Assemble the trackball and front panel bezel after the assembly parts completely dry.

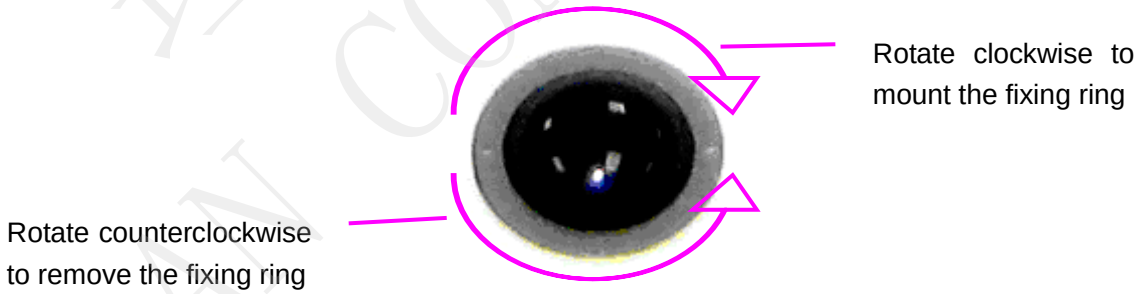


Figure 11-2 Assembling and Disassembling Trackball

CAUTION

Do not drop or place foreign objects inside the trackball assembly or it may affect the trackball operation and damage the system.

NOTE:

Be sure to clean the X and Y encoders and the idler wheel.

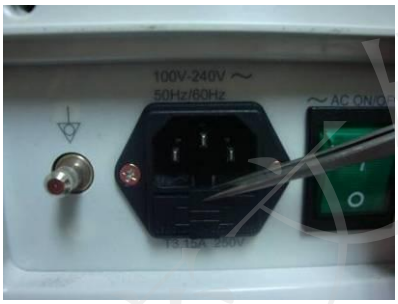
11.2.5. Replacing Fuses

You can replace the fuses if necessary.

Step 1. Pull out the fuse-box using a minus screwdriver;

Step 2. Use the tweezers to pull the fuses out through the small hole on the bottom of the box;

Step 3. Put new fuses (φ5×20, T3.15AH250V) provided by the manufacturer in position, and reposition the fuse-box.



Step 1

Step 2

Step 3

WARNING

Only use the fuses with the same model as the manufacturer specified.

11.2.6. Disinfectants

	Disinfectants' chemical name	Disinfectants' trade name
Probe	Glutaraldehyde(2.4%)	Cidex Activated Dialdehyde Solution (2.4%)
	Ortho-Phthalaldehyde (0.55%)	Cidex OPA (0.55%)
Needle guide	75% medical alcohol	/
	Glutaraldehyde(2.4%)	Cidex Activated Dialdehyde Solution (2.4%)

WARNING

1. Be sage to choose the cleansers and disinfectants. The concentration in the air must not exceed an applicable specified limit. Comply with the manufacturer's instructions when using the cleansers and disinfectants.
2. The use of diluent paint, vinyl oxide or other organic solvents is prohibited. These solvents will damage the protective film of the probe surface.

11.3. Maintenance

Maintenance must be performed every 12 months, including safety and functionality of the system.

The following safety checks should be performed at least every 12 months by a qualified person who has adequate training, knowledge, and practical experience to perform these tests.

- Inspect the safety-related labels for legibility.
- Inspect the fuse to verify compliance with rated current and breaking characteristics.
- Verify that the device function properly as described in the instructions for use.
- Test the protection earth resistance according to IEC/EN 60601-1 and IEC/EN 60601-2-37: Limit: 0 ~ 0.1 Ω.
- Test the earth leakage current according to IEC/EN 60601-1 and IEC/EN 60601-2-37: Limit: NC 500 μA ~ SFC 1000 μA.
- Test the patient leakage current according to IEC/EN 60601-1 and IEC/EN 60601-2-37: Limit: NC 100 μA ~SFC 500 μA.
- Test the Covers leakage current according to IEC/EN 60601-1 and IEC/EN 60601-2-37: Limit: NC100 μA ~ SFC 500 μA.
- The leakage current should never exceed the limit.

The data should be recorded in an equipment log. If the device is not functioning properly or any of the above tests fail, please contact the maintenance personnel of the manufacturer.

Chapter 12 Troubleshooting

12.1. Checkup

- Check whether the power supply works properly and the power cord is well connected and plugged into the power socket.
- Check whether the probe is properly connected to the main unit.

12.2. Troubleshooting

- Changing the cartridge fuse.
- Troubleshooting (see table 12-1)

Item	Problem	Solution
1	When the power switch is on, there isn't any image displayed.	1. Check power supply. 2. Check wires and plugs. 3. Check whether the cartridge fuse is melted. 4. Check the brightness control knob.
2	Strip-shape or snowflake-shape disturbance occurs on the display screen.	1. Inspect the power supply. 2. Check whether it is disturbed by the ignition action of any other device. 3. Check the disturbance of electric or magnetic field in the surrounding environment. 4. Check whether the plug and socket of power supply and probe are properly connected.
3	Image is not displayed clearly on the screen.	1. Adjust overall gain (Gain). 2. Adjust eight TGC slide controls. 3. Adjust the brightness and contrast potentiometer. 4. Adjust focus (the number and the position). 5. Clean the light filter of the display screen.
4	Near-field image is not clear.	Adjust the key total gain and the upper TGC
5	Far-field image is not clear.	Adjust the key total gain and the lower TGC
6	Image window is dark.	Adjust the brightness and contrast knobs.

Table 12-1 Troubleshooting Examples

Chapter 13 Warranty and Service

13.1. Warranty

The manufacturer warrants that products meet the labeled specifications of the products and will be free from defects in materials and workmanship that occur within warranty period.

The warranty is void in cases of:

a) Damage caused by mishandling during shipping.
b) Subsequent damage caused by improper use or maintenance.
c) Damage caused by alteration or repair by anyone not authorized by the manufacturer.
d) Damage caused by accidents.
e) Replacement or removal of serial number label and manufacture label.

If a product covered by this warranty is determined to be defective because of defective materials, components, or workmanship, and the warranty claim is made within the warranty period, the manufacturer will, at its discretion, repair or replace the defective part(s) free of charge. The manufacturer will not provide a substitute product for use when the defective product is being repaired.

13.2. Contact information

If you have any question about maintenance, technical specifications or malfunctions of devices, contact your local distributor.

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Appendix I: Specifications

A1.1: Electrical Safety Classifications

According to the type of protection against electric shock	Internally powered equipment, Class I equipment
According to the degree of protection against electric shock	Type B
According to the degree of protection against harmful ingress of liquid	Whole device: Ordinary equipment (Sealed equipment without liquid proof); Probe (do not include the probe connector): IPX7; Footswitch (optional): IP68.
According to the degree of safety of application in the presence of a flammable gas	Equipment not suitable for use in the presence of a flammable gas
According to the mode of operation	Continuous operation
According to the grade of EMC	CISPR 11 Group 1 Class A
Standards Compliance	IEC 60601-1:2005 EN 60601-1:2006 IEC/EN60601-1-2:2007 EN/ IEC 60601-2-37

A1.2: Power Supply

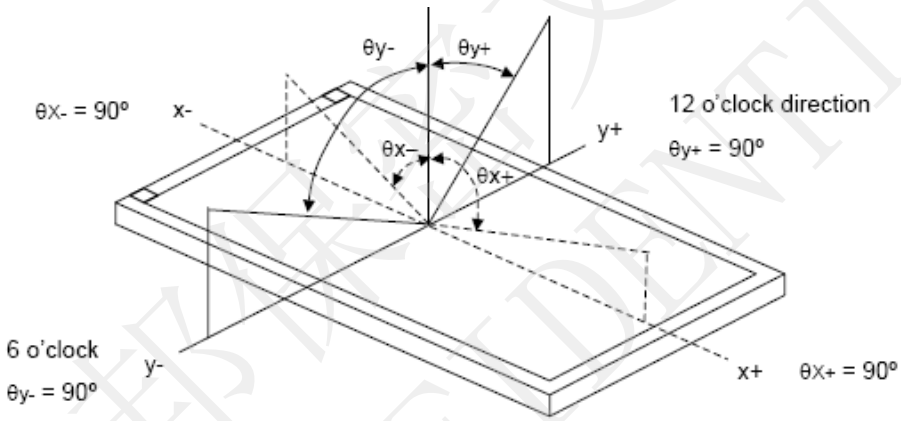
Operating Voltage	100 V-240 V~
Operating Frequency	50 Hz/60 Hz
Input Power	1.8A~0.8A
Lithium battery	
Capacity	5000 mAh
Voltage	14.8 VDC
Average working time	1h
Maximum charging time	8 h
Cycle life	300 times

A1.3: Machine Specifications

Main unit dimensions	330 mm (L) × 220 mm (W) × 320 mm (H)
Net weight	7.1 kg

A1.4: Display Specifications

Display	TFT-LCD
Diagonal Size	12.1-inch
View Angle	Horizontal: $\Theta x_{Typ.}$: 80°; Vertical: $\Theta y_{Typ.}$: 80°; see the figure below.
Pixel Number	1024*768
Center Luminance of White	Typ.: 450 cd/m^2
Contrast Ratio	Typ.: 700



A1.5: General Technical Specifications

Display Modes	B, 2B, 4B, B+M, M, and PW
Image Gray Scale	256 levels
Image Magnification	In area Real time: 100%, 144%,196%, 256%, 400%, 576%, 900%, 1600% Frozen (only available in B mode): 100%, 178%, 400%, 1600%
Storage	504 MB
Cine Review	256 frames
Depth Adjustment	Adjustable in real time in B, 2B, 4B, B+M, M, and PW modes
Frame Correlation Coefficient	8 levels to adjust (0~7), (B, 2B, 4B, B+M modes, ineffective when freezing)

Image Conversion	Up/Down flip, Left/Right flip, 90° rotate
Language Conversion	Chinese, English
Focus Position	16 levels to adjust
Focus Number	Max. 4
Software Packages	Abdomen, Obstetric, cardiology or vascular.
B mode Measurement	Distance, circumference, area, volume, ratio, % stenosis, histogram and angle
M mode Measurement	Distance, time, slope, and heart rate
D mode Measurement	Time, heart rate, velocity, acceleration, trace, and RI
Annotations	Patient name, age, sex, time, date, hospital name, doctor name, comment (full-screen character editing)
Body Mark	40 ypes
USB Port	USB 2.0

A1.6: Probe Specifications

This device can detect the probe automatically.

Type	convex array probe	Endocavity probe	Linear array probe	Linear array probe
Model	C361-2	V563-2	L743-2	VL8-3WD
B/M Frequency (MHz)	2.5/3.5/4.5	4.5/5.5/6.5	6.5/7.5/8.5	3.5/4.5/5.5
Harmonious Frequency (MHz)	H5.0 /H5.4	H8.0/H8.4	H9.0/H9.4	H8.0/H9.0
Doppler Frequency (MHz)	2.5/3.0	4.0/4.5	5.5/6.5	3.5/4.0
Needle Guide Bracket Kit	BGK-CR60		BGK-LA43	/
Application	Large animal: obstetrics, abdomen	Large animal: obstetrics, back fat, tendon	Small animal: abdomen, muscle, tendon, small parts, peripheral vascular	Back Fat

Type	Linear array probe	Micro-convex probe:	Micro-convex probe:
Model	L761-2	C321-2	C611-2
B/M Frequency (MHz)	6.5/7.5/8.5	2.5/3.5/4.5	5.5/6.5/7.5
Harmonious Frequency (MHz)	H9.0/H9.4	H5.0/H5.4	H9.0/H9.4
Doppler Frequency (MHz)	5.5/6.5	2.5/3.0	5.0/6.0
Needle Guide Bracket Kit	BGK-LA70	BGK-CR20	BGK-MCR10
Application	Small animal: abdomen, muscle, tendon, small parts, peripheral vascular	Small animal: obstetrics, abdomen, cardiology. Large animal: cardiology	Small animal: obstetrics, abdomen, cardiology. Large animal: cardiology

NOTE:

Maximum transducer temperature rise during use: Less than 10 °C.

Expanded uncertainty of temperature test: U=0.4°C, k=2.

A1.7: Operating, Storage and Transportation Environment

A1.7.1. Operating Environment:

Please only use the device in the following environment:

Temperature	+5 °C ~ +40 °C (+41ºF ~ +104ºF)
Relative humidity range	25% RH ~ 80% RH（no condensation）
Atmospheric pressure range	860 hPa ~ 1060 hPa

A1.7.2. Storage and Transportation Environment:

Temperature	-20 °C ~ +55 °C(-4ºF ~ +131ºF)
Relative humidity range	25% RH ~ 93% RH（no condensation）
Atmospheric pressure range	700 hPa ~ 1060 hPa

Appendix II: Ultrasound Intensity and Safety

A2.1: Ultrasound in Medicine

The use of diagnostic ultrasound has proved to be a valuable tool in medical practice. Given its known benefits for non-invasive investigations and medical diagnosis, including investigation of the human fetus, the question of clinical safety with regards to ultrasound intensity arises.

There is no easy answer to the question of safety surrounding the use of diagnostic ultrasound equipment. Application of the ALARA (As Low As Reasonably Achievable) principle serves as a rule-of-thumb that will help you to get reasonable results with the lowest possible ultrasonic output.

The American Institute of Ultrasound in Medicine (AIUM) states that given its track record of over 25 years of use and no confirmed biological effects on patients or instrument operators, the benefits of the prudent use of diagnostic ultrasound clearly outweigh any risks.

A2.2: Ultrasound Safety and the ALARA Principle

Ultrasound waves dissipate energy in the form of heat and can therefore cause tissue warming. Although this effect is extremely low with Transcranial Doppler, it is important to know how to control and limit patient exposure. Major governing bodies in ultrasound have issued statements to the effect that there are no known adverse effects from the use of diagnostic ultrasound, however, exposure levels should always be limited to As Low As Reasonably Achievable (the ALARA principle).

Imaging Functions Affecting Acoustic Output

In addition to the level of voltage transmitted, adjustment of the following imaging functions and /or controls may affect the acoustic output.

Item	Affection
Probe	Acoustic output will be changed with the change of probe.
Imaging mode	There are different parameters applied in B mode, M mode, and PW mode, so acoustic output will be changed with the change of among B mode, M mode, and PW mode.
Field of view (scan angle or scan width)	Frame rate may be changed with the change of the scan angle of the scan width, and the acoustic output will also be changed.
Image depth	Pulse repeated frequency will be changed with the change of the image depth, and the acoustic output will be changed.
Focus number	Frame rate and focus position will be changed with the change of the focus number, and acoustic output will also be changed.
Focus position	Acoustic output will be changed with the change of the focus position even the beam power level and the beam aperture have not been

	changed. Generally, the acoustic output will be higher with it gets nearer to the probe.
Freeze	When freezing the system, it will stop transmitting ultrasonic wave.
Transmission power	The output of probe will be changed with the change of the transmission power, and acoustic output will be changed.
Multi-frequency	The character of the wave focus will be changed with the change of the frequency, and acoustic output will be changed.
Line density	The acoustic output will be changed with the change of the number of the scanning line (line density).
PRF	The acoustic power will be changed with the change of PRF.
Sample volume	The pulsed wave and the power will be changed with the change of the sample volume, and acoustic output will be changed.
Presets	Presets contain all the parameters above, so any change of the presetting will change acoustic output.
Restart, or power on/off	System will return to the default setting when restarting, or powering on/off the system, and acoustic output will be changed.

A2.3: Explanation of MI/TI

A2.3.1. MI (Mechanical Index)

Cavitations will be generated when ultrasound wave passes through and contacts tissues, resulting in instantaneous local overheating. This phenomenon is determined by acoustic pressure, spectrum, focus, transmission mode, and factors such as states and properties of the tissue and boundary. This mechanical bioeffect is a threshold phenomenon that occurs when a certain level of ultrasound output is exceeded. The threshold is related to the type of tissue. Although no confirmed adverse mechanical effects on patients or mammals caused by exposure at intensities typical of present diagnostic ultrasound instruments have ever been reported, the threshold for cavitation is still undetermined. Generally speaking, the higher the acoustic pressure, the greater the potential for mechanical bioeffects; the lower the acoustic frequency, the greater the potential for mechanical bioeffects.

The AIUM and NEMA formulate mechanical index (MI) in order to indicate the potential for mechanical effects. The MI is defined as the ratio of the peak-rarefactional acoustic pressure (should be calculated by tissue acoustic attenuation coefficient 0.3dB/cm/MHz) to the square root of acoustic frequency.

$$MI = \frac{Pr,\alpha}{\sqrt{faw} \times C_{MI}}$$

C_{MI} = 1 (MPa / MHz)

A2.3.2. TI (Thermal Index)

Heating of tissues is caused by absorption of ultrasound when the ultrasound energy is applied. The temperature rise is determined by the acoustic intensity, exposed area and thermophysical properties of the tissue.

In order to indicate the potential for temperature rise caused by thermal effects, the AIUM and NEMA formulate thermal index (TI). It is defined as the ratio of the total acoustic power to the acoustic power required to raise the tissue temperature by 1 ℃.

According to different thermophysical properties of the tissue, TI is divided into three kinds: TIS, TIB and TIC.

TIS (Soft Tissue Thermal Index): It provides an estimate of potential temperature rise in soft or similar tissues.

TIB (Bone Thermal Index): It provides an estimate of potential temperature rise when the ultrasound beam passes through soft tissue and a focal region is in the immediate vicinity of bone.

TIC (Cranial Bone Thermal Index): It provides an estimate of potential temperature rise in the cranial bones or superficial bones.

A2.3.3. Display of MI/TI

The MI value of this system is lower than 1.0 and it is not displayed. The TI values in the upper right part of the screen. In PW mode, the TI value is displayed and the start point is 0.1. The operator should monitor these values during examinations and keep the exposure time and output level at the minimum amounts needed for effective diagnosis.

The display precision is 0.2.

Display accuracy of TI is ±50%.

A2.4: Acoustic Output

A2.4.1. Factors that Contribute to Uncertainty in the Output Display

A number of factors should be considered in display accuracy determination methods, such as:

- Transducer variability
- System variability
- Measurement variability and accuracy
- The number of operating conditions of which the system is capable and the number tested in obtaining display accuracy results
- Whether display accuracy will be determined by specific combinations of system, mode, transducer assembly and transmit patterns, or all allowed combinations of them
- Accuracy of system software MI and TI calculation algorithms.
- Engineering approximations for real-time calculations

A2.4.2. Differences between Actual and Displayed MI/TI

Actually, many assumptions adopted in the process of measurement and calculations are relatively conservative. Over-estimation of actual in situ intensity exposure, for the majority of tissue paths, is made to the measurement and calculation process. For example, attenuation coefficient of 0.3 dB/cm·MHz, which is much lower than the actual value for most tissues of the body, is adopted. And conservative values of tissue characteristics are selected for use in TI models. Therefore, the display of MI and TI should be used as relative information to assist operator in prudent use of ultrasound system and implementation of ALARA principle, and the values should not be interpreted as the actual physical values in tissues or organs examined.

A2.4.3. Measurement Uncertainty

The uncertainties in the measurements were predominantly systematic in origin; the random uncertainties were negligible in comparison. So the intensity and pressure measurement uncertainties were showed in table 1 and Table 2. The power, the center frequency and MI measurement uncertainties were showed in table 3.

Table 1 The intensity and pressure measurement uncertainties table

Transducer	**Total Error**		**Hydrophone Sensitivity**		**Digitizer**	
	Intensity	**Pressure**	**Intensity**	**Pressure**	**Intensity**	**Pressure**
V563-2	±25.65%	±12.83%	±14%	±7%	±0.95%	±0.475%
C321-2	±25.65%	±12.83%	±14%	±7%	±0.95%	±0.475%
C361-2	±25.65%	±12.83%	±14%	±7%	±0.95%	±0.475%
C611-2	±25.65%	±12.83%	±14%	±7%	±0.95%	±0.475%
L761-2	±25.65%	±12.83%	±14%	±7%	±0.95%	±0.475%
L743-2	±25.65%	±12.83%	±14%	±7%	±0.95%	±0.475%
VL8-3WD	±25.65%	±12.83%	±14%	±7%	±0.95%	±0.475%

Table 2 The intensity and pressure measurement uncertainties table

Transducer	**Temp**		**Spatial Ave.**		**Distortion**	
	Intensity	**Pressure**	**Intensity**	**Pressure**	**Intensity**	**Pressure**
V563-2	±2.39%	±1.195%	±21%	±10.5%	±4%	±2%
C321-2	±2.39%	±1.195%	±21%	±10.5%	±4%	±2%
C361-2	±2.39%	±1.195%	±21%	±10.5%	±4%	±2%
C611-2	±2.39%	±1.195%	±21%	±10.5%	±4%	±2%

L761-2	±2.39%	±1.195%	±21%	±10.5%	±4%	±2%
L743-2	±2.39%	±1.195%	±21%	±10.5%	±4%	±2%
VL8-3WD	±2.39%	±1.195%	±21%	±10.5%	±4%	±2%

Table 2 The power, center frequency and MI measurement uncertainties table

Transducer	**Total uncertainties**		
	Power	**Center frequency**	**MI**
V563-2	±25.65%	±0.2%	±13.02%
C321-2	±25.65%	±0.2%	±13.02%
C361-2	±25.65%	±0.2%	±13.02%
C611-2	±25.65%	±0.2%	±13.02%
L761-2	±25.65%	±0.2%	±13.02%
L743-2	±25.65%	±0.2%	±13.02%
VL8-3WD	±25.65%	±0.2%	±13.02%

A2.5: Operator Control Features

The possibility of producing mechanical/thermal biological effects can be influenced by three kinds of controls: Direct Controls, Indiret Controls, and Receiver Controls. The qualified operator may use the system controls to minimize the ultrasound output while acquiring necessary clinical information.

◆ Direct Controls

The acoustic output of the system can be controlled directly through the level of voltage transmitted. In this case, the maximum acoustic output never exceeds the limits in any mode of operation.

◆ Indirect Controls

The acoustic output of the system can be controlled indirectly through many imaging parameters, including imaging modes, probe frequency, focus number/position, depth and pulse repetition frequency (PRF).

The imaging mode determines whether the ultrasound beam is scanning or non-scanning. Thermal bioeffect is closely associated with M, PW and Color mode.

Acoustic attenuation of tissue is directly connected to probe frequency.

The focus number/position is related to active aperture of probe and beam width.

The higher PRF (pulse repetition frequency), the more output pulses occur over a period of time.

◆ Receiver Controls

The receiver controls (such as gain, TGC, dynamic range and image processing), which are used to improve image quality, have no effect on acoustic output. Thus these controls should be optimized before increasing acoustic output.

It is recommended to use the default (or lowest) output power setting and compensate using Gain control to acquire an image. The default setting is normally around 70% of the allowable power which will not cause any harm to users and is validated to be the most effective for all the transducers.

A2.6: Prudent Use Statement

Although no confirmed bioeffects on patients caused by exposure from present diagnostic ultrasound equipment have ever been reported, the potential exists that such bioeffects may be identified in the future. Therefore, the ultrasound should be used prudently. High levels of acoustic output and long exposure time should be avoided while acquiring necessary clinical information.

A2.7: References for Acoustic Output and Safety

1. “Bioeffects and Safety of Diagnostic Ultrasound” issued by AIUM in 1993
2. “Medical Ultrasound Safety” issued by AIUM in 1994
3. "Acoustic Output Measurement Standard for Diagnostic Ultrasound Equipment, Revision 3" issued by AIUM/NEMA in 2004
4. "Standard for real-time display of thermal and mechanical acoustic output indices on diagnostic ultrasound equipment, Revision 2" issued by AIUM/NEMA in 2004
5. "Information for Manufacturers Seeking Marketing Clearance of Diagnostic Ultrasound Systems and Transducers" issued in 2008.
6. “Medical electrical equipment – Part 2-37: Particular requirements for the safety of ultrasonic medical diagnostic and monitoring equipment” issued by IEC in 2005.

A2.8: Probe Acoustic Output Parameters List

A2.8.1:Test of Probe C361-2:

Acoustic Output Reporting Table for Track3

System : DUS 60 VET Operating Mode: B mode

Transducer: C361-2 Working Frequency: 3.5MHz

Index Label			MI	TIS			TIB	TIC
				scan	non-scan		non-scan	
					$A_{aprt}\leq 1$	$A_{aprt}>1$		
Global Maximum Index Value			0.67	0.10				0.41
Associated Acoustic Parameters	$P_{r.3}$ (MPa)		1.15					
	W_0 (mW)			30.80				30.80
	Min of[$W_{.3}(z_1)$, $I_{TA.3}(z_1)$] (mW)							
	Z_1 (cm)							
	Z_{bp} (cm)							
	Z_{sp} (cm)							
	$z@PII_{.3max}$ (cm)		5.19					
	$d_{eq}(Z_{sp})$ (cm)							
	f_c (MHz)		2.93	2.93				2.93
	Dim of A_{aprt}	X(cm)		1.9152				1.9152
		Y (cm)		1.45				1.45
Other Information	PD (usec)		0.45					
	PRF (Hz)		6225.5					
	$P_r@PII_{max}$ (MPa)		1.87					
	$d_{eq}@PII_{max}$ (cm)							
	Focal Length	FL_x (cm)		5.45				5.45
		FL_y (cm)		6.15				6.15
	$I_{PA.3}@MI_{max}(W/cm^2)$		75.92					
Operating Control Conditions	Depth(mm)		68	68				68
	Focus(mm)		60	60				60
	Freq(MHz)		3.5	3.5				3.5

Acoustic Output Reporting Table for Track3

System : DUS 60 VET Operating Mode: M mode

Transducer: C361-2 Working Frequency: 3.5MHz

Index Label			MI	TIS			TIB	TIC
				scan	non-scan		non-scan	
					$A_{aprt} \leq 1$	$A_{aprt} > 1$		
Global Maximum Index Value			0.63			0.0057	0.0119	0.0107
Associated Acoustic Parameters	$P_{r.3}$	(MPa)	1.08					
	W_0	(mW)					0.802	0.802
	Min of[$W_{.3}(z_1)$, $I_{TA.3}(z_1)$]	(mW)				0.42		
	Z_1	(cm)				3.28		
	Z_{bp}	(cm)				2.816		
	Z_{sp}	(cm)					5.06	
	$z@PII_{.3max}$	(cm)	5.50					
	$d_{eq}(Z_{sp})$	(cm)					1.92	
	f_c	(MHz)	2.90			2.90	2.90	2.90
	Dim of A_{aprt}	X(cm)				1.9152	1.9152	1.9152
		Y (cm)				1.45	1.45	1.45
Other Information	PD	(usec)	0.46					
	PRF	(Hz)	40.857					
	$P_r@PII_{max}$	(MPa)	1.79					
	$d_{eq}@PII_{max}$	(cm)					1.92	
	Focal Length	FL_x (cm)				5.3		5.3
		FL_y (cm)				5.95		5.95
	$I_{PA.3}@MI_{max}$	(W/cm^2)	62.86					
Operating Control Conditions	Depth(mm)		68			68	68	68
	Focus(mm)		60			60	60	60
	Freq(MHz)		3.5			3.5	3.5	3.5

Acoustic Output Reporting Table for Track3

System : DUS 60 VET Operating Mode: B+M mode

Transducer: C361-2 Working Frequency: 3.5MHz

Index Label			MI	TIS			TIB	TIC
				scan	non-scan		non-scan	
					$A_{aprt}\leq 1$	$A_{aprt}>1$		
Global Maximum Index Value			0.67	0.10		0.0057	0.10	0.4207
Associated Acoustic Parameters	$P_{r.3}$ (MPa)		1.08					
	W_0 (mW)			31.602			31.602	31.602
	Min of[$W_{.3}(z_1)$, $I_{TA.3}(z_1)$] (mW)					0.42		
	Z_1 (cm)					3.28		
	Z_{bp} (cm)					2.816		
	Z_{sp} (cm)						5.06	
	z@$PII_{.3max}$ (cm)		5.50					
	$d_{eq}(Z_{sp})$ (cm)						1.92	
	f_c (MHz)		2.90	2.90		2.90	2.90	2.90
	Dim of A_{aprt}	X(cm)		1.9152		1.9152	1.9152	1.9152
		Y (cm)		1.45		1.45	1.45	1.45
Other Information	PD (usec)		0.46					
	PRF (Hz)		2124.6					
	P_r@PII_{max} (MPa)		1.79					
	d_{eq}@PII_{max} (cm)						1.92	
	Focal Length	FL_x (cm)		5.3		5.3		5.3
		FL_y (cm)		5.95		5.95		5.95
	$I_{PA.3}$@MI_{max}(W/cm^2)		62.86					
Operating Control Conditions	Depth(mm)		68	68		68	68	68
	Focus(mm)		60	60		60	60	60
	Freq(MHz)		3.5	3.5		3.5	3.5	3.5

Acoustic Output Reporting Table for Track3

System : DUS 60 VET Operating Mode: PW mode

Transducer: C361-2 Working Frequency: 2.5MHz

Index Label			MI	TIS			TIB	TIC
				scan	non-scan		non-scan	
					$A_{aprt} \leq 1$	$A_{aprt} > 1$		
Global Maximum Index Value			0.56			0.44	1.79	0.76
Associated Acoustic Parameters	$P_{r.3}$	(MPa)	0.92					
	W_0	(mW)					57.53	57.53
	Min of[$W_{.3}(z_1)$, $I_{TA.3}(z_1)$]	(mW)				33.92		
	Z_1	(cm)				2.82		
	Z_{bp}	(cm)				2.816		
	Z_{sp}	(cm)					4.94	
	$z@PII_{.3max}$	(cm)	5.45					
	$d_{eq}(Z_{sp})$	(cm)					0.013	
	f_c	(MHz)	2.71			2.71	2.71	2.71
	Dim of A_{aprt}	X(cm)				1.9152	1.9152	1.9152
		Y (cm)				1.45	1.45	1.45
Other Information	PD	(usec)	1.38					
	PRF	(Hz)	4549.5					
	$P_r@PII_{max}$	(MPa)	1.46					
	$d_{eq}@PII_{max}$	(cm)					0.013	
	Focal Length	FL_x (cm)				4.775		4.775
		FL_y (cm)				5.725		5.725
	$I_{PA.3}@MI_{max}$	(W/cm^2)	53.21					
Operating Control Conditions	Depth(mm)		68			68	68	68
	Focus(mm)		60			60	60	60
	Freq(MHz)		2.5			2.5	2.5	2.5

A2.8.2: Test of Probe C611-2:

Acoustic Output Reporting Table for Track3

System : DUS 60 VET Operating Mode: B mode

Transducer: C611-2 Working Frequency: 6.5MHz

Index Label			MI	TIS			TIB	TIC
				scan	non-scan		non-scan	
					$A_{aprt}\leq 1$	$A_{aprt}>1$		
Global Maximum Index Value			0.78	0.11				0.26
Associated Acoustic Parameters	$P_{r.3}$ (MPa)		1.77					
	W_0 (mW)			7.443				7.443
	Min of[$W_{.3}(z_1)$, $I_{TA.3}(z_1)$] (mW)							
	Z_1 (cm)							
	Z_{bp} (cm)							
	Z_{sp} (cm)							
	$z@PII_{.3max}$ (cm)		1.60					
	$d_{eq}(Z_{sp})$ (cm)							
	f_c (MHz)		5.08	5.08				5.08
	Dim of A_{aprt}	X(cm)		0.672				0.672
		Y (cm)		0.58				0.58
Other Information	PD (usec)		0.26					
	PRF (Hz)		6225.5					
	$P_r@PII_{max}$ (MPa)		2.27					
	$d_{eq}@PII_{max}$ (cm)							
	Focal Length	FL_x (cm)		1.75				1.75
		FL_y (cm)		1.575				1.575
	$I_{PA.3}@MI_{max}(W/cm^2)$		128.78					
Operating Control Conditions	Depth(mm)		29	29				29
	Focus(mm)		25	25				25
	Freq(MHz)		6.5	6.5				6.5

3

Acoustic Output Reporting Table for Track3

System : DUS 60 VET Operating Mode: M mode

Transducer: C611-2 Working Frequency: 6.5MHz

Index Label			MI	TIS			TIB	TIC
				scan	non-scan		non-scan	
					$A_{aprt}\leq 1$	$A_{aprt}>1$		
Global Maximum Index Value			0.76		0.0086		0.0141	0.0126
Associated Acoustic Parameters	$P_{r.3}$	(MPa)	1.71					
	W_0	(mW)			0.3547		0.3547	0.3547
	Min of[$W_{.3}(z_1)$, $I_{TA.3}(z_1)$]	(mW)						
	Z_1	(cm)						
	Z_{bp}	(cm)						
	Z_{sp}	(cm)					1.40	
	$z@PII_{.3max}$	(cm)	1.64					
	$d_{eq}(Z_{sp})$	(cm)					1.63	
	f_c	(MHz)	5.09		5.09		5.09	5.09
	Dim of A_{aprt}	X(cm)			0.672		0.672	0.672
		Y (cm)			0.58		0.58	0.58
Other Information	PD	(usec)	0.26					
	PRF	(Hz)	75.222					
	$P_r@PII_{max}$	(MPa)	2.18					
	$d_{eq}@PII_{max}$	(cm)					1.63	
	Focal Length	FL_x (cm)			1.5			1.5
		FL_y (cm)			1.5			1.5
	$I_{PA.3}@MI_{max}$	(W/cm^2)	108.17					
Operating Control Conditions	Depth(mm)		29		29		29	29
	Focus(mm)		25		25		25	25
	Freq(MHz)		6.5		6.5		6.5	6.5

Acoustic Output Reporting Table for Track3

System : DUS 60 VET Operating Mode: B+M mode

Transducer: C611-2 Working Frequency: 6.5MHz

Index Label			MI	TIS			TIB	TIC
				scan	non-scan		non-scan	
					$A_{aprt}\leq 1$	$A_{aprt}>1$		
Global Maximum Index Value			0.78	0.11	0.0086		0.11	0.2726
Associated Acoustic Parameters	$P_{r.3}$ (MPa)		1.71					
	W_0 (mW)			7.7977	7.7977		7.7977	7.7977
	Min of[$W_{.3}(z_1)$, $I_{TA.3}(z_1)$] (mW)							
	Z_1 (cm)							
	Z_{bp} (cm)							
	Z_{sp} (cm)						1.40	
	$z@PII_{.3max}$ (cm)		1.64					
	$d_{eq}(Z_{sp})$ (cm)						1.63	
	f_c (MHz)		5.09	5.09	5.09		5.09	5.09
	Dim of A_{aprt}	X(cm)		0.672	0.672		0.672	0.672
		Y (cm)		0.58	0.58		0.58	0.58
Other Information	PD (usec)		0.26					
	PRF (Hz)		3911.5					
	$P_r@PII_{max}$ (MPa)		2.18					
	$d_{eq}@PII_{max}$ (cm)						1.63	
	Focal Length	FL_x (cm)		1.5	1.5			1.5
		FL_y (cm)		1.5	1.5			1.5
	$I_{PA.3}@MI_{max}(W/cm^2)$		108.17					
Operating Control Conditions	Depth(mm)		29	29	29		29	29
	Focus(mm)		25	25	25		25	25
	Freq(MHz)		6.5	6.5	6.5		6.5	6.5

Acoustic Output Reporting Table for Track3

System : DUS 60 VET Operating Mode: PW mode

Transducer: C611-2 Working Frequency: 5.0MHz

Index Label			MI	TIS			TIB	TIC
				scan	non-scan		non-scan	
					$A_{aprt}\leq 1$	$A_{aprt}>1$		
Global Maximum Index Value			0.74		0.33		1.07	0.49
Associated Acoustic Parameters	$P_{r.3}$	(MPa)	1.65					
	W_0	(mW)			13.80		13.80	13.80
	Min of[$W_{.3}(z_1)$, $I_{TA.3}(z_1)$]	(mW)						
	Z_1	(cm)						
	Z_{bp}	(cm)						
	Z_{sp}	(cm)					1.36	
	$z@PII_{.3max}$	(cm)	1.46					
	$d_{eq}(Z_{sp})$	(cm)					0.021	
	f_c	(MHz)	4.97		4.97		4.97	4.97
	Dim of A_{aprt}	X(cm)			0.672		0.672	0.672
		Y (cm)			0.58		0.58	0.58
Other Information	PD	(usec)	0.70					
	PRF	(Hz)	3690					
	$P_r@PII_{max}$	(MPa)	2.08					
	$d_{eq}@PII_{max}$	(cm)					0.021	
	Focal Length	FL_x (cm)			1.8			1.8
		FL_y (cm)			1.55			1.55
	$I_{PA.3}@MI_{max}$	(W/cm^2)	126.70					
Operating Control Conditions	Depth(mm)		29		29		29	29
	Focus(mm)		25		25		25	25
	Freq(MHz)		5.0		5.0		5.0	5.0

A2.8.3: Test of Probe L761-2:

Acoustic Output Reporting Table for Track3

System : DUS 60 VET Operating Mode: B mode

Transducer: L761-2 Working Frequency: 6.5MHz

Index Label			MI	TIS			TIB	TIC
				scan	non-scan		non-scan	
					$A_{aprt} \leq 1$	$A_{aprt} > 1$		
Global Maximum Index Value			0.50	0.02				0.06
Associated Acoustic Parameters	$P_{r.3}$ (MPa)		1.15					
	W_0 (mW)			2.694				2.694
	Min of[$W_{.3}(z_1)$, $I_{TA.3}(z_1)$] (mW)							
	Z_1 (cm)							
	Z_{bp} (cm)							
	Z_{sp} (cm)							
	$z@PII_{.3max}$ (cm)		1.58					
	$d_{eq}(Z_{sp})$ (cm)							
	f_c (MHz)		5.18	5.18				5.18
	Dim of A_{aprt}	X(cm)		1.8				1.8
		Y (cm)		0.58				0.58
Other Information	PD (usec)		0.23					
	PRF (Hz)		6225.5					
	$P_r@PII_{max}$ (MPa)		1.57					
	$d_{eq}@PII_{max}$ (cm)							
	Focal Length	FL_x (cm)		1.5				1.5
		FL_y (cm)		1.5				1.5
	$I_{PA.3}@MI_{max}$(W/cm^2)		45.30					
Operating Control Conditions	Depth(mm)		29	29				29
	Focus(mm)		20	20				20
	Freq(MHz)		6.5	6.5				6.5

Acoustic Output Reporting Table for Track3

System : DUS 60 VET Operating Mode: M mode

Transducer: L761-2 Working Frequency: 6.5MHz

Index Label			MI	TIS			TIB	TIC
				scan	non-scan		non-scan	
					$A_{aprt} \leq 1$	$A_{aprt} > 1$		
Global Maximum Index Value			0.53			0.0017	0.0061	0.0028
Associated Acoustic Parameters	$P_{r.3}$ (MPa)		1.22					
	W_0 (mW)						0.1272	0.1272
	Min of[$W_{.3}(z_1)$, $I_{TA.3}(z_1)$] (mW)					0.067		
	Z_1 (cm)					1.74		
	Z_{bp} (cm)					1.727		
	Z_{sp} (cm)						1.74	
	z@$PII_{.3max}$ (cm)		1.60					
	$d_{eq}(Z_{sp})$ (cm)						4.20	
	f_c (MHz)		5.29			5.29	5.29	5.29
	Dim of A_{aprt}	X(cm)				1.8	1.8	1.8
		Y (cm)				0.58	0.58	0.58
Other Information	PD (usec)		0.23					
	PRF (Hz)		75.222					
	$P_r@PII_{max}$ (MPa)		1.68					
	$d_{eq}@PII_{max}$ (cm)						4.20	
	Focal Length	FL_x (cm)				1.5		1.5
		FL_y (cm)				1.5		1.5
	$I_{PA.3}@MI_{max}$(W/cm^2)		59.97					
Operating Control Conditions	Depth(mm)		29			29	29	29
	Focus(mm)		20			20	20	20
	Freq(MHz)		6.5			6.5	6.5	6.5

Acoustic Output Reporting Table for Track3

System : DUS 60 VET Operating Mode: B+M mode

Transducer: L761-2 Working Frequency: 6.5MHz

Index Label			MI	TIS			TIB	TIC
				scan	non-scan		non-scan	
					$A_{aprt} \leq 1$	$A_{aprt} > 1$		
Global Maximum Index Value			0.53	0.02		0.0017	0.02	0.0628
Associated Acoustic Parameters	$P_{r.3}$	(MPa)	1.22					
	W_0	(mW)		2.8212			2.8212	2.8212
	Min of[$W_{.3}(z_1)$, $I_{TA.3}(z_1)$]	(mW)				0.067		
	Z_1	(cm)				1.74		
	Z_{bp}	(cm)				1.727		
	Z_{sp}	(cm)					1.74	
	$z@PII_{.3max}$	(cm)	1.60					
	$d_{eq}(Z_{sp})$	(cm)					4.20	
	f_c	(MHz)	5.29	5.29		5.29	5.29	5.29
	Dim of A_{aprt}	X(cm)		1.8		1.8	1.8	1.8
		Y (cm)		0.58		0.58	0.58	0.58
Other Information	PD	(usec)	0.23					
	PRF	(Hz)	3911.5					
	$P_r@PII_{max}$	(MPa)	1.68					
	$d_{eq}@PII_{max}$	(cm)					4.20	
	Focal Length	FL_x (cm)		1.5		1.5		1.5
		FL_y (cm)		1.5		1.5		1.5
	$I_{PA.3}@MI_{max}$	(W/cm^2)	59.97					
Operating Control Conditions	Depth(mm)		29	29		29	29	29
	Focus(mm)		20	20		20	20	20
	Freq(MHz)		6.5	6.5		6.5	6.5	6.5

Acoustic Output Reporting Table for Track3

System : DUS 60 VET Operating Mode: PW mode

Transducer: L761-2 Working Frequency: 5.5MHz

Index Label			MI	TIS			TIB	TIC
				scan	non-scan		non-scan	
					$A_{aprt} \leq 1$	$A_{aprt} > 1$		
Global Maximum Index Value			0.41			0.07	0.50	0.12
Associated Acoustic Parameters	$P_{r.3}$	(MPa)	0.97					
	W_0	(mW)					5.461	5.461
	Min of[$W_{.3}(z_1)$, $I_{TA.3}(z_1)$]	(mW)				2.806		
	Z_1	(cm)				1.74		
	Z_{bp}	(cm)				1.727		
	Z_{sp}	(cm)					1.74	
	$z@PII_{.3max}$	(cm)	1.50					
	$d_{eq}(Z_{sp})$	(cm)					0.053	
	f_c	(MHz)	5.54			5.54	5.54	5.54
	Dim of A_{aprt}	X(cm)				1.8	1.8	1.8
		Y (cm)				0.58	0.58	0.58
Other Information	PD	(usec)	0.63					
	PRF	(Hz)	5149.2					
	$P_r@PII_{max}$	(MPa)	1.36					
	$d_{eq}@PII_{max}$	(cm)					0.053	
	Focal Length	FL_x (cm)				1.5		1.5
		FL_y (cm)				1.5		1.5
	$I_{PA.3}@MI_{max}$	(W/cm^2)	52.88					
Operating Control Conditions	Depth(mm)		29			29	29	29
	Focus(mm)		20			20	20	20
	Freq(MHz)		5.5			5.5	5.5	5.5

A2.8.4: Test of Probe L743-2:

Acoustic Output Reporting Table for Track3

System : DUS 60 VET Operating Mode: B mode

Transducer: L743-2 Working Frequency: 6.5MHz

Index Label			MI	TIS			TIB	TIC
				scan	non-scan		non-scan	
					$A_{aprt} \leq 1$	$A_{aprt} > 1$		
Global Maximum Index Value			0.67	0.04				0.13
Associated Acoustic Parameters	$P_{r.3}$ (MPa)		1.49					
	W_0 (mW)			4.56				4.56
	Min of[$W_{.3}(z_1)$, $I_{TA.3}(z_1)$] (mW)							
	Z_1 (cm)							
	Z_{bp} (cm)							
	Z_{sp} (cm)							
	$z@PII_{.3max}$ (cm)		1.96					
	$d_{eq}(Z_{sp})$ (cm)							
	f_c (MHz)		4.99	4.99				4.99
	Dim of A_{aprt}	X(cm)		1.008				1.008
		Y (cm)		0.6				0.6
Other Information	PD (usec)		0.26					
	PRF (Hz)		6225.6					
	$P_r@PII_{max}$ (MPa)		2.00					
	$d_{eq}@PII_{max}$ (cm)							
	Focal Length	FL_x (cm)		2.075				2.075
		FL_y (cm)		1.5				1.5
	$I_{PA.3}@MI_{max}(W/cm^2)$		76.69					
Operating Control Conditions	Depth(mm)		29	29				29
	Focus(mm)		25	25				25
	Freq(MHz)		6.5	6.5				6.5

Acoustic Output Reporting Table for Track3

System : DUS 60 VET Operating Mode: M mode

Transducer: L743-2 Working Frequency: 6.5MHz

Index Label			MI	TIS			TIB	TIC
				scan	non-scan		non-scan	
					$A_{aprt} \leq 1$	$A_{aprt} > 1$		
Global Maximum Index Value			0.67		0.0055		0.0095	0.0065
Associated Acoustic Parameters	$P_{r.3}$ (MPa)		1.51					
	W_0 (mW)				0.2278		0.2278	0.2278
	Min of[$W_{.3}(z_1)$, $I_{TA.3}(z_1)$] (mW)							
	Z_1 (cm)							
	Z_{bp} (cm)							
	Z_{sp} (cm)						1.84	
	$z@PII_{.3max}$ (cm)		2.04					
	$d_{eq}(Z_{sp})$ (cm)						2.41	
	f_c (MHz)		5.06		5.06		5.06	5.06
	Dim of A_{aprt}	X(cm)			1.008		1.008	1.008
		Y (cm)			0.6		0.6	0.6
Other Information	PD (usec)		0.25					
	PRF (Hz)		75.222					
	$P_r@PII_{max}$ (MPa)		2.08					
	$d_{eq}@PII_{max}$ (cm)						2.41	
	Focal Length	FL_x (cm)			2.25			2.25
		FL_y (cm)			1.7			1.7
	$I_{PA.3}@MI_{max}(W/cm^2)$		75.39					
Operating Control Conditions	Depth(mm)		29		29		29	29
	Focus(mm)		25		25		25	25
	Freq(MHz)		6.5		6.5		6.5	6.5

Acoustic Output Reporting Table for Track3

System : DUS 60 VET Operating Mode: B+M mode

Transducer: L743-2 Working Frequency: 6.5MHz

Index Label			MI	TIS			TIB	TIC
				scan	non-scan		non-scan	
					$A_{aprt} \leq 1$	$A_{aprt} > 1$		
Global Maximum Index Value			0.67	0.04	0.0055		0.04	0.1365
Associated Acoustic Parameters	$P_{r.3}$ (MPa)		1.51					
	W_0 (mW)			4.7878	4.7878		4.7878	4.7878
	Min of[$W_{.3}(z_1)$, $I_{TA.3}(z_1)$] (mW)							
	Z_1 (cm)							
	Z_{bp} (cm)							
	Z_{sp} (cm)						1.84	
	$z@PII_{.3max}$ (cm)		2.04					
	$d_{eq}(Z_{sp})$ (cm)						2.41	
	f_c (MHz)		5.06	5.06	5.06		5.06	5.06
	Dim of A_{aprt}	X(cm)		1.008	1.008		1.008	1.008
		Y (cm)		0.6	0.6		0.6	0.6
Other Information	PD (usec)		0.25					
	PRF (Hz)		3911.5					
	$P_r@PII_{max}$ (MPa)		2.08					
	$d_{eq}@PII_{max}$ (cm)						2.41	
	Focal Length	FL_x (cm)		2.25	2.25			2.25
		FL_y (cm)		1.7	1.7			1.7
	$I_{PA.3}@MI_{max}(W/cm^2)$		75.39					
Operating Control Conditions	Depth(mm)		29	29	29		29	29
	Focus(mm)		25	25	25		25	25
	Freq(MHz)		6.5	6.5	6.5		6.5	6.5

Acoustic Output Reporting Table for Track3

System : DUS 60 VET Operating Mode: PW mode

Transducer: L743-2 Working Frequency: 5.5MHz

Index Label			MI	TIS			TIB	TIC
				scan	non-scan		non-scan	
					$A_{aprt}\leq 1$	$A_{aprt}>1$		
Global Maximum Index Value			0.56		0.25		0.71	0.27
Associated Acoustic Parameters	$P_{r.3}$ (MPa)		1.32					
	W_0 (mW)				9.527		9.527	9.527
	Min of[$W_{.3}(z_1)$, $I_{TA.3}(z_1)$] (mW)							
	Z_1 (cm)							
	Z_{bp} (cm)							
	Z_{sp} (cm)						1.66	
	$z@PII_{.3max}$ (cm)		2.04					
	$d_{eq}(Z_{sp})$ (cm)						0.032	
	f_c (MHz)		5.59		5.59		5.59	5.59
	Dim of A_{aprt}	X(cm)			1.008		1.008	1.008
		Y (cm)			0.6		0.6	0.6
Other Information	PD (usec)		0.62					
	PRF (Hz)		5149.2					
	$P_r@PII_{max}$ (MPa)		1.81					
	$d_{eq}@PII_{max}$ (cm)						0.032	
	Focal Length	FL_x (cm)			1.85			1.85
		FL_y (cm)			1.5			1.5
	$I_{PA.3}@MI_{max}$(W/cm^2)		65.90					
Operating Control Conditions	Depth(mm)		29		29		29	29
	Focus(mm)		25		25		25	25
	Freq(MHz)		5.5		5.5		5.5	5.5

A2.8.5: Test of Probe V563-2:

Acoustic Output Reporting Table for Track3

Transducer Model: V563-2

Operating Model: B

Index Label			MI	TIS			TIB	TIC
				scan	non-scan		non-scan	
					$A_{aprt}\leq 1$	$A_{aprt}>1$		
Global Maximum Index Value			0.66	0.04				N/A
Associated Acoustic Parameters	$P_{r.3}$ (MPa)		1.30					
	W_0 (mW)			10.51				N/A
	Min of[$W_{.3}(z_1)$, $I_{TA.3}(z_1)$] (mW)							
	Z_1 (cm)							
	Z_{bp} (cm)							
	Z_{sp} (cm)							
	z@PII$_{.3max}$ (cm)		2.96					
	$d_{eq}(Z_{sp})$ (cm)							
	f_c (MHz)		3.91	3.91				N/A
	Dim of A_{aprt}	X(cm)		1.512				N/A
		Y (cm)		1.5				N/A
Other Information	PD (usec)		0.36					
	PRF (Hz)		6225.5					
	P_r@PII_{max} (MPa)		1.86					
	d_{eq}@PII_{max} (cm)							
	Focal Length	FL_x (cm)		3.00				N/A
		FL_y (cm)		2.95				N/A
	$I_{PA.3}$@MI_{max}(W/cm^2)		56.20					
Operating Control Conditions	Depth(mm)		39	39				N/A
	Focus(mm)		30	30				N/A
	Freq(MHz)		4.5	4.5				N/A

Acoustic Output Reporting Table for Track3

Transducer Model: V563-2

Operating Model: M

Index Label			MI	TIS			TIB	TIC
				scan	non-scan		non-scan	
					$A_{aprt} \leq 1$	$A_{aprt} > 1$		
Global Maximum Index Value			0.60			0.0026	0.0066	N/A
Associated Acoustic Parameters	$P_{r.3}$ (MPa)		1.18					
	W_0 (mW)						0.28	N/A
	Min of[$W_{.3}(z_1)$, $I_{TA.3}(z_1)$] (mW)					0.142		
	Z_1 (cm)					2.50		
	Z_{bp} (cm)					2.545		
	Z_{sp} (cm)						2.68	
	z@PII$_{.3max}$ (cm)		3.02					
	$d_{eq}(Z_{sp})$ (cm)						3.48	
	f_c (MHz)		3.90			3.90	3.90	N/A
	Dim of A_{aprt}	X(cm)				1.512	1.512	N/A
		Y (cm)				1.5	1.5	N/A
Other Information	PD (usec)		0.35					
	PRF (Hz)		2124.6					
	P_r@PII_{max} (MPa)		1.73					
	d_{eq}@PII_{max} (cm)						3.48	
	Focal Length	FL_x (cm)				3.00		N/A
		FL_y (cm)				2.95		N/A
	$I_{PA.3}$@MI_{max}(W/cm^2)		52.02					
Operating Control Conditions	Depth(mm)		39			39	39	N/A
	Focus(mm)		30			30	30	N/A
	Freq(MHz)		4.5			4.5	4.5	N/A

Acoustic Output Reporting Table for Track3

Transducer Model: V563-2

Operating Model: B+M

Index Label			MI	TIS			TIB	TIC
				scan	non-scan		non-scan	
					$A_{aprt}\leq 1$	$A_{aprt}>1$		
Global Maximum Index Value			0.60	0.04		0.0026	0.04	N/A
Associated Acoustic Parameters	$P_{r.3}$ (MPa)		1.18					
	W_0 (mW)			10.79			10.79	N/A
	Min of[$W_{.3}(z_1)$, $I_{TA.3}(z_1)$] (mW)					0.142		
	Z_1 (cm)					2.50		
	Z_{bp} (cm)					2.545		
	Z_{sp} (cm)						2.68	
	z@$PII_{.3max}$ (cm)		3.02					
	$d_{eq}(Z_{sp})$ (cm)						3.48	
	f_c (MHz)		3.90	3.90		3.90	3.90	N/A
	Dim of A_{aprt}	X(cm)		1.512		1.512	1.512	N/A
		Y (cm)		1.5		1.5	1.5	N/A
Other Information	PD (usec)		0.35					
	PRF (Hz)		2124.6					
	P_r@PII_{max} (MPa)		1.73					
	d_{eq}@PII_{max} (cm)						3.48	
	Focal Length	FL_x (cm)		3.00		3.00		N/A
		FL_y (cm)		2.95		2.95		N/A
	$I_{PA.3}$@MI_{max}(W/cm^2)		52.02					
Operating Control Conditions	Depth(mm)		39	39		39	39	N/A
	Focus(mm)		30	30		30	30	N/A
	Freq(MHz)		4.5	4.5		4.5	4.5	N/A

Acoustic Output Reporting Table for Track3

Transducer Model: V563-2

Operating Model: PW

Index Label			MI	TIS			TIB	TIC
				scan	non-scan		non-scan	
					$A_{aprt}\leq 1$	$A_{aprt}>1$		
Global Maximum Index Value			0.52			0.20	0.99	N/A
Associated Acoustic Parameters	$P_{r.3}$ (MPa)		1.04					
	W_0 (mW)						21.59	N/A
	Min of[$W_{.3}(z_1)$, $I_{TA.3}(z_1)$] (mW)					10.74		
	Z_1 (cm)					2.50		
	Z_{bp} (cm)					2.545		
	Z_{sp} (cm)						2.50	
	z@PII$_{.3max}$ (cm)		2.90					
	$d_{eq}(Z_{sp})$ (cm)						0.024	
	f_c (MHz)		3.95			3.95	3.95	N/A
	Dim of A_{aprt}	X(cm)				1.512	1.512	N/A
		Y (cm)				1.5	1.5	N/A
Other Information	PD (usec)		0.88					
	PRF (Hz)		4549.5					
	P_r@PII_{max} (MPa)		1.55					
	d_{eq}@PII_{max} (cm)						0.024	
	Focal Length	FL_x (cm)				3.00		N/A
		FL_y (cm)				2.95		N/A
	$I_{PA.3}$@MI_{max}(W/cm^2)		56.70					
Operating Control Conditions	Depth(mm)		39			39	39	N/A
	Focus(mm)		30			30	30	N/A
	Freq(MHz)		4.0			4.0	4.0	N/A

A2.8.6: Test of Probe C321-2:

Acoustic Output Reporting Table for Track3

Transducer Model: C321-2

Operating Model: B

Index Label			MI	TIS			TIB	TIC
				scan	non-scan		non-scan	
					$A_{aprt} \leq 1$	$A_{aprt} > 1$		
Global Maximum Index Value			0.69	0.21				N/A
Associated Acoustic Parameters	$P_{r.3}$ (MPa)		1.18					
	W_0 (mW)			31.22				N/A
	Min of[$W_{.3}(z_1)$, $I_{TA.3}(z_1)$] (mW)							
	Z_1 (cm)							
	Z_{bp} (cm)							
	Z_{sp} (cm)							
	z@PII$_{.3max}$ (cm)		2.60					
	$d_{eq}(Z_{sp})$ (cm)							
	f_c (MHz)		2.92	2.92				N/A
	Dim of A_{aprt}	X(cm)		1.9152				N/A
		Y (cm)		1.30				N/A
Other Information	PD (usec)		0.45					
	PRF (Hz)		4549					
	P_r@PII_{max} (MPa)		1.53					
	d_{eq}@PII_{max} (cm)							
	Focal Length	FL_x (cm)		13.00				N/A
		FL_y (cm)		3.00				N/A
	$I_{PA.3}$@MI_{max}(W/cm^2)		53.69					
Operating Control Conditions	Depth(mm)		137	137				N/A
	Focus(mm)		130	130				N/A
	Freq(MHz)		2.5	2.5				N/A

Acoustic Output Reporting Table for Track3

Transducer Model: C321-2

Operating Model: M

Index Label			MI	TIS			TIB	TIC
				scan	non-scan		non-scan	
					$A_{aprt}\leq 1$	$A_{aprt}>1$		
Global Maximum Index Value			0.64			0.21	0.53	N/A
Associated Acoustic Parameters	$P_{r.3}$	(MPa)	1.08					
	W_0	(mW)					13.10	N/A
	Min of[$W_{.3}(z_1)$, $I_{TA.3}(z_1)$]	(mW)				15.48		
	Z_1	(cm)				2.60		
	Z_{bp}	(cm)				2.67		
	Z_{sp}	(cm)					2.60	
	z@PII$_{.3max}$	(cm)	2.61					
	$d_{eq}(Z_{sp})$	(cm)					0.47	
	f_c	(MHz)	2.85			2.85	2.85	N/A
	Dim of A_{aprt}	X(cm)				1.9152	1.9152	N/A
		Y (cm)				1.30	1.30	N/A
Other Information	PD	(usec)	0.48					
	PRF	(Hz)	2124.5					
	P_r@PII_{max}	(MPa)	1.41					
	d_{eq}@PII_{max}	(cm)					0.46	
	Focal Length	FL_x (cm)				13.00		N/A
		FL_y (cm)				3.00		N/A
	$I_{PA.3}$@MI_{max}	(W/cm^2)	88.4					
Operating Control Conditions	Depth(mm)		137			137	137	N/A
	Focus(mm)		130			130	130	N/A
	Freq(MHz)		2.5			2.5	2.5	N/A

Acoustic Output Reporting Table for Track3

Transducer Model: C321-2

Operating Model: B+M

Index Label			MI	TIS			TIB	TIC
				scan	non-scan		non-scan	
					$A_{aprt}\leq 1$	$A_{aprt}>1$		
Global Maximum Index Value			0.64	0.21		0.21	0.53	N/A
Associated Acoustic Parameters	$P_{r.3}$ (MPa)		1.08					
	W_0 (mW)			26.20			26.20	N/A
	Min of[$W_{.3}(z_1)$, $I_{TA.3}(z_1)$] (mW)					15.48		
	Z_1 (cm)					2.60		
	Z_{bp} (cm)					2.67		
	Z_{sp} (cm)						2.60	
	z@PII$_{.3max}$ (cm)		2.61					
	$d_{eq}(Z_{sp})$ (cm)						0.47	
	f_c (MHz)		2.85	2.85		2.85	2.85	N/A
	Dim of A_{aprt}	X(cm)		1.9152		1.9152	1.9152	N/A
		Y (cm)		1.30		1.30	1.30	N/A
Other Information	PD (usec)		0.48					
	PRF (Hz)		2124.5					
	P_r@PII_{max} (MPa)		1.41					
	d_{eq}@PII_{max} (cm)						0.46	
	Focal Length	FL_x (cm)		13.00		13.00		N/A
		FL_y (cm)		3.00		3.00		N/A
	$I_{PA.3}$@MI_{max}(W/cm^2)		88.4					
Operating Control Conditions	Depth(mm)		137	137		137	137	N/A
	Focus(mm)		130	130		130	130	N/A
	Freq(MHz)		2.5	2.5		2.5	2.5	N/A

Acoustic Output Reporting Table for Track3

Transducer Model: C321-2

Operating Model: PW

Index Label			MI	TIS			TIB	TIC
				scan	non-scan		non-scan	
					$A_{aprt}\leq 1$	$A_{aprt}>1$		
Global Maximum Index Value			0.81			0.98	3.22	N/A
Associated Acoustic Parameters	$P_{r.3}$ (MPa)		1.40					
	W_0 (mW)						119.5	N/A
	Min of[$W_{.3}(z_1)$, $I_{TA.3}(z_1)$] (mW)					68.62		
	Z_1 (cm)					2.60		
	Z_{bp} (cm)					2.67		
	Z_{sp} (cm)						2.60	
	z@$PII_{.3max}$ (cm)		2.60					
	$d_{eq}(Z_{sp})$ (cm)						0.48	
	f_c (MHz)		3.00			3.00	3.00	N/A
	Dim of A_{aprt}	X(cm)				1.9152	1.9152	N/A
		Y (cm)				1.30	1.30	N/A
Other Information	PD (usec)		1.16					
	PRF (Hz)		4074.9					
	P_r@PII_{max} (MPa)		1.82					
	d_{eq}@PII_{max} (cm)						0.48	
	Focal Length	FL_x (cm)				13.00		N/A
		FL_y (cm)				3.00		N/A
	$I_{PA.3}$@MI_{max}(W/cm^2)		83.92					
Operating Control Conditions	Depth(mm)		137			137	137	N/A
	Focus(mm)		130			130	130	N/A
	Freq(MHz)		3.0			3.0	3.0	N/A

A2.8.7: Test of Probe VL8-3WD:

Acoustic Output Reporting Table for Track3

Transducer Model: VL8-3WD

Operating Mode: B

Index Label			MI	TIS			TIB	TIC
				scan	non-scan		non-scan	
					$A_{aprt} \leq 1$	$A_{aprt} > 1$		
Global Maximum Index Value			0.42	0.15	-	-	-	N/A
Associated Acoustic Parameters	$p_{r.3}$	(MPa)	0.90					
	W_0	(mW)		6.84	-		-	N/A
	Min of[$W_{.3}(z_1)$, $I_{TA.3}(z_1)$]	(mW)				-		
	z_1	(cm)				-		
	z_{bp}	(cm)				-		
	z_{sp}	(cm)					-	
	z@PII$_{.3max}$	(cm)	7.93					
	$d_{eq}(Z_{sp})$	(cm)					-	
	f_c	(MHz)	4.54	4.54	-	-	-	N/A
	Dim of A_{aprt}	X(cm)		0.3792	-	-	-	N/A
		Y (cm)		0.58	-	-	-	N/A
Other Information	PD	(usec)	0.27					
	PRF	(Hz)	6241.40					
	p_r@PII_{max} (MPa)		0.97					
	d_{eq}@PII_{max} (cm)						-	
	Focal Length	FL_x (cm)		6.00	-	-		N/A
		FL_y (cm)		3.50	-	-		N/A
	$I_{PA.3}$@MI_{max}(W/cm^2)		23.38					
Operating Control Conditions	Focus Depth(mm)		60	60	-	-	-	N/A
	Display Depth(mm)		68	68	-	-	-	N/A
	Working Frequency(MHz)		5.5	5.5	-	-	-	N/A
	ScanAngle		Level 0	Level 0	-	-	-	N/A

Acoustic Output Reporting Table for Track3

Transducer Model: VL8-3WD

Operating Mode: M

Index Label			MI	TIS			TIB	TIC
				scan	non-scan		non-scan	
					$A_{aprt}\leq 1$	$A_{aprt}>1$		
Global Maximum Index Value			0.42	-	0.050	-	0.090	N/A
Associated Acoustic Parameters	$p_{r.3}$	(MPa)	0.90					
	W_0	(mW)		-	2.33		2.33	N/A
	Min of[$W_{.3}(z_1)$, $I_{TA.3}(z_1)$]	(mW)				-		
	z_1	(cm)				-		
	z_{bp}	(cm)				-		
	z_{sp}	(cm)					0.80	
	z@PII$_{.3max}$	(cm)	7.93					
	$d_{eq}(Z_{sp})$	(cm)					0.43	
	f_c	(MHz)	4.54	-	4.54	-	4.54	N/A
	Dim of A_{aprt}	X(cm)		-	0.3792	-	0.3792	N/A
		Y (cm)		-	0.58	-	0.58	N/A
Other Information	PD	(usec)	0.27					
	PRF	(Hz)	2130.00					
	$p_r@PII_{max}$	(MPa)	0.97					
	$d_{eq}@PII_{max}$	(cm)					0.29	
	Focal Length	FL_x (cm)		-	6.00	-		N/A
		FL_y (cm)		-	3.50	-		N/A
	$I_{PA.3}@MI_{max}$	(W/cm^2)	23.38					
Operating Control Conditions	Focus Depth(mm)		60	-	60	-	60	N/A
	Display Depth(mm)		68	-	68	-	68	N/A
	Working Frequency(MHz)		5.5	-	5.5	-	5.5	N/A
	ScanAngle		Level 0	-	Level 0	-	Level 0	N/A

Acoustic Output Reporting Table for Track3

Transducer Model: VL8-3WD

Operating Mode: B+M

Index Label			MI	TIS			TIB	TIC
				scan	non-scan		non-scan	
					$A_{aprt}\leq 1$	$A_{aprt}>1$		
Global Maximum Index Value			0.42	0.15	0.050	-	0.090	N/A
Associated Acoustic Parameters	$p_{r.3}$	(MPa)	0.90					
	W_0	(mW)		6.84	2.33		2.33	N/A
	Min of[$W_{.3}(z_1)$, $I_{TA.3}(z_1)$]	(mW)				-		
	z_1	(cm)				-		
	z_{bp}	(cm)				-		
	z_{sp}	(cm)					0.80	
	z@PII$_{.3max}$	(cm)	7.93					
	$d_{eq}(Z_{sp})$	(cm)					0.43	
	f_c	(MHz)	4.54	4.54	4.54	-	4.54	N/A
	Dim of A_{aprt}	X(cm)		0.3792	0.3792	-	0.3792	N/A
		Y (cm)		0.58	0.58	-	0.58	N/A
Other Information	PD	(usec)	0.27					
	PRF	(Hz)	2130.00					
	p_r@PII_{max}	(MPa)	0.97					
	d_{eq}@PII_{max}	(cm)					0.29	
	Focal Length	FL_x (cm)		6.00	6.00	-		N/A
		FL_y (cm)		3.50	3.50	-		N/A
	$I_{PA.3}$@MI_{max}	(W/cm^2)	23.38					
Operating Control Conditions	Focus Depth(mm)		60	60	60	-	60	N/A
	Display Depth(mm)		68	68	68	-	68	N/A
	Working Frequency(MHz)		5.5	5.5	5.5	-	5.5	N/A
	ScanAngle		Level 0	Level 0	Level 0	-	Level 0	N/A

Acoustic Output Reporting Table for Track3

Transducer Model: VL8-3WD

Operating Mode: PW

Index Label			MI	TIS			TIB	TIC
				scan	non-scan		non-scan	
					$A_{aprt}\leq 1$	$A_{aprt}>1$		
Global Maximum Index Value			0.32	-	0.24	-	0.45	N/A
Associated Acoustic Parameters	$p_{r.3}$	(MPa)	0.65					
	W_0	(mW)		-	12.63		12.63	N/A
	Min of[$W_{.3}(z_1)$, $I_{TA.3}(z_1)$]	(mW)				-		
	z_1	(cm)				-		
	z_{bp}	(cm)				-		
	z_{sp}	(cm)					1.10	
	z@PII$_{.3max}$	(cm)	1.70					
	$d_{eq}(Z_{sp})$	(cm)					0.42	
	f_c	(MHz)	4.00	-	4.00	-	4.00	N/A
	Dim of A_{aprt}	X(cm)		-	0.3792	-	0.3792	N/A
		Y (cm)		-	0.58	-	0.58	N/A
Other Information	PD	(usec)	0.90					
	PRF	(Hz)	4558.50					
	p_r@PII_{max}	(MPa)	0.82					
	d_{eq}@PII_{max}	(cm)					0.36	
	Focal Length	FL_x (cm)		-	6.00	-		N/A
		FL_y (cm)		-	3.50	-		N/A
	$I_{PA.3}$@MI_{max}	(W/cm^2)	14.12					
Operating Control Conditions	Focus Depth(mm)		60	-	60	-	60	N/A
	Display Depth(mm)		68	-	68	-	68	N/A
	Working Frequency(MHz)		4.0	-	4.0	-	4.0	N/A

TRACK3（FDA Guidance） and IEC60601-2-37 standard parameter equal contrast list		
TRACK3 parameter	**IEC60601-2-37 parameter**	**NOTE**
$p_{r.3}$	$p_{r.\alpha}$	Attenuated Peak-rare-factional Acoustic Pressure
p_r	p_r	Peak-rare-factional Acoustic Pressure
W_0	P	Output Power
z_1	z_s	Depth for Soft Tissue Thermal Index
$W_{.3}(z_1)$	$P_\alpha(Z_s)$	Attenuated Output Power
$I_{TA.3}(z_1)$	$I_{ta.\alpha}(Z_s)$	Attenuated Temporal-average Intensity
z_{bp}	z_{bp}	Break-point Depth
z_{sp}	z_b	Depth for Bone Thermal Index
PII.3	$I_{pi.\alpha}$	Attenuated Pulse-intensity Integral
PII	I_{pi}	Pulse-intensity Integral
$d_{eq}(Z_{sp})$	$d_{eq}(Z_b)$	Equivalent Beam Diameter at the point of Z_{sp}
f_c	f_{awf}	Center Frequency, Acoustic Working Frequency
X	X	-12dB Output Beam Dimensions
Y	Y	
PD	t_d	Pulse Duration
PRF	prr	Pulse Repetition Frequency (Pulse Repetition Rate)
d_{eq}	d_{eq}	Equivalent Beam Diameter
FL_x	FL_x	Focal Length
FL_y	FL_y	
$I_{PA.3}@MI_{max}(W/cm^2)$	$I_{pi.\alpha}$ at max MI	Attenuated Pulse-average Intensity at the point of Maximum MI
A_{aprt}	A_{aprt}	-12dB Output Beam Area
MI	MI	Mechanical Index
TIS	TIS	Soft Tissue Thermal Index
TIB	TIB	Bone Thermal Index
TIC	TIC	Cranial-bone Thermal Index

WARNING

The device is not intended for ophthalmic use. Do not use it for examining ophthalmic vessels, or any other procedures which may cause the ultrasound beam to pass through the eye.

Appendix III: Measurement Accuracy

Parameter	Range	Accuracy
Image depth range	C361-2: 19mm-324mm L743-2: 19mm-117mm L761-2: 29 mm-120mm C611-2: 29mm-157mm V563-2: 19mm-176mm C321-2: 29mm-245mm VL8-3WD: 29mm-285mm	<±4% of full scale
M mode Time Range	1s, 2s, 4s, 8s	<±3% of full scale
TI	\	< ± 10%
Two-dimension Measurement		
Distance/depth	up to 324 mm	< ±5%
Area (Trace)	up to 720 cm^2	< ±10%
Area (Ellipse)	up to 720 cm^2	< ±8%
Angle	0º to 180º	< ±3%
Ratio (A>B)		
-Result B/A and (A-B)/A -Result A/B	up to 1.0 1.0 to 99.9	< ±10% of A < ±10% of A
Time Motion (TM) Measurement		
Depth	up to 324 mm	< ±4%
Time	up to 25 sec	< ± 5%
Heart rate	15 to 999 bpm	< ±5%
Velocity (ratio)	up to 999 mm/sec	< ±5%
Volume Measurement		
Volume (area, length, diameter)	up to 999 cm^3	< ±15%
Thyroid gland volume	up to 999 cm^3	< ±15%
Bladder volume	up to 999 cm^3	< ±15%
Residual urine volume	up to 999 cm^3	< ±15%
Prostate volume	up to 999 cm^3	< ±15%
PW measurement		
Velocity	5 ~ 480 cm/s	< ±10%

Appendix IV: EMC Information-Guidance and Manufacture's Declaration

Guidance and manufacture's declaration-electromagnetic emissions-
For all EQUIPMENT and SYSTEMS

NOTE:

To protect from EMI, please leave the DUS 60 VET system away from the EMI sources. For the technical reasons, electromagnetic immunity is limited to 1 Vrms, otherwise, the interfaced images may affect the diagnosis and measurements.

Guidance and manufacture's declaration-electromagnetic emission		
The DUS 60 VET is intended for use in the electromagnetic environment specified below; The customer or the user of the DUS 60 VET should assure that it is used in such and environment.		
Emission test	Compliance	Electromagnetic environment-guidance
RF emissions CISPR 11	Group 1	The DUS 60 VET 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 A	The DUS 60 VET is suitable for use in all establishments, other than domestic and those directly connected to the public low-voltage power supply network that supplies building used for domestic purposes.
Harmonic emissions IEC 61000-3-2	Class A	
Voltage fluctuations/flicker emissions IEC 61000-3-3	Complies	

Guidance and manufacture's declaration – electromagnetic immunity – for all EQUIPMENT and SYSTEMS

Guidance and manufacture's declaration – electromagnetic immunity			
The DUS 60 VET is intended for use in the electromagnetic environment specified below. The customer or the user of DUS 60 VET should assure that it is used in such an environment.			
Immunity test	IEC 60601 test level	Compliance level	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 floor 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	±2KV for power supply lines	Mains power quality should be that of a typical commercial or hospital environment.
Surge IEC 61000-4-5	±1 kV line to line ±2 kV line to ground	±1 kV line to line ±2 kV line to ground	Mains power quality should be that of a typical commercial or hospital environment.
Power frequency (50/60Hz) magnetic field IEC 61000-4-8	3A/m	3A/m	Power frequency magnetic fields should be at levels characteristic of a typical location in a typical commercial or hospital environment.
Voltage dips, short interruptions and voltage variations on power supply input lines IEC 61000-4-11	<5% UT (>95% dip in UT) for 0.5 cycle 40% UT (60% dip in UT) for 5 cycles 70% UT (30% dip in UT) for 25 cycles <5% UT (>95% dip in UT) for 5 sec	<5% UT (>95% dip in UT) for 0.5 cycle 40% UT (60% dip in UT) for 5 cycles 70% UT (30% dip in UT) for 25 cycles <5% UT (>95% dip in UT) for 5 sec	Mains power quality should be that of a typical commercial or hospital environment. If the user of the DUS 60 VET requires continued operation during power mains interruptions, it is recommended that the DUS 60 VET be powered from an uninterruptible power supply or a battery.
NOTE UT is the a.c. mains voltage prior to application of the test level.			

Guidance and manufacture's declaration – electromagnetic immunity – for EQUIPMENT and SYSTEMS that are not LIFE-SUPPORTING

Guidance and manufacture's declaration – electromagnetic immunity			
The DUS 60 VET is intended for use in the electromagnetic environment specified below. The customer or the user of the DUS 60 VET should assure that it is used in such an environment.			
Immunity test	IEC 60601 test level	Compliance level	Electromagnetic environment -guidance
Conducted RF IEC 61000-4-6	3 Vrms 150 kHz to 80 MHz	3Vrms	Portable and mobile RF communications equipment should be used no closer to any part of the DUS 60 VET, including cables, than the recommended separation distance calculated from the equation applicable to the frequency of the transmitter. Recommended separation distance $d = 1.2\sqrt{P}$ 150kHz to 80MHz
Radiated RF IEC 61000-4-3	3 V/m 80 MHz to 2.5 GHz	3 V/m	$d = 1.2\sqrt{P}$ 80MHz to 800MHz $d = 2.3\sqrt{P}$ 800MHz 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 metres (m). Field strengths from fixed RF transmitters, as determined by an electromagnetic site survey,[a] should be less than the compliance level in each frequency range.[b] Interference may occur in the vicinity of equipment marked with the following symbol: 
NOTE 1: At 80 MHz and 800 MHz, the higher frequency range applies. **NOTE 2:** These guidelines may not apply in all situations. Electromagnetic propagation is affected by absorption and reflection from structures, objects and people.			
[a] Field strengths from fixed transmitters, such as base stations for radio (cellular/cordless) 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 the DUS 60 VET is used exceeds the applicable RF compliance level above, the DUS 60 VET should be observed to verify normal operation. If abnormal performance is observed, additional measures may be necessary, such as reorienting or relocating the DUS 60 VET [b] Over the frequency range 150 kHz to 80 MHz, field strengths should be less than 3 *V/m*.			

Recommended separation distances between portable and mobile RF communication equipment and the EQUIPMENT or SYSTEM- For EQUIPMENT or SYSTEM that are not LIFE-SUPPORTING

Recommended separation distances between portable and mobile RF communications equipment and the DUS 60 VET

The DUS 60 VET is intended for use in an electromagnetic environment in which radiated RF disturbances are controlled. The customer or the user of the DUS 60 VET can help prevent electromagnetic interference by maintaining a minimum distance between portable and mobile RF communications equipment (transmitters) and the DUS 60 VET as recommended below, according to the maximum output power of the communications equipment.

Rated maximum output power of transmitter (W)	Separation distance according to frequency of transmitter (m)		
	150kHz ～ 80MHz $d = 1.2\sqrt{P}$	80MHz ～ 800MHz $d = 1.2\sqrt{P}$	800MHz～ 2.5GHz $d = 2.3\sqrt{P}$
0.01	0.12	0.12	0.23
0.1	0.38	0.38	0.73
1	1.2	1.2	2.3
10	3.8	3.8	7.3
100	12	12	23

For transmitters rated at a maximum output power not listed above, the recommended separation distance d in meters (m) can be estimated using the equation applicable to the frequency of the transmitter, where P is the maximum output power rating of the transmitter in watts (W) according to the transmitter manufacturer.

NOTE 1: At 80 MHz and 800 MHz, the separation distance for the higher frequency range applies.

NOTE 2: These guidelines may not apply in all situations. Electromagnetic propagation is affected by absorption and reflection from structures, objects and people.

Appendix V: Order List

The following accessories are recommended to be used on the DUS 60 VET.

WARNING

Probes and other accessories used on the DUS 60 VET must be provided or recommended by the manufacturer. Otherwise, the device may be damaged.

Part Name	Part Number
Probe C361-2	02.01.214005
Probe L761-2	02.01.214007
Probe C611-2	02.01.214006
Probe L743-2	02.01.214008
Probe V563-2	02.01.210986
Probe C321-2	02.01.214009
Probe VL8-3WD	02.01.213528
Needle Guide Bracket Kit BGK-CR60	02.01.102338
Needle Guide Bracket Kit BGK-LA43	02.01.102355
Needle Guide Bracket Kit BGK-LA70	02.01.102899
Needle Guide Bracket Kit BGK-MCR10	02.01.116248
Needle Guide Bracket Kit BGK-CR20	02.01.102380
Rechargeable Lithium-Ion battery	01.21.064356
Freeze footswitch	21.10.027169
Mobile trolley	83.63.560172
Hand carried bag	01.56.465018
Luxury Hand carried bag	01.56.465619
Dustproof cloth	11.57.471026
U Disk / Netac, U208 (4G)	01.18.052245
Cable Holder	01.52.113229
Coupling gel holder	21.51.113131
Screw (M3×12)	11.19.057154
Ultrasound Gel	01.57.078001 01.57.078008

NOTE: The part name may vary depending on context, but the part number is constant.

Appendix VI: Glossary

Abbreviated	Description
Obstetrics	
EDC	Estimated Date of Confinement
MA	Menstrual Age
LMP	Last Menstrual Period
BBT	Basal Body Temperature
EFW	Estimated Fetal Weight
GS	Gestational Sac Diameter
CRL	Crown Rump Length
BPD	Biparietal Diameter
HC	Head Circumference
AC	Abdominal Circumference
FL	Femur Length
AFI	Amniotic Fluid Index
TAD	Transverse Abdominal Diameter/Transverse Trunk Diameter
APAD	Antero Posterior Abdominal Diameter
CER	Cerebellum Diameter
FTA	Fetus Trunk cross section Area
HUM	Humerus Length
OFD	Occipital Frontal Diameter
THD	Thorax Diameter
Umb A	Umbilical Artery
MCA	Middle Cerebral Artery
Fetal AO	Fetal Aorta
Desc.AO	Descending Aorta
Placent A	Placent Aorta
Ductus V	Ductus Venosus
FBP	Fetal Biophysical Profile
Cardiology	
LVIDd	Left Ventricle Internal Diameter (end diastolic)
LVIDs	Left Ventricle Internal Diameter (end systolic)
HR	Heart Rate
ESV	End Systolic Volume
SV	Stroke volume
CO	Cardiac Output
EF	Ejection fraction (M mode)
FS	Fractional Shortening
SI	Stroke Index
CI	Cardiac Index

MVCF	Mean Velocity Circumferential Fiber Shortening
BSA	Body Surface Area
AOD	Aortic root Diameter
LAD	Left Atrium Diameter
LAD/AOD	Left Atrium Diameter / Aortic root Diameter
CA	Cardiac cycle apex A
CE	Cardiac cycle apex E
CA/CE	The ratio of CA to CE
EF SLP	Ejection Fraction Slope
ACV	AC Decreasing Velocity
DEV	Deceleration Velocity
DCT	Deceleration Time
MAVO1	Aortic Valve Volume Opened, beginning
MAVO2	Aortic Valve Volume Opened, ending
AA	Aortic Amplitude
LVMW	Left Ventricular Muscle Weight
AVSV	Aortic Valve Stoma Valve flow
QMV	Mitral Valve Flow
LVLd	Left Ventricle Long-axle Diameter (end diastolic)
LVALd	Left Ventricle Area of Long-axle (end diastolic)
LVLs	Left Ventricle Long-axle Diameter (end systolic)
LVALs	Left Ventricle Area of Long-axle (end systolic)
LVET	Left Ventricular Ejection Time
Gynecology	
UT	Uterus
UT-L	Uterus Length
UT-W	Uterus width
UT-H	Uterus Height
Endo	Uterus Endo-membrane Thickness / Endometrium
L. OV-Vol	Left Ovary Volume
L. OV-L	Left Ovary Length
L. OV-W	Left Ovary Width
L. OV-H	Left Ovary Height
R. OV-Vol	Right Ovary Volume
R. OV-L	Right Ovary Length
R. OV-W	Right Ovary Width
R. OV-H	Right Ovary Height
L. FO-L	Left Follicle Length
L. FO-W	Left Follicle Width
R. FO-L	Right Follicle Length
R. FO-W	Right Follicle Width
CX-L	Cervix Length
UT-L/CX-L	Uterus Length / Cervix Length

L UT A	Left Uterus Aorta
R UT A	Right Uterus Aorta
L OV A	Left Ovary Aorta
R OV A	Right Ovary Aorta
Small Parts	
THY	Thyroid Gland
L. THY-V	Left Thyroid Gland Volume
L. THY-L	Left Thyroid Gland Length
L. THY-W	Left Thyroid Gland Width
L. THY-H	Left Thyroid Gland Height
R. THY-V	Right Thyroid Gland Volume
R. THY-L	Right Thyroid Gland Length
R. THY-W	Right Thyroid Gland Width
R. THY-H	Right Thyroid Gland Height
Urology	
RUV	Residual Urine Volume (mL or L)
RUV-L	Residual Urine Length
RUV-W	Residual Urine Width
RUV-H	Residual Urine Height
PV	Prostate Volume (mm3, cm3, or dm3)
PV-L	Prostate Length
PV-W	Prostate Width
PV-H	Prostate Height
SPSA	Serum of Prostate Specific Antigen
PPSA	Predicted Prostate Specific Antigen Density
PSAD	Prostate Specific Antigen Density
Pediatric	
HIP	Hip joint
Vascular	
CCA	Common Cartid Artery
ICA	Internal Cartid Artery
ECA	External Cartid Artery
Vert A	Vertebral Artery
Others	
TI	Thermal Index
MI	Mechanical Index
TIS	Soft-tissue thermal index
TIB	Bone thermal index
TIC	Cranial-bone thermal index

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